

PHASE IB ENVIRONMENTAL INVESTIGATION REPORT

ST. HELENS PHASE I LAGOON REPURPOSING



Prepared for
CITY OF ST. HELENS
ST. HELENS, OREGON
November 8, 2023
Project No. M0830.03.006

Prepared by
Maul Foster & Alongi, Inc.
3140 NE Broadway Street, Portland, OR 97232

PHASE IB ENVIRONMENTAL INVESTIGATION REPORT

ST. HELENS PHASE I LAGOON REPURPOSING

The material and data in this report were prepared under the supervision and direction of the undersigned.

MAUL FOSTER & ALONGI, INC.



EXPIRES: 6/1/2024
This digital seal certifies the signatory and document content.

David Weatherby, RG
Principal Geologist

A handwritten signature in blue ink, appearing to read "Cody Schweitzer".

Cody Schweitzer
Project Environmental Scientist

CONTENTS

TABLES AND ILLUSTRATIONS	V
ACRONYMS AND ABBREVIATIONS	VI
1 INTRODUCTION	1
1.1 REGULATORY FRAMEWORK	1
1.2 INVESTIGATION OBJECTIVE	1
2 BACKGROUND	2
2.1 SITE DESCRIPTION	2
2.2 SITE HISTORY	2
3 PHASE IB SCOPE OF WORK	3
3.1 SITE INVESTIGATION OBJECTIVES	3
3.2 DEVIATIONS FROM THE PHASE IB SCOPE OF WORK	3
3.3 PHASE IB SCOPE OF WORK	4
3.4 SAMPLE HANDLING PROCEDURES	8
3.5 ANALYTICAL METHODS	8
3.6 DECONTAMINATION PROCEDURES	9
3.7 INVESTIGATION-DERIVED WASTES	10
3.8 FIELD QUALITY CONTROL SAMPLES	10
3.9 DATA QUALITY ASSURANCE AND QUALITY CONTROL REVIEW	10
4 RESULTS	11
4.1 SHALLOW AND DEEP LAGOON SLUDGE RESULTS	11
4.2 RECONNAISSANCE GROUNDWATER RESULTS	13
4.3 MONITORING WELL GROUNDWATER RESULTS	14
4.4 GEOLOGY AND HYDROGEOLOGIC CONCEPTUAL SITE MODEL	16
5 GEOTECHNICAL INVESTIGATION	19
LIMITATIONS	
REFERENCES	
TABLES	
FIGURES	
APPENDIX A	
BORING LOGS	
APPENDIX B	
FIELD SAMPLING DATA SHEET	
APPENDIX C	
LAB REPORTS	
APPENDIX D	
DATA VALIDATION MEMORANDA	
APPENDIX E	
PHOTO LOG	

CONTENTS (CONTINUED)

APPENDIX F
GRI REPORT

TABLES AND ILLUSTRATIONS

FOLLOWING REPORT:

TABLES

- 4-1 SUMMARY OF WASTEWATER LAGOON SLUDGE ANALYTICAL RESULTS
- 4-2 SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
- 4-3 GROUNDWATER ELEVATION DATA

FIGURES

- 1-1 SITE LOCATION
- 3-1 BORING, MONITORING WELL, AND ISM SAMPLE LOCATIONS
- 4-1 SITE GEOLOGY
- 4-2 GENERALIZED GEOLOGIC CROSS SECTION A-A'
- 4-3 GENERALIZED GEOLOGIC CROSS SECTION B-B'
- 4-4 GENERALIZED GEOLOGIC CROSS SECTIONS C-C'
- 4-5 FEBRUARY 2023 GROUNDWATER ELEVATIONS

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
Apex	Apex Laboratories LLC
the City	City of St. Helens
COC	chain of custody
CRBG	Columbia River Basalt Group
DEQ	Oregon Department of Environmental Quality
DO	dissolved oxygen
DU	decision unit
EPA	U.S. Environmental Protection Agency
FSDS	field sampling data sheet
GPS	global positioning satellite
HCSM	hydrogeologic conceptual site model
ISM	incremental sampling methodology
m/s	meters per second
MFA	Maul Foster & Alongi, Inc.
OAR	Oregon Administrative Rules
ORP	oxidation-reduction potential
PCB	polychlorinated biphenyl
PFAS	polyfluorinated substances
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RBC	risk-based concentrations
SB	Sentinel Bluffs
the site	451 Plymouth Street, St. Helens, Oregon
Sonic	rotasonic
SVOC	semivolatile organic compound
TEQ	toxicity equivalence quotient
TOC	top of casing
TPH	total petroleum hydrocarbons
VOC	volatile organic compound
WW	Winter Water

1 INTRODUCTION

Maul Foster & Alongi, Inc. (MFA) has prepared this report for the City of St. Helens (the City) documenting the results of an environmental investigation conducted at the wastewater treatment lagoon located at 451 Plymouth Street, St. Helens, Oregon (the site; see Figure 1-1). The investigation generated additional information about the site geology, hydrogeology, and chemistry necessary for the repurposing of the lagoon.

1.1 Regulatory Framework

The site currently serves as the St. Helens wastewater treatment lagoon. The City is exploring repurposing the lagoon into a nonmunicipal-waste facility for receiving sediment, soil, and wastewater treatment sludge. The first phase of the lagoon repurposing project, referred to as Phase I, includes initial site characterization, conceptual design, and permitting. These activities are necessary for progress toward conditional permit approval from the Oregon Department of Environmental Quality (DEQ) under Oregon Administrative Rules (OAR) 340-093 for the conversion of the St. Helens wastewater treatment lagoon. In addition, OAR 340-94-0080, OAR 340-0040, and 40 Code of Federal Regulations Part 258 address groundwater hydrology, quality, and groundwater monitoring.

The environmental investigation described in this report is a continuation of the Phase I activities initiated by the City in 2019. In July through September 2019, MFA completed various Phase I site investigation activities to understand baseline conditions at and in the vicinity of the lagoon, including the site geology and hydrogeology. That investigation included drilling six exploratory borings completed as monitoring wells (MW-1 through MW-6): two on the basalt bluff west of the lagoon and four on the lagoon dike; water level monitoring; groundwater sampling; and aquifer testing.

The results of the Phase I investigation were provided in the Phase I Site Characterization Report (MFA 2020). The DEQ responded to the Phase I report, identifying certain data gaps it believed had not been sufficiently addressed after the initial Phase I investigation (DEQ 2020a, 2020b). The environmental investigation documented in this report, referred to as Phase IB, was conducted to address data gaps identified by the DEQ. The scope of work for Phase IB, including field procedures, sample locations, analytical methods, and quality assurance and quality control (QA/QC) procedures, is described in the Phase IB environmental investigation work plan (MFA 2022).

The Phase IB work was conducted, and this report was prepared, under the Community Wastewater Treatment Resiliency grant 5327-11-R awarded to the City by the Federal Emergency Management Agency.

1.2 Investigation Objective

The objective of the Phase IB investigation was to collect data to further advance the initial understanding of the geologic and hydrogeologic characteristics of the site while addressing data gaps

identified by the DEQ after the completion of the previous Phase I, consistent with the requirements of OAR 340-093-0130(4)(a-d). Data to support this objective were collected to assess subsurface soil conditions in and beneath the lagoon and groundwater conditions beneath and adjacent to the lagoon.

In addition to the Phase IB investigation conducted by MFA, Geotechnical Resources, Inc. (GRI) conducted a second phase of geotechnical investigation to supplement the initial phase completed in 2019 and presented in the Phase I report. A brief summary of the 2023 geotechnical investigation findings is provided in Section 5.

2 BACKGROUND

2.1 Site Description

The site is located in Columbia County, in sections 3 and 10 of township 4 north, range 1 west of the Willamette Meridian, and along the west bank of the Multnomah Channel just south of its confluence with the Columbia River (Figure 1-1). The site is occupied by the City's sewage treatment plant and its associated wastewater treatment lagoon. The lagoon encompasses approximately 40 acres and is 21 feet deep. Wastewater treatment lagoon design drawings indicate that the bottom of the lagoon lies at an elevation of about 7 feet. The north and west margins of the lagoon perimeter are defined by a basalt bedrock bluff rising steeply to elevations of 40 to 80 feet. The northeast, east, and south margins of the lagoon consist of a constructed dike. The top of the dike lies at an elevation of 31 feet.

The lagoon is bordered on the east by the Multnomah Channel, a distributary channel of the Willamette River; on the west by a residential neighborhood; to the north by the former Boise Cascade Veneer site, the Nob Hill Nature Park, and a National Guard Armory; and to the south by the former Boise Cascade pulp and paper mill.

2.2 Site History

The sewage treatment plant and wastewater treatment lagoon were constructed in 1969, per an agreement between the City and Boise Cascade (the operator of the paper mill south of the site at that time). The site facilities were used for treatment of both municipal and paper mill effluent wastes. Historically, mill effluent comprised the majority of wastewater treated at the site. In 2009, wood pulping at the mill ceased, resulting in a reduction of mill effluent, which now comprises about 70 percent of wastewater treated at the site. The City's sewage treatment plant effluent comprises the remainder.

3 PHASE IB SCOPE OF WORK

This section provides a brief summary of the objectives, followed by a description of each field investigation activity completed. The objectives; scope of work; and field, laboratory, and QC methodologies are described in detail in the Phase IB work plan. As described below, field conditions, drilling rig access, and direction from the City necessitated deviations from the scope of work described in the Phase IB work plan.

3.1 Site Investigation Objectives

The Phase IB environmental investigation was completed to address the following objectives:

1. Assess baseline conditions for metals and anthropogenic organic chemicals potentially present in sludges currently present in the lagoon.
2. Develop a better understanding of the geology and hydrogeology beneath the lagoon and the hydraulic connectivity between interflow zones in basalt bedrock to the west of the lagoon and alluvium to the east of the lagoon.
3. Assess baseline conditions for metals and anthropogenic organic chemicals potentially present in groundwater.

3.2 Deviations from the Phase IB Scope of Work

The following is a summary of deviations from the Phase IB work plan.

3.2.1 Drilling Methods and Boring Locations

The Phase IB work plan scope of work included advancement of two borings in the lagoon, using a rotosonic (sonic) drill rig operated from a barge. Doing so would have required moving the City's water-quality baffles in the lagoon to allow the barge to access the proposed boring locations while also avoiding shallow areas in the lagoon. The City later determined that the baffles could not be moved due to their physical condition. Navigating the barge around the baffles in shallow water was not possible due to the deep draft of the barge required for the sonic drilling rig.

Instead, six borings were advanced using a direct-push drilling rig operated from a barge as described in Section 3.3.2 below. Owing to its small size and lighter weight compared to a sonic drilling rig, the depth requirement for the barge was less, and the barge could be navigated through shallow-water areas around the ends of the baffles.

Owing to this deviation, the following activities proposed in the Phase IB work plan were not completed:

- Because the direct-push drilling rig cannot drill into rock, the physical and hydrogeologic properties in the basalt underlying the lagoon were not observed or assessed.
- Standard penetration tests and collection of undisturbed Shelby tube samples were not completed in the soil under the lagoon.
- Specific capacity tests were not completed in the basalt.
- Aquifer testing (pneumatic slug tests) was not completed in the basalt.

3.2.2 Deep Sludge Sample Collection

The Phase IB work plan scope of work included collection of a lagoon sludge sample from the bottom of the sludge interval at each of the two proposed sonic borings for laboratory analysis. Instead, five sludge samples were collected from the bottom of the sludge interval at each of the five direct-push borings MFA B-1 through MFA B-5 (no sample was collected from boring MFA B-3A). Rather than analyzing each individual sample as proposed in the Phase IB work plan, the five samples were composited into a single sample for laboratory analysis, as described further in Section 3.3.2 below.

3.2.3 Reconnaissance Groundwater Sample Collection

The Phase IB work plan scope of work included collection of a reconnaissance groundwater sample from the basalt in each of the two proposed sonic borings for laboratory analysis. Because the direct-push drilling rig cannot drill in rock, reconnaissance groundwater samples were not collected in the basalt.

Instead, as described in Section 3.3.3 below, a reconnaissance groundwater sample was collected from a sandy water-bearing zone within the alluvium directly underlying the lagoon at boring MFA-B3A. At the other four direct-push boring locations, a reconnaissance groundwater sample was not collected because at two boring locations, basalt was present immediately under the lagoon, and at the other two locations, the alluvium under the lagoon consisted of soft, moist silt; no sandy water-bearing zones with sufficient groundwater for sample collection were encountered within the depth drilled.

3.2.4 Analysis for Per- and Polyfluorinated Substances

At the request of the City, analysis for per- and polyfluorinated substances (PFAS) was added to the analytical program for all samples collected, including the lagoon sludge samples, the reconnaissance groundwater sample, and the groundwater samples collected from monitoring wells. The analytical methods for the Phase IB investigation are described in Section 3.5 below.

3.3 Phase IB Scope of Work

3.3.1 Shallow Lagoon Sludge Sample Collection

To address the first investigation objective above, an incremental sampling methodology (ISM) approach (DEQ 2020c) was used to collect a representative sample of the lagoon sludge. ISM is a

structured composite sampling and processing protocol that reduces data variability, thereby increasing data representativeness. ISM is appropriate when attempting to establish average chemical concentrations in a single medium over a large area, as was the objective for the lagoon sludge sampling. ISM provides a single sample for analysis with a concentration representative of the mean concentration in a predefined area termed a decision unit (DU). For this project, the entire lagoon is defined as a single DU, referred to in this work plan as DU1.

The lagoon sludge ISM sampling was completed on August 10, 2022. Fifty incremental samples were collected at the approximate locations shown on Figure 3-1, using a clam shell sampling device, from the upper portion of the sludge column. The 50 locations were placed along ten east-west-oriented transects spanning the width and length of DU1. Global positioning satellite (GPS) coordinates were generated for each location and input into a GPS handheld device with a horizontal accuracy of less than 10 feet. The locations were accessed from a powered barge operated by the City. MFA directed the barge to each location, using the GPS device. A few locations were moved a few feet to avoid baffles and aerators in the lagoon, or because of poor sample recovery in the initial sample collected.

Upon retrieval, each sludge sample was inspected to ensure the sampling device was completely closed and retained all material. Fifty 4-ounce increments were collected from DU1. Each 4-ounce increment was collected from the sampling device, using a 1/2-cup stainless steel measuring cup, which resulted in approximately 4 ounces of sludge. Each 4-ounce increment was then placed into a total of two 1-gallon glass jars provided by the laboratory and stored in an iced cooler until sample collection was complete.

In addition, for volatile organic compound (VOC) analysis, a 5-gram sample was collected from the sampling device at each ISM location, using U.S. Environmental Protection Agency (EPA) Method 5035, and placed in a single 500-milliliter methanol-preserved glass jar provided by the laboratory and stored in an iced cooler until sample collection was complete.

An additional 50 1-ounce increments were collected and placed into a single 1-gallon glass jar for percent moisture determination. To best represent the field condition of the material, which was very wet, the percent moisture container was not decanted. The 4-ounce increment sample containers were decanted by pouring off the separated liquid from the top of the container.

At the completion of the ISM sample collection, the iced cooler containing the three 1-gallon glass jars and 500-milliliter glass jar were submitted under chain of custody (COC) to Apex Laboratories LLC (Apex) in Tigard, Oregon, for analysis. Apex subcontracted a portion of the sample to both Weck Laboratories, Inc., in California and Bureau Veritas in Ontario, Canada.

Apex air dried, sieved, ground, and homogenized the entire sample and collected a single aliquot for analysis, following industry-standard methods for ISM sample processing. The final ID for the ISM sludge sample analyzed is DU1-20220810-ISM-COMP. Sludge sample analytical methods are listed in Section 3.5.

3.3.2 Drilling and Deeper Lagoon Sludge Sample Collection

From January 30 through February 7, 2023, six borings identified as MFA B-1 through MFAB-5 and MFA B-3A, were advanced in the lagoon at the locations shown on Figure 3-1. MFA B-3A was drilled adjacent to MFA B-3 due to poor recovery in the initial boring in the alluvium directly under the lagoon. Once all other borings were completed and the core recovery method had become more effective, MFA B-3A was drilled to recover soil from the missing interval at MFA B-3 from a depth of 3 to 14.5 feet. All borings were advanced using a direct-push drilling rig operated by Cascade Drilling of Clackamas, Oregon, a well constructor licensed in Oregon. The drilling rig was a Geoprobe 7822DT direct-push drill rig equipped with 2.25-inch-diameter, 5-foot-long macrocore soil sampling device.

Changes in the lithology of the core were recorded on the boring logs provided in Appendix A. Lagoon sludge was encountered at all borings. At borings MFA B-1 and MFA B-2, the boring terminated on basalt directly under the lagoon sludge. At borings MFA B-3 through MFA B-5 and MFA B-3A, alluvium was present under the sludge and described in accordance with the Unified Soil Classification System. Borings MFA B-3 and MFA B-4 terminated in alluvium at 110 feet below the lagoon bottom (defined as the top of the sludge), MFA B-3A terminated in alluvium at 21.5 feet below the lagoon bottom, and MFA B-5 terminated on basalt at 30.25 feet below the lagoon bottom.

Lagoon sludge was observed at each boring with a distinct lower boundary under which either basalt or alluvium was encountered. MFA collected a sludge sample from the bottom of the sludge interval at each boring for laboratory analysis. The samples were collected in one unpreserved 1-gallon glass jar, two methanol-preserved 500-milliliter glass jars, and one 250-milliliter unpreserved high-density polyethylene container and submitted under COC to Apex for analysis.

Apex air dried, sieved, ground, and homogenized the entire sample and collected a single aliquot for analysis, following the same industry-standard methods used for the ISM sample processing described in Section 3.3.1 above. The final ID for the deeper sludge sample analyzed is MFA-B1-B5-COMP-SL. Sludge sample analytical methods are listed in Section 3.5.

3.3.3 Reconnaissance Groundwater Sample Collection

As described above, a reconnaissance groundwater sample was not collected from the basalt due to the change in drilling method. At borings MFA B-3 through MFA B-5, where alluvium was encountered under the lagoon, a soft silt was encountered below the lagoon at MFA B-3, MFA B-4, and MFA B-5. Since no obvious water-bearing zone was encountered below the lagoon at these three borings, MFA did not attempt to collect a reconnaissance groundwater sample.

At MFA B-3A, multiple sand layers were encountered between 3.3 and 9.0 feet under the lagoon bottom. The remainder of the boring to the final depth of 21.5 feet consisted of soft silt with no water-bearing zones. A reconnaissance groundwater sample was collected from a temporary polyvinyl chloride (PVC) well screen placed at a depth of 6 to 10 feet below the bottom of the lagoon, and across the sandy intervals. On the afternoon before the groundwater sample was collected, 2 to 3 gallons of water were purged from the well until it was dry. Then the water level in the borehole was

allowed to recover and stabilize overnight to a static level. The next morning, the depth to water was measured and recorded on the field sampling data sheet (FSDS) provided in Appendix B. Due to the water volume needed for the analytical methods, and the anticipation of poor groundwater recharge to the temporary well, no additional groundwater was purged from the well prior to sample collection. The groundwater sample was collected using a peristaltic pump, with new, PFAS-free disposable tubing. Prior to sampling and directly afterward, a single water quality parameter measurement was collected using a water quality meter to measure temperature, pH, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity. These parameters were recorded on the FSDS.

The reconnaissance groundwater sample was collected directly into laboratory-supplied containers, placed in iced coolers, and submitted under COC to Apex for analysis. The reconnaissance groundwater sample analytical methods are listed in Section 3.5.

3.3.4 Groundwater Sampling from Monitoring Wells

Groundwater samples were collected from the six existing monitoring wells MW-1 through MW-6. Prior to groundwater sample collection, the depth to groundwater was measured and recorded on the FSDS. The wells were purged with low-flow sampling methods (EPA 1996), using a peristaltic pump or submersible pump when required based on the depth to groundwater. The groundwater parameters temperature, pH, specific conductance, DO, ORP, and turbidity were measured periodically during purging and recorded on the FSDS. Groundwater samples were collected after three consecutive readings indicated that the groundwater parameters had stabilized in accordance with the stabilization criteria described in the Phase IB work plan. The samples were collected directly into laboratory-supplied containers, placed in iced coolers, and submitted under COC to Apex for analysis. Monitoring well groundwater sample analytical methods are listed in Section 3.5.

3.3.5 Groundwater Level Measurements

Water levels from boring MFA B-3A and monitoring wells MW-1 through MW-6 were measured using an electronic water level meter to the nearest 0.01 foot. The static water level was measured in the alluvium at lagoon boring MFA B-3A, where the reconnaissance groundwater sample was collected. The depth to groundwater in the boring was measured from the top of the temporary outer casing. At the same time, the outer casing height above the barge deck and the barge deck height above the surface water level of the lagoon were measured and the measurements recorded. The surface water elevation of the lagoon is measured continuously at an electronic gauge at the City's wastewater treatment plant; the elevation was 28 feet during the groundwater level measuring event. That surface water elevation measurement was added to the deck height above the lagoon water level plus the casing height above the deck to establish the top of casing (TOC) elevation. The depth to groundwater below the TOC elevation was subtracted from the TOC elevation to calculate a groundwater elevation of 15.3 feet in the boring. This calculation is explained in detail on the MFA B-3A boring log in Appendix A.

The depths to water in the monitoring wells were measured from the top of the PVC well casing at the surveyed elevation point, which was marked so that readings are consistently taken from the same

reference point. Water levels were measured and recorded on the water FSDS (Appendix B) at each well location before purging or sample collection activities. The water level meter was decontaminated between wells.

3.4 Sample Handling Procedures

MFA staff collected, labeled, described, handled, and documented the samples collected in general accordance with the Phase IB work plan. Samples and sample documentation were maintained in the physical possession of MFA field personnel until custody of the samples was signed over to the analytical laboratory. All samples collected were documented on the COCs included with the laboratory reports in Appendix C.

3.5 Analytical Methods

The shallow and deep lagoon sludge samples were analyzed for the following:

- Priority pollutant metals antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc, plus barium and manganese, by EPA Method 6020B.
- Hexavalent chromium by EPA Method 7196A.
- Gasoline-range hydrocarbons by Method NWTPH-Gx.
- VOCs by Method SW8260D.
- Low-level VOCs (analyzed together with the full list of EPA Method 8260D VOCs) by Method SW8260D-SIM.
- Diesel- and motor-oil-range hydrocarbons by Method NWTPH-Dx.
- Semivolatile organic compounds (SVOCs) by Method SW8270E.
- Polychlorinated biphenyl (PCB) congeners by EPA Method 1668C.
- Dioxins/furans by EPA Method 1613B, with confirmation by EPA Method 8290A.
- Chlorinated herbicides by Method SW8151A in the shallow sludge sample only. The deeper sludge sample had insufficient volume for all analytical methods. Since chlorinated herbicides were not detected in the shallow sludge sample, the deeper sludge sample was not analyzed for chlorinated herbicides.
- Organophosphorus pesticides by Method SW8270E.
- PFAS by ASTM D7968-17A.
- Low-level organochlorine pesticides by EPA Method SW8270E.

The reconnaissance groundwater sample and six monitoring well groundwater samples were analyzed for the following:

- Priority pollutant metals antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc, plus barium and manganese, by EPA Method 6020B.
- Hexavalent chromium by EPA Method 218.6.
- Gasoline-range hydrocarbons by Method NWTPH-Gx.
- VOCs by EPA Method SW8260D.
- Low-level VOCs (analyzed together with the full list of Method 8260D VOCs) by Method SW8260D-SIM.
- Diesel- and motor-oil-range hydrocarbons by Method NWTPH-Dx.
- SVOCs by EPA Method 8270E.
- PCB congeners by EPA Method 1668C.
- Dioxins/furans by EPA Method 1613B, with confirmation by EPA Method 8290A.
- Chlorinated herbicides by EPA Method 8151A.
- Organophosphorus pesticides by EPA Method 8270E.
- PFAS by EPA 537.1 Modified.
- Low-level organochlorine pesticides by EPA Method 1699

3.6 Decontamination Procedures

Nondedicated sampling equipment (the submersible pump and water level meter) were decontaminated using the following procedures:

- Rinse with water.
- Wash with nonphosphate detergent.
- Rinse with distilled water.
- Air dry.

For ISM sampling, decontamination was not required for nondedicated sampling equipment used in the same DU, since all incremental samples were composited.

To mitigate PFAS cross-contamination, the following procedures were followed during sampling:

- Field staff wore synthetic or 100 percent cotton clothing that had been well-laundered without fabric softener.
- Waterproof clothing was made with polyurethane, PVC, wax-coated fabric, rubber, or neoprene.
- Boots were made of polyurethane.

- Powderless nitrile gloves were worn.
- High-density polyethylene and silicone tubing was used for sample collection.
- Powderless nitrile gloves were worn during and changed between sample locations or when handling sample equipment.
- Sample container(s) remained sealed at all times and opened only during sample collection.
- Sample container caps and lids were never placed directly on the ground or facing downward.
- Method-specific sample preservation, thermal storage, and holding time requirements were followed.

3.7 Investigation-Derived Wastes

Excess sludge from the shallow sludge sampling event and sludge and soil from the five lagoon borings were returned to the lagoon, adjacent to each sample location. Purge water generated during reconnaissance groundwater sampling and groundwater sampling at monitoring wells MW-3 through MW-6 was discharged to the wastewater treatment lagoon. Purge water generated during groundwater sampling at monitoring wells MW-1 and MW-2 was discharged to the ground adjacent to each well and allowed to infiltrate.

3.8 Field Quality Control Samples

Field quality control samples collected included the following:

- **Field Duplicate:** During groundwater sample collection from the monitoring wells, a duplicate sample with the ID MW3-20230214-GW-35-DUP was collected from MW-3.
- **Temperature Blank:** A temperature blank provided by the laboratory was included in each cooler. All samples were placed into coolers with ice after sample collection to maintain a sample temperature of 4°C or less until receipt at the laboratory.
- **Trip Blank:** Trip blanks were used with all groundwater VOC sample delivery groups.

3.9 Data Quality Assurance and Quality Control Review

MFA evaluated the laboratory data for precision, completeness, accuracy, and compliance with the analytical method. MFA performed a Stage 2A validation, consistent with EPA's Superfund risk assessment guide (EPA 1989), and assigned data qualifiers to sample results, following applicable sections of the EPA procedures for data review (EPA 1986, 2014, 2020a, 2020b, 2020c).

The results of the data evaluation review for each data package are summarized in the data validation memoranda in Appendix D. Based on the validation results, the data, with the appropriate data qualifiers assigned, are considered acceptable for their intended use.

4 RESULTS

This section presents the results of the Phase IB investigation, which include the following:

- A description of the lagoon sludge encountered and shallow and deep sludge sample analytical results
- The results of the reconnaissance groundwater sample analysis
- The results of the monitoring well groundwater sample analysis
- A revised hydrogeologic conceptual site model (HCSM) based on a geologic literature review, and the results of the Phase I and Phase IB subsurface investigations

The sludge sample analytical results are summarized on Table 4-1 and compared to the DEQ human health risk-based concentrations (RBCs) for (1) construction and excavation worker soil ingestion, dermal contact, and inhalation, and (2) soil leaching to groundwater for residential tap water exposure.

The reconnaissance groundwater and monitoring well groundwater results are summarized on Table 4-2 and compared to DEQ human health RBCs for residential ingestion and inhalation of tap water and the following ecological RBCs:

- Freshwater RBC for protection of aquatic life, chronic
- Freshwater RBC for protection of aquatic life, acute
- Surface water RBC for wildlife ingestion of surface water, birds
- Surface water RBC for wildlife ingestion of surface water, mammals

Representative photographs of shallow sludge encountered during sampling and deeper sludge and soils encountered at the borings are included in Appendix E.

4.1 Shallow and Deep Lagoon Sludge Results

The lagoon sludge consisted of dark gray to black, very fine-grained and wet decomposed organic material. It was very loose with trace sheen, organic-like odor, and trace woody debris. By weight, the solids content in the shallow sludge material was 6.71 percent and increased to 19.2 percent in the deeper sludge.

As shown on Table 4-1, chlorinated herbicides, organophosphorus pesticides, and VOCs were not detected in the shallow sludge sample (sample ID DU1-20220810-ISM-COMP on Table 4-1). The following analytical groups were detected in the shallow sludge sample:

- Dioxins/furans: all but one congener were detected, and the dioxin/furan toxicity equivalence quotient (TEQ) exceeded the RBC for leaching to groundwater.
- Metals: 14 of 16 metals were detected. No metals concentrations exceeded RBCs.

- Organochlorine pesticides: four of 28 pesticides were detected. No organochlorine pesticide concentrations exceeded RBCs.
- PCB congeners: 80 of 164 congeners were detected. The total PCB congener concentration did not exceed the RBCs.
- PFAS: 18 of 32 compounds were detected; there are no RBCs to which the data can be compared.
- SVOCs: five SVOCs were detected. No SVOC concentrations exceeded RBCs.
- Total petroleum hydrocarbons (TPH): Only diesel-range hydrocarbons were detected at a concentration that exceeded the leaching to groundwater and construction worker RBCs. Gasoline- and lube-oil-range petroleum hydrocarbons were not detected.

As shown on Table 4-1, organophosphorus pesticides were not detected in the deeper sludge sample (sample ID MFA-B1-B5-COMP-SL on Table 4-1). The following analytical groups were detected in the deeper sludge sample:

- Dioxins/furans: all but one congener were detected, and the dioxin/furan TEQ exceeded the leaching to groundwater and construction worker RBCs.
- Metals: 14 of 16 metals were detected. Only lead was detected at a concentration that exceeded the leaching to groundwater RBC, but both the concentration and the RBC were less than the natural background concentration.
- Organochlorine pesticides: one of 28 pesticides was detected. No organochlorine pesticide concentrations exceeded RBCs.
- PCB congeners: 49 of 164 congeners were detected, and the total PCB congener concentration exceeded the leaching to groundwater RBC.
- PFAS: 14 of 32 compounds were detected; there are no RBCs to which the data can be compared.
- SVOCs: three of 77 SVOCs were detected. No SVOC concentrations exceeded RBCs.
- TPH: Only diesel-range hydrocarbons were detected at a concentration that exceeded the leaching to groundwater and construction worker RBCs. Gasoline- and lube-oil-range petroleum hydrocarbons were not detected.
- VOCs: Only toluene was detected, and it did not exceed the RBC.

In general, concentrations of dioxins/furans and PCBs were higher in the deeper sludge. Metals concentrations showed no consistent trend; seven metals had higher concentrations in the shallow sludge, and eight metals had higher concentrations in the deeper sludge. PFAS compounds were detected at somewhat higher concentrations in the shallow sludge. The remaining chemical groups had no detections or no obvious trend in concentration between the shallow and deeper sludge.

4.2 Reconnaissance Groundwater Results

The reconnaissance groundwater sample results from boring MFA B-3A are summarized on Table 4-2. Chlorinated herbicides, organophosphorus pesticides, and TPH were not detected in the sample. PCB congeners were also not detected, but the detection limits for the sample were elevated about an order of magnitude above the detection limits and the concentrations of PCB congeners detected in the groundwater samples from the monitoring wells. Therefore, PCB congeners may be present in the reconnaissance groundwater sample at concentrations less than the detection limits. The following analytical groups were detected:

- Total metals: all 16 metals were detected, of which 12 had concentrations that exceeded the residential tap water and/or the ecological RBCs.
- Dioxins/furans: 15 of 25 congeners were detected, of which the 2,3,7,8-TCDD concentration and the dioxin/furan TEQ exceeded the residential tap water and ecological RBCs. No RBCs are available for other dioxin/furan congeners.
- Organochlorine pesticides: 19 of 28 pesticides were detected, of which the 4,4'-DDT and total DDx concentrations exceeded the ecological RBCs.
- PFAS: seven of 32 compounds were detected; there are no RBCs to which the data can be compared.
- SVOCs: five of 77 SVOCs were detected at concentrations less than the RBCs.
- VOCs: four of 66 VOCs were detected at concentrations less than the RBCs.

Since the reconnaissance groundwater sample was collected at only 5 to 9 feet below the bottom of the lagoon sludge, MFA compared the sludge and reconnaissance groundwater results to assess whether chemicals detected in the reconnaissance groundwater are similar to those detected in the sludge. In general, chemical groups that had very few detections or no detections in the sludge (chlorinated herbicides, organophosphorus pesticides, SVOCs, and VOCs) were similarly not detected or had few detections in the reconnaissance groundwater sample.

Fewer dioxins/furans were detected in the reconnaissance groundwater sample compared to the sludge samples, consistent with the fact that dioxins/furans generally have a low solubility in water and tend to partition to organic carbon.

A greater number of organochlorine pesticides were detected in the reconnaissance groundwater sample compared to the sludge samples, but this may be due to detection limits for the water analysis, which were two to four orders of magnitude lower than the sludge samples analyses.

Fewer PFAS compounds were detected in the reconnaissance groundwater sample than the sludge samples. PFAS have a high solubility in water, but studies of the partitioning of PFAS to solid-phase materials such as organic carbon indicate that PFAS can partition to organic carbon, including in sewage solids. This may explain the fewer detections in the water analysis compared to the sludge samples.

As noted above, PCB congeners were detected in the sludge samples but not the reconnaissance groundwater sample, likely due to the elevated detection limits for the water analysis.

Diesel-range hydrocarbons were detected at a high concentration in the sludge but not detected in the reconnaissance groundwater sample. In general, diesel has a low solubility in water and may partition to organic carbon, which may explain its presence in the sludge but not the water.

Numerous metals were detected in both the sludge and the reconnaissance groundwater samples. Because metals occur naturally in soil, such as the silt and sand at the sample collection depth for the reconnaissance groundwater samples (see the MFA B-3A boring log in Appendix A), and because the reconnaissance groundwater sample was turbid (see the FSDS in Appendix B), the detection of metals in the groundwater sample may reflect the entrainment of soil particles into the sample, and may be unrelated to the metals content in the sludge.

4.3 Monitoring Well Groundwater Results

The monitoring well groundwater sample results are summarized on Table 4-2. Chlorinated herbicides, organophosphorus pesticides, and dioxins/furans were not detected in the sample. The following analytical groups were detected:

- Total metals: eight of 16 metals were detected, of which five had concentrations that exceeded the residential tap water and/or ecological RBCs.
- Organochlorine pesticides: 19 of 28 pesticides were detected at concentrations less than the RBC.
- PFAS: 11 of 32 compounds were detected; there are no RBCs to which the data can be compared.
- PCB congeners: ten of 164 congeners were detected, of which only the total PCB congener concentration at MW-1 exceeded an ecological RBC.
- SVOCs: 30 of 77 SVOCs were detected, three of them at concentrations that exceeded the residential tap water and ecological RBCs. Pentachlorophenol, a common wood-treating chemical, was detected at upgradient well MW-2. It was not detected in the lagoon sludge, the reconnaissance groundwater sample from MFA B-3A, or groundwater samples from the other monitoring wells. Its detection at MW-2 suggests a possible source of pentachlorophenol unrelated to the lagoon.
- TPH: Diesel- and lube-oil range hydrocarbons were detected at MW-4 through MW-6 at concentrations that exceeded the residential tap water RBCs.
- VOCs: three of 66 VOCs were detected. No VOC concentrations exceeded RBCs.

As described in the Phase I Site Characterization Report (MFA 2020), the groundwater flow direction at the site is east toward the Multnomah Channel based on groundwater elevations measured at MW-1 through MW-6. The Phase IB investigation confirmed the groundwater flow direction, as described further in Section 4.4.3 below. Since MW-1 and MW-2 are upgradient of the lagoon, MFA B-3A is

under the lagoon, and MW-3 through MW-6 are downgradient of the lagoon, MFA compared the groundwater sample data from these locations to assess whether the analytical results and distribution of chemicals in groundwater are consistent with groundwater flow to the east. The objective of this comparison is to assess whether chemicals possibly sourced from the lagoon are more frequently detected or detected at higher concentrations in downgradient wells versus upgradient wells. This comparison assumes that the aquifers in which the upgradient wells are screened are in direct hydraulic connection with the aquifers in which the downgradient wells are screened. As described further in Section 4.4.2, this may not be the case. The following is a summary of this comparison.

Metals

- Two metals, chromium and nickel, were detected at MFA B-3A and the downgradient wells, but not the upgradient wells.
- Arsenic, barium, manganese, and zinc were detected at MFA B-3A, and at higher concentrations at the downgradient wells compared to the upgradient wells.
- Only copper and lead were detected at slightly higher concentrations at upgradient well MW-2 compared to downgradient wells.
- In general, the metals data appear to confirm that the groundwater flow direction is to the east.

Organochlorine pesticides

- Three to seven pesticides were detected in the upgradient wells, 19 were detected at MFA B-3A, and four to 13 were detected at the downgradient wells.
- Some pesticide concentrations were slightly higher in the downgradient wells compared to the upgradient wells.
- The organochlorine pesticide data appear consistent with a groundwater flow direction to the east.

PFAS

- Seven PFAS were detected at MFA B-3A, and eight to 11 PFAS were detected at the downgradient wells, compared to no or two PFAS detections at the upgradient wells.
- Six of the seven PFAS detected at MFA B-3A were also detected at one or more downgradient wells.
- Only one of seven PFAS detected at MFA B-3A was also detected at one upgradient well.
- The PFAS data are consistent with a groundwater flow direction to the east.

PCB Congeners

- Due to the elevated detection limits in the reconnaissance groundwater sample from MFA B3A, PCB congeners were not detected.
- Eighty PCB congeners were detected in the lagoon sludge sample compared to only two to five congeners in the monitoring wells.

- Due to the lack of PCB congener detections in the reconnaissance groundwater sample, general low solubility of PCBs in water, and few detections in the monitoring wells, the PCB congener data are not useful for assessing the groundwater flow direction.
- The highest PCB congener concentrations were from upgradient well MW-1. The source of this is unknown.

SVOCs

- Five SVOCs were detected at MFA B-3A, one or two SVOCs were detected at the upgradient wells, and one to 21 SVOCs were detected at the downgradient wells.
- Except for MW-3 and MW-6, where 21 and 14 SVOCs were detected, respectively, the number of SVOC detections at downgradient wells MW-4 and MW-5 were few and similar in number to MFA B-3A and the upgradient wells MW-1 and MW-2.
- Only two of five SVOCs detected at MFA B-3A were detected in the downgradient wells. Conversely, many SVOCs detected at MW-3 and MW-6 were not detected at MFA B3-A or the upgradient wells.
- In general, the SVOC data are not useful for assessing the groundwater flow direction.

TPH

- Diesel and oil were detected only at the downgradient wells MW-4 through MW-6.
- Since TPH were not detected in the reconnaissance groundwater sample from MFA B-3A, it is unclear whether the diesel and oil detections are associated with the lagoon and present at MW-4 through MW-6 due to the groundwater flow direction.

VOCs

- The four VOCs detected at MFA B-3A were not detected at the downgradient wells.
- The two VOCs detected at the downgradient wells were not detected at MFA B-3A or the upgradient wells.
- The VOC data are not useful for assessing the groundwater flow direction.

In summary, the data for metals, organochlorine pesticides, and PFAS are consistent with a groundwater flow direction to the east. The data for the other chemical groups show no consistent spatial pattern and are not useful for assessing the groundwater flow direction.

4.4 Geology and Hydrogeologic Conceptual Site Model

A preliminary HCSM was presented in the Phase I report and Phase IB work plan. The preliminary HCSM was prepared based on the review of public documents providing information on the geology and hydrogeology of the site vicinity and on the results of the 2019 Phase I work. This section presents the updated HCSM, which now incorporates the results of the Phase IB site investigation.

4.4.1 Regional Geology

The geology of the site vicinity is shown in plan view on Figure 4-1, and in cross section on Figures 4-2, 4-3, and 4-4. A basalt bluff is west-adjacent to, and higher in elevation than, the lagoon. The basalt has been identified as the Sentinel Bluffs (SB) member of the Columbia River Basalt Group (CRBG) (Evarts 2004), which is a regionally significant water-bearing formation. In the area surrounding St. Helens, the SB member is the most widespread CRBG unit, and the unit with the highest average groundwater yield (Ahern 2017). Groundwater in the CRBG is largely confined to interflow zones associated with structures present at the tops and bottoms of individual basalt flows. These interflow structures include vesicular flow tops, flow-top and flow-bottom breccias, and pillow lava/hyaloclastite complexes, and typically have hydraulic conductivities on the order of 10^{-2} to 10^{-15} meters per second (m/s), which is substantially higher than dense flow interiors, which typically have maximum hydraulic conductivity values on the order of 10^{-9} m/s. The highest values for hydraulic conductivity and porosity are typically observed in brecciated flow tops and bottoms (Tolan, Lindsey, and Porcello 2009). During the Phase I investigation in 2019, interflow zones were observed at the two borings advanced on the basalt bluff (MW-1 and MW-2). These were composed of highly weathered in situ basalt bedrock between nonvesicular unweathered bedrock above and highly vesicular unweathered bedrock below. The observed K-values at these interflow zones in the basalt dike borings had geometric means of 0.073 and 0.081 feet/day (2.58×10^{-7} to 2.86×10^{-7} m/s). These were calculated using pneumatic slug testing at intervals of 12, 24, and 36 inches of water pressure.

The SB member of the CRBG is underlain by the Winter Water (WW) member of the CRBG at the site. Both members dip slightly to the east toward the Multnomah Channel. The contact between the two members is mapped at the base of the basalt bluff on the west side of the lagoon (Evarts 2004). The WW member extends east beneath the lagoon and the Multnomah Channel. The presence of the contact between the two members, together with the eastward dip, suggests that an interflow zone may be present between the two units and across the top of the WW member where it extends east beneath the lagoon.

East of the lagoon, the WW is overlain by fill along the dike alignment and by Holocene Columbia River alluvium (Evarts 2004). The fill is localized and is not laterally extensive outside the site vicinity, but the alluvium extends east onto Sauvie Island and south along the floodplain. The alluvium, together with a potential interflow zone at the top of the WW member, may provide a pathway for groundwater flow beneath the wastewater treatment lagoon.

4.4.2 Lagoon Geology

Based on the combined results of the Phase I and Phase IB investigations, the prior geologic cross sections have been updated and a new geologic cross section created. The cross section locations are shown on Figure 4-1 and include the following:

- Cross Section A-A' (Figure 4-2): based on geologic data provided by private water well COLU55412, MFA monitoring wells and borings MW-2, MFA B-1, MFA B-2, MFA B-3, MW-4, and GRI boring B-3.

- Cross Section B-B' (Figure 4-3): based on geologic data provided by MFA monitoring wells and boring MW-1, MFA B-5, and MW-5.
- Cross Section C-C' (Figure 4-4): based on geologic data provided by MFA monitoring wells MW-3, MW-5, MW-4, MW-6, and GRI cone penetrometer test location CPT-21.

Boring logs for MFA borings and monitoring wells and the private water well COLU55412 are provided in Appendix A. The logs for GRI locations B-3 and CPT-1 are provided in Appendix F.

The lagoon is located at the interface between shallow basalt bedrock to the west and deep alluvium to the east. This is depicted on Figure 4-2 where the western portion of the lagoon near its north end is directly underlain by a thin layer of sediment then basalt bedrock at locations MFA B-1 and MFA B2. The eastern portion of the lagoon is underlain by sand and silty sand followed by silt. Bedrock was not encountered at locations MFA B-3, MW-4, and B-3. Farther east across the Multnomah Channel, basalt bedrock crops out at the north end of Sauvie Island. This deep structural feature in the basalt that is filled by more than 280 feet of alluvium is interpreted as a former channel of the Columbia River.

At the south end of the lagoon, the former channel feature is not present, or is shallower and more subdued, as shown on Figure 4-3. Here the lagoon is underlain by 30 to 80 feet of alluvium then basalt bedrock at locations MFA B-5 and MW-5.

Figure 4-4 depicts the subsurface geology in a line parallel to the lagoon dike. Consistent with Figures 4-2 and 4-3, the depth to basalt is shallower in the southern portion of the lagoon at locations MW-3 and MW-5. Basalt was not encountered farther north at locations MW4 and MW-6, where it occurs at a greater depth. Basalt was encountered at a shallow depth at location CPT-1 at the north end of the lagoon. Again, this structural feature in the basalt filled with alluvium is interpreted as a former channel of the Columbia River.

Interflow zones were encountered in the basalt at locations MW-1 and MW-2 and are interpreted to be present at COLU55412, as shown on Figures 4-2 and 4-3. The horizontal extent of these interflow zones is not known, and therefore Figures 4-2 and 4-3 do not show these zones as being laterally extensive. However, since these interflow zones are associated with the flow tops and flow bottoms of the CRBG, and the CRBG flows are known to be regionally extensive units, it is possible that the zones are laterally continuous, extend horizontally to the east, and are in contact with the alluvium underlying the lagoon.

The interpretation that the interflow zones are laterally extensive would indicate that groundwater in the interflow zones is in direct hydraulic connection with groundwater in the alluvium. However, significant water-bearing zones in the alluvium underlying the lagoon were limited to a shallow unit of sand at locations MFA B-3 and MW-3 through MW-6. This water-bearing zone does not appear to be in direct contact with the basalt, as shown on Figures 4-2 through 4-4. Rather, silt is in direct contact with the basalt at the locations on Figures 4-2 and 4-3 where the interflows would potentially be in contact with the alluvium if they were laterally extensive. The presence of the thick unit of silt between the basalt and the sand and silty sand water-bearing zone suggests that the hydraulic

connectivity between the basalt interflow zones and the water-bearing zone in the alluvium may be suppressed by the presence of the silt.

4.4.3 Groundwater Flow Direction

Based on the site topography, surface hydrology, and regional groundwater elevations (Ahern 2017), the expected direction of groundwater flow is toward the Multnomah Channel. Groundwater elevation data collected from the monitoring wells during the August 2019 Phase I investigation were used to prepare a water level elevation contour map (see Figure 8-1 of the 2020 Phase I Report). The elevation contours indicated that the groundwater flow is toward the Multnomah Channel.

Groundwater elevations were measured again at MW-1 through MW-6 and at MFA B-3A in February 2023, and are summarized on Table 4-3. The elevation data were used to prepare the updated water level elevation contour map (Figure 4-5). Consistent with the 2019 data, the 2023 groundwater elevation data indicate that the groundwater flow direction is east, toward the Multnomah Channel. As noted in Section 4.3 above, the groundwater data for metals, organochlorine pesticides, and PFAS are consistent with a groundwater flow direction to the east.

Figure 4-5 presents a single potentiometric surface generated using data from two aquifers—the interflow zones in basalt at MW-1 and MW-2, and the sand and silty sand water-bearing zones at MW-3 through MW-6 and MFA B-3. Presenting the single potentiometric surface in this way assumes that the basalt interflow zones and alluvial water-bearing zones are in direct contact and there is no hydraulic separation between the two. As noted in Section 4.4.2 above, it is unknown whether the interflow zones at COLU55412 and MW-1 and MW-2 extend east to the lagoon, and if they do, it appears they are separated from the alluvial water-bearing zones by a thick layer of silt.

Based on the groundwater elevation data from just the single alluvial water-bearing zone under the lagoon (at MFA B-3 and MW-3 through MW-6), it does appear that the groundwater flow direction in this single aquifer is east, toward the Multnomah Channel.

5 GEOTECHNICAL INVESTIGATION

GRI completed a preliminary Phase I Geotechnical Investigation for the proposed repurposing of the wastewater treatment plant lagoon as a nonmunicipal-waste facility. The project would include draining and partially to fully filling the lagoon with sediment, soil, and the City's wastewater sludge. A Geosynthetic Clay liner (GCL) and 60-mil High-Density Polyethylene (HDPE) liner would be installed near the base of the facility and filled with up to 56 feet of fill. The following is a brief overview of the geotechnical engineering evaluation for the project and is not intended to replace more detailed information contained within the report in Appendix F. A summary of GRI's findings, opinion, and recommendations is provided below.

- The borings and geotechnical data collected for this investigation and review of available existing subsurface information indicates the site is underlain by variable thickness of sand, underlain by a significant thickness of highly compressible alluvial silt. The silt is underlain by basalt. The depth to basalt varies significantly across the project site from at or near the ground surface to depths of over 350 feet over relatively short horizontal distances. This variability has significant static and seismic design implications as discussed further below.
- The sand and silt soils below the groundwater surface are susceptible to liquefaction and cyclic softening during a design level earthquake. Significant lateral soil movements are estimated, and ground improvement will likely be required to improve seismic slope stability.
- Preliminary geotechnical modeling of ground improvement was completed to increase seismic slope stability and limit slope movements to about 2 feet. The results indicated the largest ground improvement cross sections are typically required where the basalt depths are the greatest. Additional explorations, lab testing, and more robust modeling, such as finite difference or finite element numerical modeling will be required to better evaluate ground improvement assumptions as part of the Phase II geotechnical investigation.
- Up to 9 feet of total settlement are estimated following site filling. Due to significant variation in depth of basalt over relatively short distances across the site, we estimate total settlements may approach differential settlements.
- Differential settlement tolerances of GCL, HDPE liners, and geotube containment berms need to be further evaluated during the Phase II geotechnical investigation. Initial team review indicates the differential settlements estimated will be difficult to tolerate and will require additional measures to reduce.
- The GCL and HDPE liners are currently proposed below the 100-year flood elevation and the risks associated with floating the HDPE liner when river levels exceed fill levels within the lagoon will be a design consideration.
- Final uses for the site have not been finalized but may include new buildings. Due to settlement implications, the buildings will likely require special foundation considerations such as deep foundation systems.
- Due to the significant variability observed at the site, additional geotechnical explorations, laboratory testing, slope stability modeling and engineering analysis will be required as part of the Phase II geotechnical investigation.

LIMITATIONS

The services undertaken in completing this work plan were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This work plan is solely for the use and information of our client unless otherwise noted. Any reliance on this work plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this work plan apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this work plan.

REFERENCES

- Ahern, Eli Thomas. 2017. "Hydrostratigraphy of Warren Bench and Surrounding Area, Columbia County, Oregon." Honors theses, Portland State University. Paper 512. November 19.
- DEQ. 2020a. Heather Kuoppamaki, Oregon Department of Environmental Quality, Portland, Oregon. *Phase I Site Characterization Report, St. Helens Intergovernmental Agreement Phase I Lagoon Repurposing*. Memorandum to file. February 19.
- DEQ. 2020b. Scott Yankey, Oregon Department of Environmental Quality, Portland, Oregon. *Phase I Site Characterization Report—Draft Comments, St. Helens Intergovernmental Agreement Phase I Lagoon Repurposing, Columbia County*. Memorandum to file. February 26.
- DEQ. 2020c. *Decision Unit Characterization*. Oregon Department of Environmental Quality. September 14.
- EPA. 1986. *Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods*. EPA publication SW-846. 3rd ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), VI phase III (2019), VII phase I (2019), and VII phase II (2020).
- EPA. 1989. *Risk Assessment Guide for Superfund*. Vol. I, *Human Health Evaluation Manual (Part A)*. *Interim final*. EPA/540/1A89/002. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. December.
- EPA. 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. U.S. Environmental Protection Agency. April.
- EPA. 2014. *R10 Data Validation and Review Guidelines for Polychlorinated Dibenzo-P-Dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) Using Method 1613B and SW846 Method 8290A*. EPA-910-R-14-003. U.S. Environmental Protection Agency, Office of Environmental Assessment. May.
- EPA. 2020a. *EPA Contract Laboratory Program, National Functional Guidelines for High Resolution Superfund Methods Data Review*. EPA 542-R-20-007. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. November.
- EPA. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA 542-R-20-006. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.
- EPA. 2020c. *National Functional Guidelines for Organic Superfund Methods Data Review*. EPA 540-R-20-005. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.
- Evarts, Russell C. 2004. *Geologic map of the Saint Helens Quadrangle, Columbia County, Oregon, and Cowlitz and Clark Counties, Washington*. U.S. Geological Survey Scientific Investigations Map 2834.

MFA. 2020. *Phase I Site Characterization Report*. Maul Foster & Alongi, Inc: Portland, OR. May 4.

MFA. 2022. *Phase IB Environmental Investigation Work Plan*. Maul Foster & Alongi, Inc: Portland, OR. August 3.

Tolan, Terry, Kevin Lindsey, and John Porcello. 2009. *A Summary of Columbia River Basalt Group Geology and Its Influence on the Hydrogeology of the Columbia River Basalt Aquifer System: Columbia Basin Ground Water Management Area of Adams, Franklin, Grant, and Lincoln Counties*. Prepared by the Columbia Basin Ground Water Management Area of Adams, Franklin, Grant, and Lincoln Counties, Othello, Washington. June.

TABLES



**Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
Sample Name:					DU1-20220810-ISM-COMP	MFA-B1-B5-COMP-SL
Collection Date:	Construction Worker	Excavation Worker	Residential		08/10/2022	1/30/2023
Collection Depth (ft bml):					Surface	0.5-2.0 ^(a)
Chlorinated Herbicides (mg/kg)						
2,4,5-T	NV	NV	NV	NV	0.15 UJ	--
2,4-D	2,700	74,000	2.3	NV	0.33 UJ	--
2,4-DB	NV	NV	NV	NV	0.58 UJ	--
Dalapon	NV	NV	NV	NV	0.26 UJ	--
Dicamba	NV	NV	NV	NV	0.24 UJ	--
Dichlorprop	NV	NV	NV	NV	0.24 UJ	--
Dinoseb	NV	NV	NV	NV	0.083 UJ	--
MCPA	130	3,700	0.097	NV	54 UJ	--
MCPP	NV	NV	NV	NV	140 UJ	--
Pentachlorophenol	34	960	0.066	NV	0.23 UJ	--
Picloram	NV	NV	NV	NV	0.22 UJ	--
Silvex	NV	NV	NV	NV	0.18 UJ	--
Conventional Parameters (%)						
Percent solids	NV	NV	NV	NV	6.71	19.2
Dioxins/Furans (pg/g)						
1,2,3,4,6,7,8-HpCDD	NV	NV	NV	NV	259	474
1,2,3,4,6,7,8-HpCDF	NV	NV	NV	NV	56.5	50.9
1,2,3,4,7,8,9-HpCDF	NV	NV	NV	NV	2.94 J	3.56 J
1,2,3,4,7,8-HxCDD	NV	NV	NV	NV	2.77 J	7.73
1,2,3,4,7,8-HxCDF	NV	NV	NV	NV	4.87 J	6.77
1,2,3,6,7,8-HxCDD	NV	NV	NV	NV	43.8	610
1,2,3,6,7,8-HxCDF	NV	NV	NV	NV	2.71 J	2.64 J
1,2,3,7,8,9-HxCDD	NV	NV	NV	NV	30.2	312
1,2,3,7,8,9-HxCDF	NV	NV	NV	NV	0.386 U	0.453 UK
1,2,3,7,8-PeCDD	NV	NV	NV	NV	5.59	37.8
1,2,3,7,8-PeCDF	NV	NV	NV	NV	4.38 J	11
2,3,4,6,7,8-HxCDF	NV	NV	NV	NV	1.86 J	2.96 J
2,3,4,7,8-PeCDF	NV	NV	NV	NV	3.01 J	8.2
2,3,7,8-TCDD	NV	NV	NV	NV	10.2	77.1
2,3,7,8-TCDF	NV	NV	NV	NV	59.5	440
OCDD	NV	NV	NV	NV	2,460	2,230
OCDF	NV	NV	NV	NV	100	108
Total HpCDDs	NV	NV	NV	NV	492	820
Total HpCDFs	NV	NV	NV	NV	124	137
Total HxCDDs	NV	NV	NV	NV	281	3,910
Total HxCDFs	NV	NV	NV	NV	51.1	67.4
Total PeCDDs	NV	NV	NV	NV	38.7	251
Total PeCDFs	NV	NV	NV	NV	54.1	130
Total TCDDs	NV	NV	NV	NV	135	144
Total TCDFs	NV	NV	NV	NV	191	1,110
Dioxin/Furan TEQ ^{(b)(3)}	170	4,800	6.8	NV	35.4 J	262 J
Metals (mg/kg)						
Antimony	NV	NV	NV	0.56	2.62	0.944 J-
Arsenic	15	420	NV	8.8	4.21	3.48
Barium	69,000	NV	NV	790	339	174

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location: Sample Name:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Collection Date:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Depth (ft bml):					08/10/2022	1/30/2023
					Surface	0.5-2.0 ^(c)
Beryllium	700	19,000	NV	2	0.327	0.316
Cadmium	350	9,700	NV	0.63	2.97	3.24
Chromium	NV	NV	NV	76	70.1	191
Chromium, Hexavalent	49	1,400	NV	NV	10.7 UJ	11.4 U
Copper	14,000	390,000	NV	34	259	142
Lead	800	800	30	79	27.1	40.2
Manganese	8,200	230,000	NV	1,800	711	763
Mercury	110	2,900	NV	0.23	0.485	0.881
Nickel	7,000	190,000	NV	47	37.8	46.8
Selenium	NV	NV	NV	0.71	2.46	0.813
Silver	1,800	49,000	NV	0.82	2.27	2.5
Thallium	NV	NV	NV	5.2	0.286 U	0.265 U
Zinc	NV	NV	NV	180	817	531
Organochlorine Pesticides (mg/kg)						
2,4'-DDD	NV	NV	NV	NV	0.00106 U	0.00395 UJ
2,4'-DDE	NV	NV	NV	NV	0.00053 U	0.00124 UJ
2,4'-DDT	NV	NV	NV	NV	0.00053 U	0.00124 UJ
4,4'-DDD	9.7	270	1.1	NV	0.00106 U	0.00124 UJ
4,4'-DDE	66	1,800	1.6	NV	0.00548	0.00305 J
4,4'-DDT	66	1,800	12	NV	0.00053 U	0.00124 UJ
Aldrin	1.1	30	0.023	NV	0.00053 U	0.00124 UJ
alpha-BHC	3	83	0.0063	NV	0.00053 U	0.00272 UJ
alpha-Chlordane	NV	NV	NV	NV	0.00146	0.00124 UJ
beta-BHC	NV	NV	NV	NV	0.00053 U	0.00321 UJ
beta-Chlordane	NV	NV	NV	NV	0.00199	0.00124 UJ
cis-Nonachlor	NV	NV	NV	NV	0.00053 U	0.00124 UJ
delta-BHC	NV	NV	NV	NV	0.00053 U	0.00124 UJ
Dieldrin	1.2	33	0.01	NV	0.00117 U	0.242 UJ
Endosulfan I	1,600	45,000	NV	NV	0.0107 U	0.0124 UJ
Endosulfan II	1,600	45,000	NV	NV	0.00371 U	0.0124 UJ
Endosulfan sulfate	NV	NV	NV	NV	0.00053 U	0.00124 UJ
Endrin	80	2,200	11	NV	0.00053 U	0.00124 UJ
Endrin aldehyde	NV	NV	NV	NV	0.00053 U	--
Endrin ketone	NV	NV	NV	NV	0.00053 U	0.00124 UJ
Heptachlor	4	110	0.017	NV	0.00053 U	0.0042 UJ
Heptachlor epoxide	2	56	0.0042	NV	0.00053 U	0.00124 UJ
Hexachlorobutadiene	NV	NV	NV	NV	0.00053 U	0.00124 UJ
Lindane	17	470	0.036	NV	0.00053 U	0.00124 UJ
Methoxychlor	NV	NV	NV	NV	0.00053 U	0.00124 UJ
Mirex	NV	NV	NV	NV	0.00053 U	0.00124 UJ
Oxychlordane	NV	NV	NV	NV	0.00053 U	0.00124 UJ
trans-Nonachlor	NV	NV	NV	NV	0.00108	0.00124 UJ
Organophosphorus Pesticides (mg/kg)						
Coumaphos	NV	NV	NV	NV	4.23 U	2.94 UJ
Demeton-O	NV	NV	NV	NV	2.11 U	1.01 UJ
Demeton-S	NV	NV	NV	NV	2.11 U	1.01 UJ

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Sample Name:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Date:						08/10/2022
Collection Depth (ft bml):					Surface	0.5-2.0 ^(a)
Diazinon	NV	NV	NV	NV	2.11 U	1.01 UJ
Dichlorvos	NV	NV	NV	NV	2.11 U	1.01 UJ
Dimethoate	NV	NV	NV	NV	2.11 U	1.01 UJ
Disulfoton	NV	NV	NV	NV	2.11 U	1.01 UJ
Dursban (Chloropyrifos)	NV	NV	NV	NV	2.11 U	1.01 UJ
Ethoprop	NV	NV	NV	NV	2.11 U	1.01 UJ
Fensulfothion	NV	NV	NV	NV	2.11 U	1.01 UJ
Fenthion	NV	NV	NV	NV	2.11 U	1.01 UJ
Guthion (Azinphos-Methyl)	NV	NV	NV	NV	2.11 U	1.01 UJ
Merphos	NV	NV	NV	NV	18.2 U	30 UJ
Methyl parathion	NV	NV	NV	NV	4.23 U	2.01 UJ
Mevinphos	NV	NV	NV	NV	2.11 U	1.01 UJ
Monocrotophos	NV	NV	NV	NV	4.23 U	2.01 UJ
Naled	NV	NV	NV	NV	2.11 U	1.01 UJ
Parathion	NV	NV	NV	NV	6.17 U	9.5 UJ
Phorate	NV	NV	NV	NV	2.11 U	1.01 UJ
Pyridine	NV	NV	NV	NV	2.11 U	1.01 UJ
Santox (EPN)	NV	NV	NV	NV	2.11 U	1.01 UJ
Stirofos	NV	NV	NV	NV	9.64 U	11 UJ
Sulfotepp	NV	NV	NV	NV	2.11 U	1.01 UJ
Sulprofos (Bolstar)	NV	NV	NV	NV	2.11 U	2.01 UJ
Sumitox (Malathion)	NV	NV	NV	NV	2.11 U	2.01 UJ
Tetraethylpyrophosphate	NV	NV	NV	NV	8.46 U	4.03 UJ
Tokuthion	NV	NV	NV	NV	2.11 U	2.01 UJ
Trichloronate	NV	NV	NV	NV	6.09 U	13.2 UJ
PCB Congeners (pg/g)						
2-MonoCB-(1)	NV	NV	NV	NV	163	--
3-MonoCB-(2)	NV	NV	NV	NV	92 J	--
4-MonoCB-(3)	NV	NV	NV	NV	179 J	--
2,2'-DiCB-(4)	NV	NV	NV	NV	360	--
2,3-DiCB-(5)	NV	NV	NV	NV	82 U	--
2,3'-DiCB-(6)	NV	NV	NV	NV	267	--
2,4-DiCB-(7)	NV	NV	NV	NV	83 U	--
2,4'-DiCB-(8)	NV	NV	NV	NV	455	--
2,5-DiCB-(9)	NV	NV	NV	NV	93 J	--
2,6-DiCB-(10)	NV	NV	NV	NV	140 U	--
3,3'-DiCB-(11)	NV	NV	NV	NV	7,100	--
PCBs 12 + 13	NV	NV	NV	NV	221 J	--
3,5-DiCB-(14)	NV	NV	NV	NV	85 U	--
4,4'-DiCB-(15)	NV	NV	NV	NV	810	5,160 J-
2,2',3-TriCB-(16)	NV	NV	NV	NV	510	-- R
2,2',4-TriCB-(17)	NV	NV	NV	NV	690	-- R
PCBs 18 + 30	NV	NV	NV	NV	1,100	1,100 J-
2,2',6-TriCB-(19)	NV	NV	NV	NV	410	-- R
PCBs 20 + 28	NV	NV	NV	NV	2,300	3,240 J-
PCBs 21 + 33	NV	NV	NV	NV	610	693 J-

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location: Sample Name:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Collection Date:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Depth (ft bml):					08/10/2022	1/30/2023
					Surface	0.5-2.0 ^(a)
2,3,4'-TriCB-(22)	NV	NV	NV	NV	840	1,000 J-
2,3,5-TriCB-(23)	NV	NV	NV	NV	120 U	-- R
2,3,6-TriCB-(24)	NV	NV	NV	NV	140 U	-- R
2,3',4-TriCB-(25)	NV	NV	NV	NV	530	-- R
PCBs 26 + 29	NV	NV	NV	NV	580	480 J-
2,3',6-TriCB-(27)	NV	NV	NV	NV	140 U	-- R
2,4',5-TriCB-(31)	NV	NV	NV	NV	2,200	2,730 J-
2,4',6-TriCB-(32)	NV	NV	NV	NV	440	-- R
2,3',5'-TriCB-(34)	NV	NV	NV	NV	130 U	-- R
3,3',4-TriCB-(35)	NV	NV	NV	NV	260	562 J-
3,3',5-TriCB-(36)	NV	NV	NV	NV	110 U	-- R
3,4,4'-TriCB-(37)	NV	NV	NV	NV	790	374 J-
3,4,5-TriCB-(38)	NV	NV	NV	NV	120 U	-- R
3,4',5-TriCB-(39)	NV	NV	NV	NV	110 U	-- R
PCBs 40 + 41 + 71	NV	NV	NV	NV	1,450	-- R
2,2',3,4'-TetraCB-(42)	NV	NV	NV	NV	910	-- R
2,2',3,5-TetraCB-(43)	NV	NV	NV	NV	380 U	-- R
PCBs 44/47/65	NV	NV	NV	NV	3,770	7,840 J-
PCBs 45 + 51	NV	NV	NV	NV	520	-- R
2,2',3,6'-TetraCB-(46)	NV	NV	NV	NV	320 U	-- R
2,2',4,5-TetraCB-(48)	NV	NV	NV	NV	600	-- R
PCBs 49 + 69	NV	NV	NV	NV	2,560	6,530 J-
PCBs 50 + 53	NV	NV	NV	NV	480 J	-- R
2,2',5,5'-TetraCB-(52)	NV	NV	NV	NV	7,650	19,200 J-
2,2',6,6'-TetraCB-(54)	NV	NV	NV	NV	220 U	-- R
2,3,3',4-TetraCB-(55)	NV	NV	NV	NV	270 U	-- R
2,3,3',4'-Tetra CB-(56)	NV	NV	NV	NV	1,250	1,110 J-
2,3,3',5-TetraCB-(57)	NV	NV	NV	NV	240 U	-- R
2,3,3',5'-TetraCB-(58)	NV	NV	NV	NV	260 U	-- R
PCBs 59/62/75	NV	NV	NV	NV	220 J	-- R
2,3,4,4'-TetraCB-(60)	NV	NV	NV	NV	540	-- R
PCBs 61/70/74/76	NV	NV	NV	NV	6,910	17,900 J-
2,3,4',5-TetraCB-(63)	NV	NV	NV	NV	230 U	-- R
2,3,4',6-TetraCB-(64)	NV	NV	NV	NV	1,400	3,110 J-
2,3',4,4'-TetraCB-(66)	NV	NV	NV	NV	2,530	6,600 J-
2,3',4,5-TetraCB-(67)	NV	NV	NV	NV	230 J	-- R
2,3',4,5'-TetraCB-(68)	NV	NV	NV	NV	230 U	-- R
2,3',5,5'-TetraCB-(72)	NV	NV	NV	NV	230 U	-- R
2,3',5',6-TetraCB-(73)	NV	NV	NV	NV	200 U	-- R
3,3',4,4'-TetraCB-(77)	NV	NV	NV	NV	570	-- R
3,3',4,5-TetraCB-(78)	NV	NV	NV	NV	240 U	-- R
3,3',4,5'-TetraCB-(79)	NV	NV	NV	NV	210 U	-- R
3,3',5,5'-TetraCB-(80)	NV	NV	NV	NV	210 U	-- R
3,4,4',5-TetraCB-(81)	NV	NV	NV	NV	260 U	-- R
2,2',3,3',4-PentaCB-(82)	NV	NV	NV	NV	1,000	-- R
PCBs 83 + 99	NV	NV	NV	NV	5,070	15,800 J-

**Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Construction Worker	Excavation Worker	Residential		DU1-20220810-ISM-COMP 08/10/2022	MFA-B1-B5-COMP-SL 1/30/2023
Collection Date: Collection Depth (ft bml):					Surface	0.5-2.0 ^(c)
2,2',3,3',6-PentaCB-(84)	NV	NV	NV	NV	2,260	5,860 J-
PCBs 85/116/117	NV	NV	NV	NV	1,230	4,020 J-
PCBs 86/87/97/109/119/125	NV	NV	NV	NV	6,080	20,300 J-
PCBs 88 + 91	NV	NV	NV	NV	1,210	1,840 J-
2,2',3,4,6'-PentaCB-(89)	NV	NV	NV	NV	310 U	-- R
PCBs 90 + 101 + 113	NV	NV	NV	NV	9,380	32,800 J-
2,2',3,5,5'-PentaCB-(92)	NV	NV	NV	NV	1,760	3,270 J-
PCBs 93 + 98 + 100 + 102	NV	NV	NV	NV	290 U	-- R
2,2',3,5,6'-PentaCB-(94)	NV	NV	NV	NV	300 U	-- R
2,2',3,5',6-PentaCB-(95)	NV	NV	NV	NV	6,310	23,200 J-
2,2',3,6,6'-PentaCB-(96)	NV	NV	NV	NV	140 U	-- R
2,2',4,5',6-PentaCB-(103)	NV	NV	NV	NV	270 U	-- R
2,2',4,6,6'-PentaCB-(104)	NV	NV	NV	NV	160 U	-- R
2,3,3',4,4'-PentaCB-(105)	NV	NV	NV	NV	3,880	6,490 J-
2,3,3',4,5-PentaCB-(106)	NV	NV	NV	NV	210 U	-- R
2,3,3',4',5-PentaCB-(107)	NV	NV	NV	NV	580	2,290 J-
PCBs 108 + 124	NV	NV	NV	NV	370 J	1,280 J-
PCBs 110 + 115	NV	NV	NV	NV	12,500	37,200 J-
2,3,3',5,5'-PentaCB-(111)	NV	NV	NV	NV	210 U	-- R
2,3,3',5,6-PentaCB-(112)	NV	NV	NV	NV	190 U	-- R
2,3,4,4',5-PentaCB-(114)	NV	NV	NV	NV	380	-- R
2,3',4,4',5-PentaCB-(118)	NV	NV	NV	NV	10,100	17,800 J-
2,3',4,5,5'-PentaCB-(120)	NV	NV	NV	NV	200 U	-- R
2,3',4,5',6-PentaCB-(121)	NV	NV	NV	NV	210 U	-- R
2,3,3',4',5'-PentaCB-(122)	NV	NV	NV	NV	240 U	-- R
2,3',4,4',5'-PentaCB-(123)	NV	NV	NV	NV	280	-- R
3,3',4,4',5-PentaCB-(126)	NV	NV	NV	NV	230 U	-- R
3,3',4,5,5'-PentaCB-(127)	NV	NV	NV	NV	240 U	-- R
PCBs 128 + 166	NV	NV	NV	NV	1,840	3,640 J-
PCBs 129/138/163	NV	NV	NV	NV	11,000	25,300 J-
2,2',3,3',4,5'-HexaCB-(130)	NV	NV	NV	NV	680	1,520 J-
2,2',3,3',4,6'-HexaCB-(131)	NV	NV	NV	NV	470 U	-- R
2,2',3,3',4,6'-HexaCB-(132)	NV	NV	NV	NV	3,150	7,640 J-
2,2',3,3',5,5'-HexaCB-(133)	NV	NV	NV	NV	430 U	-- R
PCBs 134 + 143	NV	NV	NV	NV	530	1,360 J-
PCBs 135 + 151	NV	NV	NV	NV	1,980	6,220 J-
2,2',3,3',6,6'-HexaCB-(136)	NV	NV	NV	NV	930	2,760 J-
2,2',3,4,4',5-HexaCB-(137)	NV	NV	NV	NV	490 J	-- R
PCBs 139 + 140	NV	NV	NV	NV	370 U	-- R
2,2',3,4,5,5'-HexaCB-(141)	NV	NV	NV	NV	1,500	3,200 J-
2,2',3,4,5,6-HexaCB-(142)	NV	NV	NV	NV	420 U	-- R
2,2',3,4,5',6-HexaCB-(144)	NV	NV	NV	NV	210 U	-- R
2,2',3,4,6,6'-HexaCB-(145)	NV	NV	NV	NV	150 U	-- R
2,2',3,4',5,5'-HexaCB-(146)	NV	NV	NV	NV	1,090	2,460 J-
PCBs 147 + 149	NV	NV	NV	NV	5,830	11,900 J-
2,2',3,4',5,6'-HexaCB-(148)	NV	NV	NV	NV	190 U	-- R

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Sample Name:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Date:						
Collection Depth (ft bml):					Surface	0.5-2.0 ^(c)
2,2',3,4',6,6'-HexaCB-(150)	NV	NV	NV	NV	130 U	-- R
2,2',3,5,6,6'-HexaCB-(152)	NV	NV	NV	NV	150 U	-- R
PCBs 153 + 168	NV	NV	NV	NV	6,590	15,400 J-
2,2',4,4',5,6'-HexaCB-(154)	NV	NV	NV	NV	150 U	-- R
2,2',4,4',6,6'-HexaCB-(155)	NV	NV	NV	NV	220 J	-- R
PCBs 156 + 157	NV	NV	NV	NV	1,990	3,360 J-
2,3,3',4,4',6-HexaCB-(158)	NV	NV	NV	NV	1,040	2,470 J-
2,3,3',4,5,5'-HexaCB-(159)	NV	NV	NV	NV	430 U	-- R
2,3,3',4,5,6-HexaCB-(160)	NV	NV	NV	NV	350 U	-- R
2,3,3',4,5',6-HexaCB-(161)	NV	NV	NV	NV	300 U	-- R
2,3,3',4',5,5'-HexaCB-(162)	NV	NV	NV	NV	390 U	-- R
2,3,3',4',5',6-HexaCB-(164)	NV	NV	NV	NV	860	-- R
2,3,3',5,5',6-HexaCB-(165)	NV	NV	NV	NV	340 U	-- R
2,3',4,4',5,5'-HexaCB-(167)	NV	NV	NV	NV	730	1,060 J-
3,3',4,4',5,5'-HexaCB-(169)	NV	NV	NV	NV	360 U	-- R
2,2',3,3',4,4',5-HeptaCB-(170)	NV	NV	NV	NV	1,850	2,230 J-
PCBs 171 + 173	NV	NV	NV	NV	570 U	-- R
2,2',3,3',4,5,5'-HeptaCB-(172)	NV	NV	NV	NV	600 U	-- R
2,2',3,3',4,5,6'-HeptaCB-(174)	NV	NV	NV	NV	1,470	3,000 J-
2,2',3,3',4,5',6-HeptaCB-(175)	NV	NV	NV	NV	310 U	-- R
2,2',3,3',4,6,6'-HeptaCB-(176)	NV	NV	NV	NV	190 U	-- R
2,2',3,3',4,5',6'-HeptaCB-(177)	NV	NV	NV	NV	920	1,570 J-
2,2',3,3',5,5',6-HeptaCB-(178)	NV	NV	NV	NV	300 U	-- R
2,2',3,3',5,6,6'-HeptaCB-(179)	NV	NV	NV	NV	480	-- R
PCBs 180 + 193	NV	NV	NV	NV	3,270	8,670 J-
2,2',3,4,4',5,6-HeptaCB-(181)	NV	NV	NV	NV	560 U	-- R
2,2',3,4,4',5,6'-HeptaCB-(182)	NV	NV	NV	NV	340 U	-- R
2,2',3,4,4',5',6-HeptaCB-(183)	NV	NV	NV	NV	1,000	1,840 J-
2,2',3,4,4',6,6'-HeptaCB-(184)	NV	NV	NV	NV	180 U	-- R
2,2',3,4,5,5',6-HeptaCB-(185)	NV	NV	NV	NV	600 U	-- R
2,2',3,4,5,6,6'-HeptaCB-(186)	NV	NV	NV	NV	200 U	-- R
2,2',3,4',5,5',6-HeptaCB-(187)	NV	NV	NV	NV	1,950	3,190 J-
2,2',3,4',5,6,6'-HeptaCB-(188)	NV	NV	NV	NV	300 U	-- R
2,3,3',4,4',5,5'-HeptaCB-(189)	NV	NV	NV	NV	620 U	-- R
2,3,3',4,4',5,6-HeptaCB-(190)	NV	NV	NV	NV	430 U	-- R
2,3,3',4,4',5',6-HeptaCB-(191)	NV	NV	NV	NV	420 U	-- R
2,3,3',4,5,5',6-HeptaCB-(192)	NV	NV	NV	NV	460 U	-- R
2,2',3,3',4,4',5,5'-OctaCB-(194)	NV	NV	NV	NV	660 U	-- R
2,2',3,3',4,4',5,6-OctaCB-(195)	NV	NV	NV	NV	750 U	-- R
2,2',3,3',4,4',5,6'-OctaCB-(196)	NV	NV	NV	NV	550 U	-- R
2,2',3,3',4,4',6,6'-OctaCB-(197)	NV	NV	NV	NV	430 U	-- R
PCBs 198 + 199	NV	NV	NV	NV	830	-- R
2,2',3,3',4,5,6,6'-OctaCB-(200)	NV	NV	NV	NV	370 U	-- R
2,2',3,3',4,5',6,6'-OctaCB-(201)	NV	NV	NV	NV	380 U	-- R
2,2',3,3',5,5',6,6'-OctaCB-(202)	NV	NV	NV	NV	470 U	-- R
2,2',3,4,4',5,5',6-OctaCB-(203)	NV	NV	NV	NV	500 U	-- R

**Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Construction Worker	Excavation Worker	Residential		DU1-20220810-ISM-COMP 08/10/2022	MFA-B1-B5-COMP-SL 1/30/2023
Collection Date:					Surface	0.5-2.0 ^(c)
Collection Depth (ft bml):						
2,2',3,4,4',5,6,6'-OctaCB-(204)	NV	NV	NV	NV	410 U	-- R
2,3,3',4,4',5,5',6-OctaCB-(205)	NV	NV	NV	NV	530 U	-- R
2,2',3,3',4,4',5,5',6-NonaCB-(206)	NV	NV	NV	NV	710 U	-- R
2,2',3,3',4,4',5,6,6'-NonaCB-(207)	NV	NV	NV	NV	630 U	-- R
2,2',3,3',4,5,5',6,6'-NonaCB-(208)	NV	NV	NV	NV	730 U	-- R
DecaCB-(209)	NV	NV	NV	NV	720 U	-- R
Total PCBs ^(c)	4,900,000	140,000,000	240,000	NV	181,000 J	359,000 J ^(d)
PFAS (mg/kg)						
9CI-PF3ONS (F-53B Major)	NV	NV	NV	NV	0.00021 U	0.0001 U
11CI-PF3OUdS (F-53B Minor)	NV	NV	NV	NV	0.00022 U	0.00028 U
4:2 FTSA	NV	NV	NV	NV	0.00025 U	0.0001 U
6:2 FTSA	NV	NV	NV	NV	0.00046 J	0.00024 U
8:2 FTSA	NV	NV	NV	NV	0.0015	0.00026 U
ADONA	NV	NV	NV	NV	0.00028 U	0.00015 U
EfFOSA	NV	NV	NV	NV	0.00031 UJ	0.00038 U
EfFOSAA	NV	NV	NV	NV	0.0088	0.007
EfFOSE	NV	NV	NV	NV	0.0017 J	0.00037 U
HFPO-DA (GenX)	NV	NV	NV	NV	0.00019 U	0.00016 U
MeFOSA	NV	NV	NV	NV	0.00039 UJ	0.00045 U
MeFOSAA	NV	NV	NV	NV	0.01	0.0043
MeFOSE	NV	NV	NV	NV	0.0036 J	0.00034 U
PFBA	NV	NV	NV	NV	0.00024 U	0.00014 U
PFBS	NV	NV	NV	NV	0.00017 U	0.00015 U
PFDA	NV	NV	NV	NV	0.0039	0.0015 J
PFDoA	NV	NV	NV	NV	0.0055	0.0012
PFDS	NV	NV	NV	NV	0.0018	0.00092 J
PFHpA	NV	NV	NV	NV	0.0012	0.00051 J
PFHpS	NV	NV	NV	NV	0.00017 U	0.00021 U
PFHxA	NV	NV	NV	NV	0.0023	0.00072 J
PFHxS	NV	NV	NV	NV	0.0035 J	0.0022 J
PFNA	NV	NV	NV	NV	0.0029	0.00076 J
PFNS	NV	NV	NV	NV	0.00024 U	0.00018 U
PFOA	NV	NV	NV	NV	0.0022	0.00095 J
PFOS	NV	NV	NV	NV	0.0024	0.00057 J
PFOSA	NV	NV	NV	NV	0.0002 UJ	0.0001 U
PFPeA	NV	NV	NV	NV	0.00023 U	0.00017 U
PFPeS	NV	NV	NV	NV	0.00026 U	0.00034 U
PFTeDA	NV	NV	NV	NV	0.0022 J	0.00046 J
PFTTrDA	NV	NV	NV	NV	0.0039 J	0.00061 J
PFUnA	NV	NV	NV	NV	0.0068	0.0013
SVOCs (mg/kg)						
1,2,4-Trichlorobenzene	NV	NV	NV	NV	0.353 U	0.494 UJ
1,2-Dichlorobenzene	20,000	560,000	36	NV	0.353 U	0.494 UJ
1,2-Dinitrobenzene	NV	NV	NV	NV	3.53 U	4.94 UJ
1,2-Diphenylhydrazine	NV	NV	NV	NV	0.353 U	0.494 UJ
1,3-Dichlorobenzene	NV	NV	NV	NV	0.353 U	0.494 UJ

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Sample Name:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Date:					08/10/2022	1/30/2023
Collection Depth (ft bml):					Surface	0.5-2.0 ^(a)
1,3-Dinitrobenzene	NV	NV	NV	NV	3.53 U	4.94 UJ
1,4-Dichlorobenzene	1,300	36,000	0.057	NV	0.353 U	0.494 UJ
1,4-Dinitrobenzene	NV	NV	NV	NV	3.53 U	4.94 UJ
1-Methylnaphthalene	NV	NV	NV	NV	0.283 U	0.396 UJ
2,2'-oxybis(1-Chloropropane)	NV	NV	NV	NV	0.353 U	0.494 UJ
2,3,4,6-Tetrachlorophenol	NV	NV	NV	NV	0.707 U	0.99 UJ
2,3,5,6-Tetrachlorophenol	NV	NV	NV	NV	0.707 U	0.99 UJ
2,4,5-Trichlorophenol	NV	NV	NV	NV	0.707 U	0.99 UJ
2,4,6-Trichlorophenol	270	7,400	2.4	NV	0.707 U	0.99 UJ
2,4-Dichlorophenol	NV	NV	NV	NV	0.707 U	0.99 UJ
2,4-Dimethylphenol	NV	NV	NV	NV	0.707 U	0.99 UJ
2,4-Dinitrophenol	NV	NV	NV	NV	3.53 U	4.94 UJ
2,4-Dinitrotoluene	NV	NV	NV	NV	1.41 U	1.97 UJ
2,6-Dinitrotoluene	13	350	0.0089	NV	1.41 U	1.97 UJ
2-Chloronaphthalene	NV	NV	NV	NV	0.141 U	0.197 UJ
2-Chlorophenol	NV	NV	NV	NV	0.707 U	0.99 UJ
2-Methylnaphthalene	NV	NV	NV	NV	0.283 U	0.396 UJ
2-Methylphenol	NV	NV	NV	NV	0.353 U	0.494 UJ
2-Nitroaniline	NV	NV	NV	NV	2.83 U	3.96 UJ
2-Nitrophenol	NV	NV	NV	NV	1.41 U	1.97 UJ
3- & 4-Methylphenol (m,p-Cresol)	NV	NV	NV	NV	0.353 U	0.494 UJ
3,3-Dichlorobenzidine	42	1,200	0.17	NV	2.83 R	3.96 UJ
3-Nitroaniline	NV	NV	NV	NV	2.83 U	3.96 UJ
4,6-Dinitro-2-methylphenol	NV	NV	NV	NV	3.53 U	4.94 UJ
4-Bromophenylphenyl ether	NV	NV	NV	NV	0.353 U	0.494 UJ
4-Chloro-3-methylphenol	NV	NV	NV	NV	1.41 U	1.97 UJ
4-Chloroaniline	NV	NV	NV	NV	0.353 U	0.494 UJ
4-Chlorophenylphenyl ether	NV	NV	NV	NV	0.353 U	0.494 UJ
4-Nitroaniline	NV	NV	NV	NV	2.83 U	3.96 UJ
4-Nitrophenol	NV	NV	NV	NV	1.41 U	1.97 UJ
Acenaphthene	21,000	590,000	NV	NV	0.141 U	0.197 UJ
Acenaphthylene	NV	NV	NV	NV	0.141 U	0.197 UJ
Aniline	NV	NV	NV	NV	0.707 U	0.99 UJ
Anthracene	110,000	NV	NV	NV	0.211 J	0.197 UJ
Benzo(a)anthracene	170	4,800	1.6	NV	0.141 U	0.197 UJ
Benzo(a)pyrene	NV	NV	NV	NV	0.212 U	0.297 UJ
Benzo(b)fluoranthene	170	4,900	NV	NV	0.212 U	0.297 UJ
Benzo(ghi)perylene	NV	NV	NV	NV	0.141 U	0.197 UJ
Benzo(k)fluoranthene	1,700	49,000	NV	NV	0.212 U	0.297 UJ
Benzoic acid	NV	NV	NV	NV	17.7 U	49.4 UJ
Benzyl alcohol	NV	NV	NV	NV	0.707 U	0.99 UJ
Bis(2-chloroethoxy)methane	NV	NV	NV	NV	0.353 U	0.494 UJ
Bis(2-chloroethyl)ether	16	450	0.00019	NV	0.353 U	0.494 UJ
Bis(2-ethylhexyl)phthalate	1,300	37,000	NV	NV	11.8	4.08 J
Butylbenzylphthalate	NV	NV	NV	NV	0.707 U	1.97 UJ
Carbazole	NV	NV	NV	NV	0.212 U	0.297 UJ

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Sample Name:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Date:					08/10/2022	1/30/2023
Collection Depth (ft bml):					Surface	0.5-2.0 ^(a)
Chrysene	17,000	490,000	NV	NV	0.141 U	0.197 UJ
Di(2-ethylhexyl)adipate	NV	NV	NV	NV	3.53 U	4.94 UJ
Dibenzo(a,h)anthracene	17	490	NV	NV	0.141 U	0.197 UJ
Dibenzofuran	NV	NV	NV	NV	0.141 U	0.197 UJ
Diethyl phthalate	NV	NV	NV	NV	0.707 U	0.99 UJ
Dimethyl phthalate	NV	NV	NV	NV	0.707 U	0.99 UJ
Di-n-butyl phthalate	NV	NV	NV	NV	0.707 U	0.99 UJ
Di-n-octyl phthalate	NV	NV	NV	NV	1.13 U	1.72 UJ
Fluoranthene	10,000	280,000	NV	NV	0.179 J	0.197 UJ
Fluorene	14,000	390,000	NV	NV	0.141 U	0.197 UJ
Hexachlorobenzene	11	320	0.018	NV	0.141 U	0.197 UJ
Hexachlorobutadiene	NV	NV	NV	NV	0.353 U	0.494 UJ
Hexachlorocyclopentadiene	NV	NV	NV	NV	0.707 U	0.99 UJ
Hexachloroethane	180	5,100	0.022	NV	0.353 U	0.494 UJ
Indeno(1,2,3-cd)pyrene	170	4,900	NV	NV	0.141 U	0.197 UJ
Isophorone	NV	NV	NV	NV	0.353 U	0.494 UJ
Naphthalene	580	16,000	0.077	NV	0.283 U	0.396 UJ
Nitrobenzene	NV	NV	NV	NV	1.41 U	1.97 UJ
N-Nitrosodimethylamine	NV	NV	NV	NV	0.353 U	0.494 UJ
N-Nitrosodiphenylamine	3,800	110,000	10	NV	0.353 U	0.99 UJ
N-Nitrosodipropylamine	2.7	74	0.00094	NV	0.353 U	0.494 UJ
Pentachlorophenol	34	960	0.066	NV	1.41 U	1.97 UJ
Phenanthrene	NV	NV	NV	NV	0.366	0.582 J
Phenol	NV	NV	NV	NV	0.283 U	0.396 UJ
Pyrene	7,500	210,000	NV	NV	0.189 J	0.304 J
Pyridine	NV	NV	NV	NV	0.707 U	0.99 UJ
cPAH TEQ ^{(e)(4)}	17	490	4.4	NV	0.212 U	0.297 UJ
TPH (mg/kg)						
Gasoline-range hydrocarbons	9,700	NV	31	NV	182 U	26.7 U
Diesel-range hydrocarbons	4,600	NV	9,500	NV	20,500	26,100 J+
Lube-oil-range hydrocarbons	NV	NV	NV	NV	4,230 U	2,070 UJ
VOCs (mg/kg)						
1,1,1,2-Tetrachloroethane	NV	NV	NV	NV	0.456 U	0.133 U
1,1,1-Trichloroethane	470,000	NV	190	NV	0.456 U	0.133 U
1,1,2,2-Tetrachloroethane	NV	NV	NV	NV	0.911 U	0.0533 U
1,1,2-Trichloroethane	54	1,500	0.0063	NV	0.456 U	0.0267 U
1,1-Dichloroethane	3,200	89,000	0.044	NV	0.456 U	0.0107 U
1,1-Dichloroethene	13,000	370,000	6.7	NV	0.456 U	0.0107 U
1,1-Dichloropropene	NV	NV	NV	NV	0.911 U	0.267 U
1,2,3-Trichlorobenzene	NV	NV	NV	NV	4.56 U	1.33 U
1,2,3-Trichloropropane	NV	NV	NV	NV	0.911 U	0.0267 U
1,2,4-Trichlorobenzene	NV	NV	NV	NV	4.56 U	1.33 U
1,2,4-Trimethylbenzene	2,900	81,000	10	NV	0.911 U	0.0533 U
1,2-Dibromo-3-chloropropane	NV	NV	NV	NV	4.56 U	0.0267 U
1,2-Dibromoethane	9	250	0.00012	NV	0.911 U	0.0107 U
1,2-Dichlorobenzene	20,000	560,000	36	NV	0.456 U	0.133 U

**Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Collection Date:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP 08/10/2022
Collection Depth (ft bml):					Surface	0.5-2.0 ^(a)
1,2-Dichloroethane	200	5,600	0.0028	NV	0.456 U	0.0107 U
1,2-Dichloropropane	NV	NV	NV	NV	0.456 U	0.0107 U
1,3,5-Trimethylbenzene	2,900	81,000	11	NV	0.911 U	0.0533 U
1,3-Dichlorobenzene	NV	NV	NV	NV	0.456 U	0.133 U
1,3-Dichloropropane	NV	NV	NV	NV	0.911 U	0.267 U
1,4-Dichlorobenzene	1,300	36,000	0.057	NV	0.456 U	0.133 U
2,2-Dichloropropane	NV	NV	NV	NV	0.911 U	0.267 U
2-Butanone	NV	NV	NV	NV	9.11 U	2.67 U
2-Chlorotoluene	NV	NV	NV	NV	0.911 U	0.267 U
2-Hexanone	NV	NV	NV	NV	18.2 UJ	2.67 U
4-Chlorotoluene	NV	NV	NV	NV	0.911 U	0.267 U
4-Isopropyltoluene	NV	NV	NV	NV	0.911 U	0.267 U
4-Methyl-2-pentanone	NV	NV	NV	NV	9.11 U	2.67 U
Acetone	NV	NV	NV	NV	18.2 U	5.33 U
Acrylonitrile	40	1,100	0.00036	NV	1.82 U	0.533 U
Benzene	380	11,000	0.023	NV	0.182 U	0.0107 U
Bromobenzene	NV	NV	NV	NV	0.456 U	0.133 U
Bromodichloromethane	230	6,300	0.002	NV	0.911 U	0.267 U
Bromoform	2,700	74,000	0.046	NV	1.82 U	0.533 U
Bromomethane	370	10,000	0.083	NV	18.2 U	5.33 U
Carbon disulfide	NV	NV	NV	NV	9.11 U	2.67 U
Carbon tetrachloride	320	8,900	0.013	NV	0.911 U	0.267 U
Chlorobenzene	4,700	130,000	5.8	NV	0.456 U	0.133 U
Chlorobromomethane	NV	NV	NV	NV	0.911 U	0.267 U
Chloroethane	NV	NV	310	NV	9.11 U	5.33 UJ
Chloroform	410	11,000	0.0034	NV	0.911 U	0.0533 U
Chloromethane	25,000	700,000	2.2	NV	4.56 U	1.33 U
cis-1,2-Dichloroethane	710	20,000	0.63	NV	0.456 U	0.0107 U
cis-1,3-Dichloropropene	NV	NV	NV	NV	0.911 U	0.0107 U
Dibromochloromethane	210	5,800	0.0024	NV	1.82 U	0.533 U
Dibromomethane	NV	NV	NV	NV	0.911 U	0.267 U
Dichlorodifluoromethane (Freon 12)	NV	NV	NV	NV	1.82 U	0.533 U
Ethylbenzene	1,700	49,000	0.22	NV	0.456 U	0.0267 U
Hexachlorobutadiene	NV	NV	NV	NV	1.82 U	0.533 U
Isopropylbenzene	27,000	750,000	96	NV	0.911 U	0.267 U
m,p-Xylene	NV	NV	NV	NV	0.911 U	0.0533 U
Methyl tert-butyl ether	12,000	320,000	0.11	NV	0.911 U	0.0213 U
Methylene chloride	2,100	58,000	0.14	NV	9.11 U	2.67 U
Naphthalene	580	16,000	0.077	NV	3.65 UJ	0.533 U
n-Butylbenzene	NV	NV	NV	NV	0.911 U	0.267 U
n-Propylbenzene	NV	NV	NV	NV	0.456 U	0.133 U
o-Xylene	NV	NV	NV	NV	0.456 U	0.0267 U
sec-Butylbenzene	NV	NV	NV	NV	0.911 U	0.267 U
Styrene	56,000	NV	170	NV	0.911 U	0.267 U
tert-Butylbenzene	NV	NV	NV	NV	0.911 U	0.267 U
Tetrachloroethene	1,800	50,000	0.46	NV	0.456 U	0.0107 U

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location:	RBC, Soil, Ingestion, Dermal Contact, and Inhalation ⁽¹⁾		RBC, Soil, Leaching to Groundwater ⁽¹⁾	Background Metals, Portland Basin ⁽²⁾	DU1	MFA-B1-B5-COMP
	Sample Name:	Construction Worker	Excavation Worker		Residential	DU1-20220810-ISM-COMP
Collection Date:					08/10/2022	1/30/2023
Collection Depth (ft bml):					Surface	0.5-2.0 ^(a)
Toluene	28,000	770,000	84	NV	0.911 U	0.0297 J
trans-1,2-Dichloroethene	7,100	200,000	7	NV	0.456 U	0.0107 U
trans-1,3-Dichloropropene	NV	NV	NV	NV	0.911 U	0.0107 U
Trichloroethene	130	3,700	0.013	NV	0.456 U	0.0107 U
Trichlorofluoromethane (Freon 11)	69,000	NV	61	NV	1.82 U	0.533 U
Vinyl chloride	34	950	0.00057	NV	0.456 U	0.0533 U
Xylenes, total ^(f)	20,000	560,000	23	NV	0.911 U	0.0533 U

Table 4-1
Summary of Wastewater Lagoon Sludge Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Notes
Detected results are shown in bold font.
Shading (color key below) indicates values that exceed screening criteria; non-detects (U and UJ) and rejected data (R) were not compared with screening criteria. When multiple screening criteria are exceeded, the result is shaded based on the highest criterion. When multiple screening criteria with the same value are exceeded, the result is shaded based on the criterion presented to the right.
DEQ RBC, soil, ingestion, dermal contact, and inhalation, construction worker
DEQ RBC, soil, soil leaching to groundwater, residential
-- = not analyzed or result qualified as rejected.
cPAH TEQ = carcinogenic polycyclic aromatic hydrocarbon.
DEQ = Oregon Department of Environmental Quality.
EPA = U.S. Environmental Protection Agency.
ft bml = feet below mudline.
J = result is estimated.
J+ = result is estimated but may be biased high.
J- = result is estimated but may be biased low.
mg/kg = milligrams per kilogram.
NV = no value.
PCB = polychlorinated biphenyl.
pg/g = picograms per gram.
R = result is rejected. The analyte may or may not be present in the sample.
RBC = risk-based concentration.
SVOC = semivolatile organic compound.
TEF = toxic equivalency factor.
TEQ = toxicity equivalence.
TPH = total petroleum hydrocarbon.
U = result is non-detect at the detection limit.
UJ = result is non-detect with an estimated detection limit.
UK = result is non-detect at the estimated maximum potential concentration.
VOC = volatile organic compound.
^(a) At time of collection, discrete sample IDs were assigned based on collection depth from barge deck.
^(b) Dioxin/furan TEQs are calculated as the sum of each detected congener concentration multiplied by the corresponding TEF value. Non-detect congeners are multiplied by one-half as well as the corresponding TEF value.
^(c) Total PCBs is the sum of all detected PCB congeners. Non-detect PCB congeners are not included in the sum.
^(d) PCB congener numbers 001 through 014, and PCB-077 could not be reported by the laboratory because the sample matrix interfered with analyte recovery. The total PCB congener result should be considered an estimated value with a low bias.
^(e) cPAH TEQ calculated as the sum of each cPAH multiplied by the corresponding TEF with non-detect results also multiplied by one-half. When all cPAHs are non-detect, the highest detection limit is provided.
^(f) Total xylenes is the sum of m,p-xylene and o-xylene. When both results are non-detect, the higher detection limit is used.
References
⁽¹⁾ DEQ. 2023. Table: Risk-Based Concentrations for Individual Chemicals. Oregon Department of Environmental Quality. June.
⁽²⁾ DEQ. 2013. Development of Oregon Background Metals Concentrations in Soil. Oregon Department of Environmental Quality, Land Quality Division Cleanup Program, Portland, Oregon. March.
⁽³⁾ Van den Berg, M. et al. 1998. "Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife." Environmental Health Perspectives. 106 (12):775-792.
⁽⁴⁾ EPA. 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. 600/R-93/089. U.S. Environmental Protection Agency. July.

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**



Location: Sample Name: Collection Date: Collection Depth (ft) ^(c) :	RBC, Groundwater, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
										36	70	60	35	35	40	40	40.25
Total Metals (ug/L)																	
Antimony	NV	190	900	NV	NV	21,000	52,000	690	2,300	0.697 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Arsenic	0.052	150	340	NV	NV	380,000	760,000	560	5,600	29.1	0.519 J	4.59	0.773 J	0.722 J	25.8	11.2	27.7
Barium	4,000	220	2,000	NV	NV	220,000	770,000	6,100	8,800	1,080	64.9	19.6	70.1	70.9	856	760	617
Beryllium	40	11	93	NV	NV	5,900	82,000	2,900	29,000	6.44	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	20	0.094	0.49	NV	NV	7,100	71,000	4,800	17,000	1.5	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	NV	NV	NV	NV	NV	82	2000	160,000	630,000	339	1 U	1 U	1 U	1 U	2.26	1 U	1.2 J
Chromium, hexavalent	0.05	11	16	NV	NV	12,000	130,000	160,000	630,000	0.057	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.04 U	0.04 U	0.04 U
Copper	800	1.4	2.3	NV	NV	50,000	500,000	22,000	33,000	210	1 U	3.12	1 U	1 U	1.18 J	1 U	1 U
Lead	15	0.54	14	NV	NV	78	780	4,300	16,000	66.8	0.122 J	0.619	0.11 U	0.11 U	0.375	0.11 U	0.11 U
Manganese	480	93	1,700	NV	NV	110,000	160,000	6,300	63,000	2,350	55.1	19	826	826	4,080	6,640	2,860
Mercury	6	0.012	1.4	0.0013	0.012	1,000,000	10,000,000	140	710	0.328	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Nickel	400	16	140	NV	NV	1,400	14,000	890	1400	285	1 U	1 U	1.21 J	1 U	4.04	2.46	2.49
Selenium	NV	4.6	20	NV	NV	4,500	45,000	110,000	1,100,000	4.48	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Silver	100	0.1	0.3	NV	NV	490,000	4,900,000	31	310	0.776	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Thallium	NV	6	54	NV	NV	1,400	14,000	31	310	0.711	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Zinc	NV	36	36	NV	NV	490,000	4,900,000	560,000	4,400,000	802	2.21 J	2.5 J	2 U	2 U	3.58 J	2 U	5.18
Chlorinated Herbicides (ug/L)																	
2,4,5-T	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.14 U	0.14 U	0.14 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
2,4-D	170	79	130	NV	NV	NV	NV	NV	NV	0.34 U	0.34 U	0.34 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
2,4-DB	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.99 U	0.99 U	0.99 U	5 U	5 U	5 U	5 U	5 U
3,5-Dichlorobenzoic acid	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.28 U	0.28 U	0.28 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
4-Nitrophenol	NV	58	530	NV	NV	NV	NV	NV	NV	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acifluorfen	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.24 U	0.24 U	0.24 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Bentazon	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.55 U	0.55 U	0.55 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Dacthal	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.2 U	0.2 U	0.2 U	1 U	1 U	1 U	1 U	1 U
Dalapon	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.16 U	0.16 U	0.16 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Dicamba	NV	15	61	NV	NV	NV	NV	NV	NV	0.19 U	0.19 U	0.19 U	0.95 U	0.95 U	0.95 U	0.95 U	0.95 U
Dichlorprop	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.24 U	0.24 U	0.24 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Dinoseb	NV	0.48	4.8	NV	NV	NV	NV	NV	NV	0.09 U	0.09 U	0.09 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
MCPA	7.4	2.6	90	NV	NV	NV	NV	NV	NV	40 U	40 U	40 U	200 U	200 U	200 U	200 U	200 U
Mecoprop	NV	NV	NV	NV	NV	NV	NV	NV	NV	27 U	27 U	27 U	140 U	140 U	140 U	140 U	140 U
Pentachlorophenol	0.044	6.7	8.7	NV	NV	13,000	130,000	1,000	10,000	0.18 U	0.18 U	0.18 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Picloram	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.13 U	0.13 U	0.13 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
Silvex	NV	30	270	NV	NV	NV	NV	NV	NV	0.14 U	0.14 U	0.14 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Dioxins/Furans (pg/L)																	
1,2,3,4,6,7,8-HpCDD	NV	NV	NV	NV	NV	NV	NV	NV	NV	79	1.06 U	1.01 U	1 U	1.03 U	1.06 U	1.01 U	1.39 U
1,2,3,4,6,7,8-HpCDF	NV	NV	NV	NV	NV	NV	NV	NV	NV	7.9 U	0.87 U	0.844 U	0.815 U	0.893 U	0.88 U	0.893 U	0.975 U
1,2,3,4,7,8,9-HpCDF	NV	NV	NV	NV	NV	NV	NV	NV	NV	1.37 U	0.962 U	0.897 U	0.888 U	0.955 U	0.954 U	0.975 U	1.05 U
1,2,3,4,7,8-HxCDD	NV	NV	NV	NV	NV	NV	NV	NV	NV	1.55 U	1.1 U	1.02 U	0.979 U	1.04 U	1.05 U	1.05 U	1.25 U
1,2,3,4,7,8-HxCDF	NV	NV	NV	NV	NV	NV	NV	NV	NV	1.05 U	0.904 U	0.891 U	0.815 U	0.879 U	0.937 U	0.944 U	0.994 U
1,2,3,6,7,8-HxCDD	NV	NV	NV	NV	NV	NV	NV	NV	NV	69.9	1.08 U	1.07 U	1.01 U	1.03 U	1.01 U	1.04 U	1.21 U
1,2,3,6,7,8-HxCDF	NV	NV	NV	NV	NV	NV	NV	NV	NV	1.27 U	0.911 U	0.884 U	0.817 U	0.908 U	0.922 U	0.944 U	0.986 U
1,2,3,7,8,9-HxCDD	NV	NV	NV	NV	NV	NV	NV	NV	NV	40.4 J	1.02 U	0.971 U	0.924 U	0.964 U	0.959 U	0.972 U	1.14 U
1,2,3,7,8,9-HxCDF	NV	NV	NV	NV	NV	NV	NV	NV	NV	1.15 U	0.979 U	0.955 U	0.894 U	0.973 U	0.995 U	1.03 U	1.12 U
1,2,3,7,8-PeCDD	NV	NV	NV	NV	NV	NV	NV	NV	NV	4.31 J	1.07 U	1.06 U	0.983 U	1.1 U	1.15 U	1.08 U	1.34 U
1,2,3,7,8-PeCDF	NV	NV	NV	NV	NV	NV	NV	NV	NV	1.76 U	1.31 U	1.33 U	1.19 U	1.29 U	1.33 U	1.3 U	1.43 U

Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location:	RBC, Groundwater, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
Sample Name:										MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
Collection Date:		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
Collection Depth (ft) ^(c) :		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	36	70	60	35	35	40	40	40.25
Total endosulfans ^(g)	NV	0.056	0.22	NV	NV	NV	NV	NV	0.00278 J	0.000074 U	0.000158 J	0.00014 J	0.00019 J	0.00028 J	0.00016 J	0.0002 J	
Total hexachlorocyclohexanes ^(h)	NV	0.08	0.95	0.11	0.95	2,300	9,200	62	620	0.00049 J	0.00012 J	9.45E-05 J	7.2E-05 J	6.4E-05 J	0.00028 J	0.00024 J	0.00014 J
Organophosphorus Pesticides (ug/L)																	
Coumaphos	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.532 U
Demeton-O	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Demeton-S	NV	0.1	5.2	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Diazinon	NV	0.17	0.17	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Dichlorvos	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Dimethoate	NV	0.5	22	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Disulfoton	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Dursban (Chloropyrifos)	NV	0.041	0.083	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Ethoprop	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Fensulfotion	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Fenthion	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Guthion (Azinphos-Methyl)	NV	0.01	0.08	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Merphos	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.658 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Methyl parathion	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Mevinphos	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Monocrotophos	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Naled	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Parathion	NV	0.013	0.065	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Phorate	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Pyridine	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Santox (EPN)	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Stirofos	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Sulfotepp	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Sulprofos (Bolstar)	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Sumitox (Malathion)	NV	0.1	0.3	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Tetraethylpyrophosphate	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.538 U	0.549 U	0.532 U
Tokuthion	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
Trichloronate	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.329 U	0.26 U	0.26 U	0.248 U	0.248 U	0.269 U	0.275 U	0.266 U
PFAS (ug/L)																	
9CI-PF3ONS (F-53B Major)	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0043 U	0.0043 U	0.0043 U	0.0043 U	0.0043 U
11CI-PF3OUdS (F-53B Minor)	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0035 U	0.0035 U	0.0035 U	0.0035 U	0.0035 U
4:2 FTSA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0033 U
6:2 FTSA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0021 J
8:2 FTSA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	0.0059 J
ADONA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0027 U	0.0027 U	0.0027 U	0.0027 U	0.0027 U
EtFOSA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U
EtFOSAA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0046 U	0.0046 U	0.0046 U	0.0046 U	0.0046 U
EtFOSE	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U
HFPO-DA (GenX)	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U
MeFOSA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U
MeFOSAA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U	0.0045 U
MeFOSE	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
PFBA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.017 J	0.02 U	0.02 U	0.023	0.022	0.02 U	0.015 J	0.0098 J
PFBS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.0037 J	0.02 U	0.0028 J

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name:	RBC, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
Collection Date:										2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
Collection Depth (ft) ^(c) :		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	36	70	60	35	35	40	40	40.25
PFDA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.021	0.018 J	0.02 U	0.0057 J	0.012 J
PFDaA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFDS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFHpA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0036 J	0.02 U	0.02 U	0.068	0.067	0.0087 J	0.042	0.049
PFHpS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFHxA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0086 J	0.02 U	0.02 U	0.046	0.044	0.16	0.13	0.076
PFHxS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0022 J	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFNA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.007 J	0.02 U	0.056	0.053	0.003 J	0.017 J	0.038
PFNS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFOA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0082 J	0.011 J	0.02 U	0.1	0.096	0.025	0.06	0.083
PFOS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0066 J	0.02 U	0.02 U	0.0076 J	0.007 J	0.02 U	0.02 U	0.012 J
PFOSA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFPeA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0061 J	0.02 U	0.02 U	0.033	0.031	0.012 J	0.026	0.022
PFPeS	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFTeDA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 UJ	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFTrDA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 UJ	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PFUnA	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB Congeners (pg/L)																	
2-MonoCB-(1)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	28	23 U	13 J	17 U	24	18 J	42
3-MonoCB-(2)	NV	NV	NV	NV	NV	NV	NV	NV	NV	260 U	55	21 U	11 U	17 U	19 U	16 U	13 U
4-MonoCB-(3)	NV	NV	NV	NV	NV	NV	NV	NV	NV	94 U	100	18 U	9.5 U	14 U	17 U	14 U	11 U
2,2'-DiCB-(4)	NV	NV	NV	NV	NV	NV	NV	NV	NV	210 U	20 U	25 U	10 J	20 U	22 U	22 U	17 J
2,3-DiCB-(5)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	5.3 U	8.3 U	3.2 U	8.4 U	9.8 U	9 U	6.3 U
2,4-DiCB-(7)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	5.3 U	8.4 U	3.1 U	8.3 U	9.7 U	8.9 U	6.2 U
2,4'-DiCB-(8)	NV	NV	NV	NV	NV	NV	NV	NV	NV	380 U	9.1 UJ	8.2 U	3 U	8 U	9.3 U	8.6 UJ	20.3 UJ
Total octaCB	NV	NV	NV	NV	NV	NV	NV	NV	NV	250 U	5.5 U	8.6 U	3.1 U	8.2 U	9.6 U	8.9 U	6.2 U
2,5-DiCB-(9)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	5.2 U	8.2 U	3.1 U	8.1 U	9.5 U	8.7 U	6.1 U
2,6-DiCB-(10)	NV	NV	NV	NV	NV	NV	NV	NV	NV	180 U	7.3 U	11 U	3.9 U	10 U	12 U	11 U	7.8 U
3,3'-DiCB-(11)	NV	NV	NV	NV	NV	NV	NV	NV	NV	780 UJ	365 J+	102 UJ	3.2 UJ	118 UJ	73.8 UJ	117 UJ	139 UJ
PCBs 12 + 13	NV	NV	NV	NV	NV	NV	NV	NV	NV	230 U	5.7 J	7.9 U	2.9 U	7.6 U	9 U	8.2 U	5.8 U
3,5-DiCB-(14)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	5.4 U	8.5 U	3.2 U	8.3 U	9.8 U	9 U	6.3 U
4,4'-DiCB-(15)	NV	NV	NV	NV	NV	NV	NV	NV	NV	250 U	13.8 UJ	7.5 U	2.7 U	7 U	8.4 U	7.5 U	9.2 UJ
2,2',3-TriCB-(16)	NV	NV	NV	NV	NV	NV	NV	NV	NV	82 U	13 U	13 U	7.1 U	12 U	15 U	13 U	10 U
2,2',4-TriCB-(17)	NV	NV	NV	NV	NV	NV	NV	NV	NV	190 U	11 U	10 U	5.7 U	9.4 U	12 U	11 U	8.4 U
PCBs 18 + 30	NV	NV	NV	NV	NV	NV	NV	NV	NV	170 U	12.3 UJ	8.5 U	4.9 U	8.1 U	10 U	9.1 U	13.1 UJ
2,2',6-TriCB-(19)	NV	NV	NV	NV	NV	NV	NV	NV	NV	270 U	12 U	18 U	9 U	17 U	19 U	17 U	14 U
PCBs 20 + 28	NV	NV	NV	NV	NV	NV	NV	NV	NV	100 U	5.9 UJ	7.7 UJ	3.3 UJ	12.5 UJ	9.5 UJ	8.4 UJ	4.8 U
PCBs 21 + 33	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	3.8 UJ	4.7 UJ	3.6 U	7.8 UJ	7.6 U	6.7 U	16.8 UJ
2,3,4'-TriCB-(22)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	6.4 U	7 UJ	3.7 U	6 U	7.6 U	6.8 U	5.4 U
2,3,5-TriCB-(23)	NV	NV	NV	NV	NV	NV	NV	NV	NV	37 U	6.3 U	5.9 U	3.7 U	6.1 U	7.7 U	6.8 U	5.4 U
2,3,6-TriCB-(24)	NV	NV	NV	NV	NV	NV	NV	NV	NV	52 U	8 U	7.5 U	4.5 U	7.4 U	9.4 U	8.3 U	6.6 U
2,3',4-TriCB-(25)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	6.4 U	6 U	3.7 U	6.1 U	7.8 U	6.9 U	5.5 U
PCBs 26 + 29	NV	NV	NV	NV	NV	NV	NV	NV	NV	100 U	5.8 U	5.4 U	3.4 U	5.6 U	7.1 U	6.3 U	5 U
2,3',6-TriCB-(27)	NV	NV	NV	NV	NV	NV	NV	NV	NV	140 U	7.6 U	7.1 U	4.2 U	6.9 U	8.8 U	7.8 U	6.2 U
2,4',5-TriCB-(31)	NV	NV	NV	NV	NV	NV	NV	NV	NV	98 U	11.4 UJ	14.8 UJ	3.2 UJ	12 UJ	7.6 UJ	6 U	4.8 U
2,4',6-TriCB-(32)	NV	NV	NV	NV	NV	NV	NV	NV	NV	140 U	7.4 U	7 U	4 U	6.6 U	8.4 U	7.4 U	5.9 U
2,3',5'-TriCB-(34)	NV	NV	NV	NV	NV	NV	NV	NV	NV	37 U	6.2 U	5.8 U	3.6 U	6 U	7.6 U	6.7 U	5.3 U

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name:	RBC, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
										MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
Collection Date:		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
Collection Depth (ft) ^(c) :		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	36	70	60	35	35	40	40	40.25
3,3',4,-TriCB-(35)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	6.4 U	6 U	3.5 U	5.8 U	7.4 U	6.5 U	5.2 U
3,3',5-TriCB-(36)	NV	NV	NV	NV	NV	NV	NV	NV	NV	31 U	5.7 U	5.3 U	3.2 U	5.3 U	6.8 U	6 U	4.8 U
3,4,4'-TriCB-(37)	NV	NV	NV	NV	NV	NV	NV	NV	NV	42 U	6.6 U	7.7 UJ	3.2 U	5.1 U	6.7 U	5.8 U	10.1 UJ
3,4,5-TriCB-(38)	NV	NV	NV	NV	NV	NV	NV	NV	NV	35 U	5.9 U	5.5 U	3.4 U	5.6 U	7.1 U	6.3 U	5 U
3,4',5-TriCB-(39)	NV	NV	NV	NV	NV	NV	NV	NV	NV	73 U	6.3 U	5.9 U	3.6 U	5.9 U	7.5 U	6.7 U	5.3 U
PCBs 40 + 41 + 71	NV	NV	NV	NV	NV	NV	NV	NV	NV	330 U	19 U	16 U	11 U	14 U	19 U	19 U	14 U
2,2',3,4'-TetraCB-(42)	NV	NV	NV	NV	NV	NV	NV	NV	NV	660 U	26 U	22 U	15 U	19 U	26 U	26 U	20 U
2,2',3,5-TetraCB-(43)	NV	NV	NV	NV	NV	NV	NV	NV	NV	460 U	25 U	21 U	14 U	18 U	25 U	25 U	19 U
PCBs 44/47/65	NV	NV	NV	NV	NV	NV	NV	NV	NV	320 U	18 U	28 J	19 J	29 UJ	18 U	20 J	37 J
PCBs 45 + 51	NV	NV	NV	NV	NV	NV	NV	NV	NV	350 U	20 UK	17 U	11 U	15 U	20 U	20 U	15 U
2,2',3,6'-TetraCB-(46)	NV	NV	NV	NV	NV	NV	NV	NV	NV	590 U	22 U	19 U	12 U	16 U	22 U	22 U	17 U
2,2',4,5-TetraCB-(48)	NV	NV	NV	NV	NV	NV	NV	NV	NV	510 U	19 U	16 U	11 U	14 U	19 U	19 U	15 U
PCBs 49 + 69	NV	NV	NV	NV	NV	NV	NV	NV	NV	300 U	17 U	15 U	9.7 U	12 U	17 U	17 U	17 UJ
PCBs 50 + 53	NV	NV	NV	NV	NV	NV	NV	NV	NV	520 U	19 U	17 U	11 U	14 U	20 U	20 U	15 U
2,2',5,5'-TetraCB-(52)	NV	NV	NV	NV	NV	NV	NV	NV	NV	510 U	31 UJ	49 UJ	11 U	20 UJ	19 U	19 U	38 UJ
2,2',6,6'-TetraCB-(54)	NV	NV	NV	NV	NV	NV	NV	NV	NV	300 U	21 U	28 U	18 U	26 U	34 U	29 U	23 U
2,3,3',4-TetraCB-(55)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	15 U	12 U	7.7 U	9.9 U	14 U	14 U	10 U
2,3,3',4'-Tetra CB-(56)	NV	NV	NV	NV	NV	NV	NV	NV	NV	350 U	14 U	12 U	7.5 U	9.5 U	13 U	13 U	10 U
2,3,3',5-TetraCB-(57)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	14 U	12 U	7.4 U	9.4 U	13 U	13 U	10 U
2,3,3',5'-TetraCB-(58)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	13 U	11 U	7.3 U	9.3 U	13 U	13 U	9.9 U
PCBs 59/62/75	NV	NV	NV	NV	NV	NV	NV	NV	NV	370 U	14 U	12 U	7.7 U	9.8 U	14 U	14 U	10 U
2,3,4,4'-TetraCB-(60)	NV	NV	NV	NV	NV	NV	NV	NV	NV	340 U	14 U	12 U	7.2 U	9.3 U	13 U	13 U	9.8 U
PCBs 61/70/74/76	NV	NV	NV	NV	NV	NV	NV	NV	NV	350 U	32 UJ	58 UJ	7.4 UJ	26 UJ	13 U	13 U	47 UJ
2,3,4',5-TetraCB-(63)	NV	NV	NV	NV	NV	NV	NV	NV	NV	330 U	13 U	11 U	7.1 U	9.1 U	13 U	13 U	9.6 U
2,3,4',6-TetraCB-(64)	NV	NV	NV	NV	NV	NV	NV	NV	NV	290 U	16 U	14 U	9 U	11 U	16 U	16 U	12 U
2,3',4,4'-TetraCB-(66)	NV	NV	NV	NV	NV	NV	NV	NV	NV	330 U	13 U	11 UK	7 U	9.3 UJ	12 U	12 U	20.4 UJ
2,3',4,5-TetraCB-(67)	NV	NV	NV	NV	NV	NV	NV	NV	NV	190 U	11 U	9.5 U	6.1 U	7.8 U	11 U	11 U	8.3 U
2,3',4,5'-TetraCB-(68)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	12 U	11 U	6.6 U	8.5 U	12 U	12 U	9 U
2,3',5,5'-TetraCB-(72)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	13 U	11 U	7.1 U	9.1 U	13 U	13 U	9.7 U
2,3',5',6-TetraCB-(73)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	13 U	11 U	7.5 U	9.6 U	13 U	13 U	10 U
3,3',4,4'-TetraCB-(77)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	11 U	8.6 U	5.5 U	6.8 U	9.7 U	9.8 U	9 J
3,3',4,5-TetraCB-(78)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	15 U	12 U	7.7 U	9.8 U	14 U	14 U	10 U
3,3',4,5'-TetraCB-(79)	NV	NV	NV	NV	NV	NV	NV	NV	NV	200 U	11 U	9.5 U	6.1 U	7.8 U	11 U	11 U	8.3 U
3,3',5,5'-TetraCB-(80)	NV	NV	NV	NV	NV	NV	NV	NV	NV	190 U	11 U	9.7 U	6 U	7.7 U	11 U	11 U	8.1 U
3,4,4',5-TetraCB-(81)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	12 U	9.3 U	6 U	7.6 U	11 U	11 U	8.3 U
2,2',3,3',4-PentaCB-(82)	NV	NV	NV	NV	NV	NV	NV	NV	NV	310 U	25 U	18 U	11 U	13 U	18 U	18 U	14 U
PCBs 83 + 99	NV	NV	NV	NV	NV	NV	NV	NV	NV	380 U	20 U	15 U	8.7 U	11 U	15 U	15 U	12 U
2,2',3,3',6-PentaCB-(84)	NV	NV	NV	NV	NV	NV	NV	NV	NV	410 U	21 U	19 UJ	9.6 U	12 U	16 U	17 U	13 U
PCBs 85/116/117	NV	NV	NV	NV	NV	NV	NV	NV	NV	300 U	26 U	26 J	6.8 U	8.4 U	12 U	12 U	9.1 U
PCBs 86/87/97/109/119/125	NV	NV	NV	NV	NV	NV	NV	NV	NV	310 U	26 UJ	50 UJ	7.3 U	15.2 UJ	12 U	13 U	9.8 U
PCBs 88 + 91	NV	NV	NV	NV	NV	NV	NV	NV	NV	400 U	20 U	15 U	9.3 U	12 U	16 U	16 U	12 U
2,2',3,4,6'-PentaCB-(89)	NV	NV	NV	NV	NV	NV	NV	NV	NV	310 U	24 U	18 U	11 U	14 U	19 U	19 U	15 U
PCBs 90 + 101 + 113	NV	NV	NV	NV	NV	NV	NV	NV	NV	430 UJ	16 UK	120 UJ	7.4 UJ	36.1 UJ	18 UJ	13 UJ	69.2 UJ
2,2',3,5,5'-PentaCB-(92)	NV	NV	NV	NV	NV	NV	NV	NV	NV	430 U	22 U	16 U	10 U	12 U	17 U	17 U	13 U
PCBs 93 + 98 + 100 + 102	NV	NV	NV	NV	NV	NV	NV	NV	NV	380 U	19 U	14 U	9.1 U	11 U	16 U	16 U	12 U
2,2',3,5,6'-PentaCB-(94)	NV	NV	NV	NV	NV	NV	NV	NV	NV	280 U	20 U	15 U	9.5 U	12 U	16 U	16 U	13 U
2,2',3,5',6-PentaCB-(95)	NV	NV	NV	NV	NV	NV	NV	NV	NV	420 U	52 U	104 U	9.9 UJ	33 UJ	17 U	17 U	58 U

Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Location: Sample Name: Collection Date: Collection Depth (ft) ^(c) :	RBC, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
										MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	36	70	60	35	35	40	40	40.25
2,2',3,6,6'-PentaCB-(96)	NV	NV	NV	NV	NV	NV	NV	NV	NV	220 U	16 U	12 U	8 U	10 U	14 U	14 U	11 U
2,2',4,5',6'-PentaCB-(103)	NV	NV	NV	NV	NV	NV	NV	NV	NV	380 U	20 U	14 U	8.9 U	11 U	15 U	15 U	12 U
2,2',4,6,6'-PentaCB-(104)	NV	NV	NV	NV	NV	NV	NV	NV	NV	89 U	16 UK	13 U	8.7 U	11 U	16 U	15 U	11 U
2,3,3',4,4'-PentaCB-(105)	NV	NV	NV	NV	NV	NV	NV	NV	NV	93 U	10 UJ	19.6 UJ	4.5 U	5.6 U	7.7 U	7.6 U	17.8 UJ
2,3,3',4,5'-PentaCB-(106)	NV	NV	NV	NV	NV	NV	NV	NV	NV	77 U	12 U	8.4 U	5.9 U	7.3 U	10 U	10 U	7.9 U
2,3,3',4',5'-PentaCB-(107)	NV	NV	NV	NV	NV	NV	NV	NV	NV	190 U	9.1 U	6.6 U	4.5 U	5.6 U	7.7 U	7.7 U	6 U
PCBs 108 + 124	NV	NV	NV	NV	NV	NV	NV	NV	NV	150 U	11 U	8.3 U	5.6 U	6.9 U	9.5 U	9.6 U	7.5 U
PCBs 110 + 115	NV	NV	NV	NV	NV	NV	NV	NV	NV	490 UJ	46 UJ	102 U	6.7 UJ	24.1 UJ	15 UJ	12 U	52.1 UJ
2,3,3',5,5'-PentaCB-(111)	NV	NV	NV	NV	NV	NV	NV	NV	NV	85 U	13 U	9.5 U	6 U	7.4 U	10 U	10 U	8 U
2,3,3',5,6'-PentaCB-(112)	NV	NV	NV	NV	NV	NV	NV	NV	NV	83 U	13 U	24.3 J	5.7 U	7.1 U	9.8 U	9.8 U	7.6 U
2,3,4,4',5'-PentaCB-(114)	NV	NV	NV	NV	NV	NV	NV	NV	NV	100 U	11 U	7.5 U	5.2 U	6.3 U	8.5 U	8.9 U	7 U
2,3',4,4',5'-PentaCB-(118)	NV	NV	NV	NV	NV	NV	NV	NV	NV	127 UJ	31 UJ	61.7 UJ	4.8 UJ	14.4 UJ	8.2 U	8.4 U	31.4 UJ
2,3',4,5,5'-PentaCB-(120)	NV	NV	NV	NV	NV	NV	NV	NV	NV	90 U	14 U	10 U	6.1 U	7.6 U	10 U	10 U	8.2 U
2,3',4,5',6'-PentaCB-(121)	NV	NV	NV	NV	NV	NV	NV	NV	NV	88 U	14 U	10 U	6.3 U	7.8 U	11 U	11 U	8.4 U
2,3,3',4',5'-PentaCB-(122)	NV	NV	NV	NV	NV	NV	NV	NV	NV	290 U	15 U	11 U	7.3 U	9.1 U	12 U	13 U	9.8 U
2,3',4,4',5'-PentaCB-(123)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	11 U	8.2 U	5.4 U	6.7 U	9.1 U	9.3 U	7.3 U
3,3',4,4',5'-PentaCB-(126)	NV	NV	NV	NV	NV	NV	NV	NV	NV	78 U	10 U	7.5 U	4.7 U	6 U	8.3 U	8.4 U	6.7 U
3,3',4,5,5'-PentaCB-(127)	NV	NV	NV	NV	NV	NV	NV	NV	NV	72 U	11 U	8.1 U	5.5 U	6.8 U	9.4 U	9.4 U	7.3 U
PCBs 128 + 166	NV	NV	NV	NV	NV	NV	NV	NV	NV	330 U	16 U	11 UK	6.6 U	9 U	9.9 U	11 U	9.9 U
PCBs 129/138/163	NV	NV	NV	NV	NV	NV	NV	NV	NV	520 UJ	61 UJ	139 UJ	7.5 UJ	25 UJ	11 U	12 U	56 UJ
2,2',3,3',4,5'-HexaCB-(130)	NV	NV	NV	NV	NV	NV	NV	NV	NV	420 U	18 U	13 U	8.2 U	11 U	12 U	14 U	12 U
2,2',3,3',4,6'-HexaCB-(131)	NV	NV	NV	NV	NV	NV	NV	NV	NV	530 U	23 U	17 U	10 U	14 U	15 U	17 U	15 U
2,2',3,3',4,6'-HexaCB-(132)	NV	NV	NV	NV	NV	NV	NV	NV	NV	440 U	20 U	44 UJ	8.9 U	12 U	13 U	15 U	19 UJ
2,2',3,3',5,5'-HexaCB-(133)	NV	NV	NV	NV	NV	NV	NV	NV	NV	440 U	20 U	14 U	8.8 U	12 U	13 U	15 U	13 U
PCBs 134 + 143	NV	NV	NV	NV	NV	NV	NV	NV	NV	330 U	22 U	16 U	9.4 U	13 U	14 U	16 U	14 U
PCBs 135 + 151	NV	NV	NV	NV	NV	NV	NV	NV	NV	510 U	37 UJ	76 UJ	10 U	14 U	15 U	17 U	38 UJ
2,2',3,3',6,6'-HexaCB-(136)	NV	NV	NV	NV	NV	NV	NV	NV	NV	370 U	16 U	23 UJ	7.4 U	10 U	11 U	12 U	11 U
2,2',3,4,4',5'-HexaCB-(137)	NV	NV	NV	NV	NV	NV	NV	NV	NV	410 U	19 U	13 U	7.8 U	10 U	12 U	13 U	12 U
PCBs 139 + 140	NV	NV	NV	NV	NV	NV	NV	NV	NV	370 U	17 U	12 U	7.2 U	9.6 U	11 U	12 U	11 U
2,2',3,4,5,5'-HexaCB-(141)	NV	NV	NV	NV	NV	NV	NV	NV	NV	380 U	16 U	29 UJ	7.4 U	10 U	11 U	12 U	14 UJ
2,2',3,4,5,6'-HexaCB-(142)	NV	NV	NV	NV	NV	NV	NV	NV	NV	160 U	21 U	15 U	9.2 U	12 U	14 U	15 U	14 U
2,2',3,4,5',6'-HexaCB-(144)	NV	NV	NV	NV	NV	NV	NV	NV	NV	500 U	22 U	16 U	9.9 U	13 U	15 U	16 U	15 U
2,2',3,4,6,6'-HexaCB-(145)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	15 U	11 U	7.2 U	9.7 U	11 U	12 U	11 U
2,2',3,4',5,5'-HexaCB-(146)	NV	NV	NV	NV	NV	NV	NV	NV	NV	340 U	16 U	18 UJ	6.8 U	9.2 U	10 U	11 U	10 U
PCBs 147 + 149	NV	NV	NV	NV	NV	NV	NV	NV	NV	360 U	72 UJ	134 U	7.1 UJ	32.3 UJ	13 UJ	12 U	63 UJ
2,2',3,4',5,6'-HexaCB-(148)	NV	NV	NV	NV	NV	NV	NV	NV	NV	170 U	23 U	16 U	10 U	14 U	15 U	17 U	15 U
2,2',3,4',6,6'-HexaCB-(150)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	16 U	11 U	7.1 U	9.6 U	11 U	12 U	11 U
2,2',3,5,6,6'-HexaCB-(152)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	17 U	12 U	7.4 U	9.9 U	11 U	12 U	11 U
PCBs 153 + 168	NV	NV	NV	NV	NV	NV	NV	NV	NV	320 UJ	62 UJ	125 U	6 UJ	25.3 UJ	12.8 UJ	9.9 U	59.4 UJ
2,2',4,4',5,6'-HexaCB-(154)	NV	NV	NV	NV	NV	NV	NV	NV	NV	390 U	18 U	13 U	7.8 U	11 U	12 U	13 U	12 U
2,2',4,4',6,6'-HexaCB-(155)	NV	NV	NV	NV	NV	NV	NV	NV	NV	93 U	18 U	11 U	7.7 U	9.8 U	14 U	14 U	11 U
PCBs 156 + 157	NV	NV	NV	NV	NV	NV	NV	NV	NV	100 U	10 U	9.8 UJ	4.9 U	6.2 U	6.3 U	7.8 U	7.1 U
2,3,3',4,4',6'-HexaCB-(158)	NV	NV	NV	NV	NV	NV	NV	NV	NV	250 U	11 U	11.3 UJ	4.9 U	6.6 U	7.3 U	8.1 U	7.3 U
2,3,3',4,5,5'-HexaCB-(159)	NV	NV	NV	NV	NV	NV	NV	NV	NV	140 U	9.6 U	6.8 U	4.7 U	6.3 U	7 U	7.7 U	6.9 U
2,3,3',4,5,6'-HexaCB-(160)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	14 U	10 U	6.2 U	8.3 U	9.2 U	10 U	9.2 U
2,3,3',4,5',6'-HexaCB-(161)	NV	NV	NV	NV	NV	NV	NV	NV	NV	100 U	14 U	9.6 U	5.7 U	7.7 U	8.6 U	9.5 U	8.5 U
2,3,3',4',5,5'-HexaCB-(162)	NV	NV	NV	NV	NV	NV	NV	NV	NV	140 U	9.5 U	6.8 U	4.6 U	6.2 U	6.8 U	7.5 U	6.8 U

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name:	RBC, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
										MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
Collection Date:	Aquatic Life	Aquatic-Dependent Wildlife		Birds		Mammals		2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	
Collection Depth (ft) ^(c) :		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	36	70	60	35	35	40	40	40.25
2,3,3',4',5',6'-HexaCB-(164)	NV	NV	NV	NV	NV	NV	NV	NV	NV	270 U	12 U	8.4 U	5.3 U	7.2 U	8 U	8.8 U	7.9 U
2,3,3',5,5',6'-HexaCB-(165)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	15 U	10 U	6.3 U	8.4 U	9.4 U	10 U	9.3 U
2,3',4,4',5,5'-HexaCB-(167)	NV	NV	NV	NV	NV	NV	NV	NV	NV	95 U	10 U	7.4 U	4.9 U	6.4 U	7.1 U	8 U	7.2 U
3,3',4,4',5,5'-HexaCB-(169)	NV	NV	NV	NV	NV	NV	NV	NV	NV	70 U	11 U	8.1 U	5.1 U	8.2 U	9.8 U	8.3 U	8.3 U
2,2',3,3',4,4',5-HeptaCB-(170)	NV	NV	NV	NV	NV	NV	NV	NV	NV	95 U	12 U	16.3 UJ	5.1 U	6.8 U	9.2 U	8.9 U	7.8 U
PCBs 171 + 173	NV	NV	NV	NV	NV	NV	NV	NV	NV	200 U	15 U	10 U	6.3 U	8.3 U	11 U	11 U	9.5 U
2,2',3,3',4,5,5'-HeptaCB-(172)	NV	NV	NV	NV	NV	NV	NV	NV	NV	240 U	15 U	11 U	6.2 U	8.2 U	11 U	11 U	9.3 U
2,2',3,3',4,5,6'-HeptaCB-(174)	NV	NV	NV	NV	NV	NV	NV	NV	NV	220 U	14 U	29.8 UJ	5.9 U	7.7 U	10 U	10 U	10.1 UJ
2,2',3,3',4,5,6'-HeptaCB-(175)	NV	NV	NV	NV	NV	NV	NV	NV	NV	290 U	18 U	12 U	7.2 U	9.4 U	13 U	12 U	11 U
2,2',3,3',4,6,6'-HeptaCB-(176)	NV	NV	NV	NV	NV	NV	NV	NV	NV	210 U	13 U	8.7 U	5.2 U	6.8 U	9.3 U	9 U	7.8 U
2,2',3,3',4,5',6'-HeptaCB-(177)	NV	NV	NV	NV	NV	NV	NV	NV	NV	240 U	15 U	19 UJ	6.4 U	8.5 U	12 U	11 U	9.7 U
2,2',3,3',5,5',6'-HeptaCB-(178)	NV	NV	NV	NV	NV	NV	NV	NV	NV	300 U	18 U	12 U	7.3 U	9.6 U	13 U	13 U	11 U
2,2',3,3',5,6,6'-HeptaCB-(179)	NV	NV	NV	NV	NV	NV	NV	NV	NV	210 U	13 UK	20.4 UJ	5.2 U	6.8 U	9.2 U	9 U	9 UJ
PCBs 180 + 193	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	23 UJ	49.8 UJ	4.8 U	8.9 UJ	8.5 U	8.3 U	18 UJ
2,2',3,4,4',5,6'-HeptaCB-(181)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	14 U	9.9 U	6.1 U	8 U	11 U	11 U	9.1 U
2,2',3,4,4',5,6'-HeptaCB-(182)	NV	NV	NV	NV	NV	NV	NV	NV	NV	88 U	16 U	11 U	6.5 U	8.5 U	12 U	11 U	9.7 U
2,2',3,4,4',5',6'-HeptaCB-(183)	NV	NV	NV	NV	NV	NV	NV	NV	NV	200 U	13 U	19.3 UJ	5.5 U	7.3 U	9.9 U	9.6 U	9 UJ
2,2',3,4,4',6,6'-HeptaCB-(184)	NV	NV	NV	NV	NV	NV	NV	NV	NV	67 U	12 U	8.4 U	5 U	6.5 U	8.8 U	8.6 U	7.4 U
2,2',3,4,5,5',6'-HeptaCB-(185)	NV	NV	NV	NV	NV	NV	NV	NV	NV	89 U	13 U	9.3 U	6.6 U	8.7 U	12 U	11 U	9.9 U
2,2',3,4,5,6,6'-HeptaCB-(186)	NV	NV	NV	NV	NV	NV	NV	NV	NV	73 U	13 U	8.9 U	5.4 U	7.1 U	9.6 U	9.4 U	8.1 U
2,2',3,4',5,5',6'-HeptaCB-(187)	NV	NV	NV	NV	NV	NV	NV	NV	NV	270 U	22 UJ	38 UJ	6.5 U	8.5 U	12 U	11 U	19.1 UJ
2,2',3,4',5,6,6'-HeptaCB-(188)	NV	NV	NV	NV	NV	NV	NV	NV	NV	66 U	13 U	8.3 U	5.6 U	6.9 U	9.8 U	11 U	8 U
2,3,3',4,4',5,5'-HeptaCB-(189)	NV	NV	NV	NV	NV	NV	NV	NV	NV	79 U	9.3 U	6.6 U	4.2 U	5.8 U	7.6 U	6.7 U	6.3 U
2,3,3',4,4',5,6'-HeptaCB-(190)	NV	NV	NV	NV	NV	NV	NV	NV	NV	170 U	10 U	7.1 U	4.4 U	5.7 U	7.8 U	7.6 U	6.5 U
2,3,3',4,4',5',6'-HeptaCB-(191)	NV	NV	NV	NV	NV	NV	NV	NV	NV	110 U	10 U	7 U	4.4 U	5.7 U	7.8 U	7.6 U	6.5 U
2,3,3',4,5,5',6'-HeptaCB-(192)	NV	NV	NV	NV	NV	NV	NV	NV	NV	63 U	12 U	8.2 U	4.8 U	6.3 U	8.6 U	8.4 U	7.2 U
2,2',3,3',4,4',5,5'-OctaCB-(194)	NV	NV	NV	NV	NV	NV	NV	NV	NV	210 U	9.5 U	9.2 U	11 U	15 U	19 U	6.3 U	11 U
2,2',3,3',4,4',5,6'-OctaCB-(195)	NV	NV	NV	NV	NV	NV	NV	NV	NV	230 U	11 U	11 U	12 U	17 U	22 U	7.1 U	12 U
2,2',3,3',4,4',5,6'-OctaCB-(196)	NV	NV	NV	NV	NV	NV	NV	NV	NV	250 U	11 U	11 U	12 U	17 U	22 U	7.2 U	12 U
2,2',3,3',4,4',6,6'-OctaCB-(197)	NV	NV	NV	NV	NV	NV	NV	NV	NV	54 U	8 U	7.9 U	8.6 U	12 U	15 U	5 U	8.5 U
PCBs 198 + 199	NV	NV	NV	NV	NV	NV	NV	NV	NV	260 U	12 U	12 U	13 U	18 U	23 U	7.7 U	13 U
2,2',3,3',4,5,6,6'-OctaCB-(200)	NV	NV	NV	NV	NV	NV	NV	NV	NV	120 U	9.1 U	8.9 U	10 U	14 U	18 U	6 U	10 U
2,2',3,3',4,5',6,6'-OctaCB-(201)	NV	NV	NV	NV	NV	NV	NV	NV	NV	130 U	8.1 U	7.9 U	8.8 U	12 U	15 U	5.1 U	8.8 U
2,2',3,3',5,5',6,6'-OctaCB-(202)	NV	NV	NV	NV	NV	NV	NV	NV	NV	76 U	9 U	8.4 U	9.7 U	13 U	15 U	5.9 U	9.4 U
2,2',3,4,4',5,5',6'-OctaCB-(203)	NV	NV	NV	NV	NV	NV	NV	NV	NV	240 U	11 U	11 U	12 U	17 U	22 U	7.2 U	12 U
2,2',3,4,4',5,6,6'-OctaCB-(204)	NV	NV	NV	NV	NV	NV	NV	NV	NV	45 U	5.6 U	5.5 U	7.6 U	10 U	13 U	4.4 U	7.6 U
2,3,3',4,4',5,5',6'-OctaCB-(205)	NV	NV	NV	NV	NV	NV	NV	NV	NV	53 U	6.9 U	7 U	7.7 U	11 U	15 U	4.3 U	7.8 U
2,2',3,3',4,4',5,5',6'-NonaCB-(206)	NV	NV	NV	NV	NV	NV	NV	NV	NV	75 U	14 U	14 U	14 U	20 U	29 U	7.8 U	26 U
2,2',3,3',4,4',5,6,6'-NonaCB-(207)	NV	NV	NV	NV	NV	NV	NV	NV	NV	44 U	12 U	12 U	13 U	18 U	25 U	7.1 U	23 U
2,2',3,3',4,5,5',6,6'-NonaCB-(208)	NV	NV	NV	NV	NV	NV	NV	NV	NV	42 U	11 U	11 U	12 U	16 U	23 U	6.8 U	21 U
DecaCB-(209)	NV	NV	NV	NV	NV	NV	NV	NV	NV	47 U	11 U	10 U	18 U	24 U	27 U	6.3 U	25 U
Total PCBs⁽ⁱ⁾	6,000	14,000	2,000,000	120	NV	99,000,000	990,000,000	44,000,000	440,000,000	780 UJ	554 J	78 J	42 J	118 UJ	24 J	38 J	105 J
SVOCs (ug/L)																	
1,2,4-Trichlorobenzene	NV	130	420	NV	NV	NV	NV	6,600	66,000	0.0641 UJ	-- R	-- R	-- R	-- R	-- R	-- R	-- R
1,2-Dichlorobenzene	300	23	130	NV	NV	NV	NV	NV	NV	0.0641 UJ	-- R	-- R	-- R	-- R	-- R	-- R	-- R
1,2-Dinitrobenzene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.321 U	0.253 U	0.266 U	0.24 UJ	0.236 UJ	0.309 U	0.294 U	0.278 U
1,2-Diphenylhydrazine	NV	1.1	10	NV	NV	NV	NV	NV	NV	0.0641 U	0.0253 U	0.0266 U	0.024 UJ	0.0236 UJ	0.0617 U	0.0588 U	0.0278 U

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name: Collection Date: Collection Depth (ft) ^(c) :	RBC, Groundwater, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
										36	70	60	35	35	40	40	40.25
Chrysene	NV	4.7	42	NV	NV	NV	NV	760	7,600	0.0128 U	0.0101 U	0.0106 U	0.00962 UJ	0.00943 UJ	0.0123 U	0.0118 U	0.0146
Di(2-ethylhexyl)adipate	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.321 U	0.253 U	0.266 U	0.24 UJ	0.236 UJ	0.309 U	0.294 U	0.278 U
Dibenzo(a,h)anthracene	0.025	0.012	0.28	NV	NV	NV	NV	5,900	59,000	0.0128 U	0.0101 U	0.0106 U	0.00962 UJ	0.00943 UJ	0.0123 U	0.0118 U	0.0111 U
Dibenzofuran	NV	4	36	NV	NV	NV	NV	NV	NV	0.0256 UJ	0.0101 U	0.0106 U	0.0174 J-	0.00943 UJ	0.0123 U	0.0118 U	0.0222 U
Diethyl phthalate	NV	220	980	NV	NV	NV	NV	NV	NV	0.256 U	0.202 U	0.213 U	0.192 UJ	0.189 UJ	0.247 U	0.235 U	0.222 U
Dimethyl phthalate	NV	1,100	3,200	NV	NV	NV	NV	300,000	3,000,000	0.256 U	0.202 U	0.213 U	0.192 UJ	0.189 UJ	0.247 U	0.235 U	0.222 U
Di-n-butyl phthalate	NV	19	34	NV	NV	570	5,700	2,600,000	8,900,000	0.256 U	0.202 U	0.213 U	0.192 UJ	0.189 UJ	0.247 U	0.235 U	0.347
Di-n-octyl phthalate	NV	220	890	NV	NV	NV	NV	290,000	2,900,000	0.256 U	0.202 U	0.213 U	0.192 UJ	0.189 UJ	0.247 U	0.235 U	0.222 U
Fluoranthene	NV	0.8	3.7	NV	NV	NV	NV	56,000	560,000	0.0128 U	0.0101 U	0.0106 U	0.024 J-	0.0106 J-	0.0123 U	0.0118 U	0.0185
Fluorene	280	19	110	NV	NV	NV	NV	560,000	1,100,000	0.0128 U	0.0101 U	0.0106 U	0.0586 J-	0.0201 J-	0.0123 U	0.0118 U	0.0301
Hexachlorobenzene	0.0098	0.15	2.8	0.0003	NV	NV	NV	NV	NV	0.0128 U	0.0101 U	0.0106 U	0.0179 J-	0.00943 UJ	0.0123 U	0.0118 U	0.0111 U
Hexachlorobutadiene	NV	1	10	1	10	NV	NV	NV	NV	0.0321 U	-- R	-- R	0.0358 J-	-- R	-- R	-- R	-- R
Hexachlorocyclopentadiene	NV	0.45	4.5	NV	NV	NV	NV	NV	NV	0.0641 U	0.0505 U	0.0532 U	-- R	-- R	-- R	-- R	-- R
Hexachloroethane	0.34	NV	NV	NV	NV	NV	NV	NV	NV	0.0321 U	-- R	-- R	0.0378 J-	-- R	-- R	-- R	-- R
Indeno(1,2,3-cd)pyrene	NV	0.012	0.27	NV	NV	NV	NV	32,000	320,000	0.0128 U	0.0101 U	0.0106 U	0.00962 UJ	0.00943 UJ	0.0123 U	0.0118 U	0.0111 U
Isophorone	NV	920	7,500	NV	NV	NV	NV	NV	NV	0.0541 J	0.0253 U	0.0266 U	0.0272 J-	0.0236 UJ	0.0309 U	0.0294 U	0.0398
Naphthalene	0.17	21	170	NV	NV	57	570	2,200	22,000	0.0513 UJ	0.0202 U	0.0213 U	0.0722 J-	0.0362 J-	-- R	-- R	-- R
Nitrobenzene	NV	230	1,000	NV	NV	NV	NV	26,000	260,000	0.128 U	0.101 U	0.106 U	0.0962 UJ	0.0943 UJ	0.123 U	0.118 U	0.111 U
N-Nitrosodimethylamine	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.0321 U	0.0253 U	0.0266 U	0.024 UJ	0.0236 UJ	0.0309 U	0.0588 U	0.0278 U
N-Nitrosodiphenylamine	13	25	220	NV	NV	NV	NV	NV	NV	0.0321 U	0.0253 U	0.0266 U	0.0257 J-	0.0236 UJ	0.0309 U	0.0294 U	0.0278 U
N-Nitrosodipropylamine	0.011	NV	NV	NV	NV	NV	NV	NV	NV	0.0641 U	0.0253 U	0.0266 U	0.024 UJ	0.0236 UJ	0.0617 U	0.0588 U	0.0278 U
Pentachlorophenol	0.044	6.7	8.7	NV	NV	13,000	130,000	1,000	10,000	0.128 U	0.101 U	0.107 J	0.0962 U	0.0943 U	0.123 U	0.118 U	0.111 U
Phenanthrene	NV	2.3	31	NV	NV	NV	NV	23,000	230,000	0.0128 U	0.0101 U	0.0106 U	0.00962 UJ	0.00943 UJ	0.0247 U	0.0235 U	0.0239
Phenol	NV	160	4,700	NV	NV	NV	NV	NV	NV	0.256 U	0.202 U	0.213 U	0.192 U	0.189 U	0.247 U	0.235 U	0.222 U
Pyrene	110	4.6	42	NV	NV	NV	NV	33,000	330,000	0.0128 U	0.0101 U	0.0106 U	0.00962 UJ	0.00943 UJ	0.0123 U	0.0118 U	0.0111 U
Pyridine	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.128 U	0.101 U	0.106 U	0.0962 UJ	0.0943 UJ	0.123 U	0.118 U	0.111 U
cPAH TEQ ^{(f)(5)}	0.025	NV	NV	NV	NV	NV	NV	NV	NV	0.0192 U	0.0152 U	0.016 U	0.0144 UJ	0.0142 UJ	0.0185 U	0.0176 U	0.0298
TPH (ug/L)																	
Gasoline-range hydrocarbons	110	440	NV	NV	NV	NV	NV	NV	NV	50 UJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Diesel-range hydrocarbons	100	640	NV	NV	NV	NV	NV	NV	NV	112 U	98 U	111 U	103 U	108 U	148 J	139	180 J
Lube-oil-range hydrocarbons	100 ^(k)	NV	NV	NV	NV	NV	NV	NV	NV	225 U	196 U	222 U	206 U	215 U	213 U	206 U	316 J
VOCs (ug/L)																	
1,1,1,2-Tetrachloroethane	NV	85	770	NV	NV	NV	NV	NV	NV	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	8,000	76	690	NV	NV	NV	NV	4,400,000	44,000,000	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2,2-Tetrachloroethane	NV	200	910	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1,2-Trichloroethane	0.28	730	3,200	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 UJ
1,1-Dichloroethane	2.8	410	3,700	NV	NV	NV	NV	1,700,000	17,000,000	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,1-Dichloroethene	280	130	1,200	NV	NV	NV	NV	130,000	1,300,000	0.02 UJ	0.01 U	0.02 U	0.01 U	0.01 U	0.02 U	0.01 U	0.01 U
1,1-Dichloropropene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	NV	8	130	NV	NV	NV	NV	NV	NV	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2,4-Trichlorobenzene	NV	130	420	NV	NV	NV	NV	6,600	66,000	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trimethylbenzene	54	NV	NV	NV	NV	NV	NV	NV	NV	0.0578 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.1 UJ
1,2-Dibromo-3-chloropropane	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dibromoethane	0.0075	NV	NV	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 UJ
1,2-Dichlorobenzene	300	23	130	NV	NV	NV	NV	NV	NV	0.25 UJ	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-Dichloroethane	0.17	2,000	8,200	NV	NV	19,000	37,000	220,000	2,200,000	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location: Sample Name: Collection Date: Collection Depth (ft) ^(c) :	RBC, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
										36	70	60	35	35	40	40	40.25
1,2-Dichloropropane	NV	520	3300	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,3,5-Trimethylbenzene	59	NV	NV	NV	NV	NV	NV	NV	NV	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.1 UJ
1,3-Dichlorobenzene	NV	22	79	NV	NV	NV	NV	NV	NV	0.25 UJ	0.25 U	0.25 U	0.35 J	0.44 J	0.33 J	0.26 J	0.25 J
1,3-Dichloropropane	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.48	9.4	57	NV	NV	NV	NV	11,000	44,000	0.25 UJ	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,2-Dichloropropane	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	NV	22,000	200,000	NV	NV	NV	NV	7,900,000	20,000,000	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Chlorotoluene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	NV	NV	NV	NV	NV	NV	NV	NV	NV	5 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
4-Chlorotoluene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Isopropyltoluene	NV	16	150	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-pentanone	NV	NV	NV	NV	NV	NV	NV	NV	NV	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	NV	1,700	15,000	NV	NV	830,000	8,300,000	44,000	220,000	20 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acrylonitrile	0.052	78	650	NV	NV	NV	NV	NV	NV	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzene	0.46	160	700	NV	NV	NV	NV	110,000	1,100,000	0.0754 J	0.05 U	0.176 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromobenzene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.25 UJ	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Bromodichloromethane	0.13	340	3,100	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	3.3	230	1,100	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	7.5	16	38	NV	NV	NV	NV	NV	NV	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon disulfide	NV	15	130	NV	NV	NV	NV	NV	NV	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon tetrachloride	0.46	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	77	25	220	NV	NV	NV	NV	260,000	2,600,000	0.25 UJ	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Chlorobromomethane	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	21,000	NV	NV	NV	NV	NV	NV	NV	NV	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloroform	0.22	140	1,300	NV	NV	NV	NV	67,000	180,000	0.122 J+	0.1 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloromethane	190	NV	NV	NV	NV	NV	NV	NV	NV	2.5 UJ	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
cis-1,2-Dichloroethene	36	620	5,500	NV	NV	NV	NV	200,000	2,000,000	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.0291	0.0212
cis-1,3-Dichloropropene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Dibromochloromethane	0.17	320	2,900	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromomethane	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon 12)	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	1.5	61	550	NV	NV	NV	NV	NV	NV	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.1 UJ
Hexachlorobutadiene	NV	1	10	1	10	NV	NV	NV	NV	2.5 UJ	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene	440	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m,p-Xylene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 UJ
Methyl tert-butyl ether	14	NV	NV	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Methylene chloride	11	1,500	8,500	NV	NV	NV	NV	26,000	220,000	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Naphthalene	0.17	21	170	NV	NV	57	570	2,200	22,000	1 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
n-Butylbenzene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
n-Propylbenzene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.25 UJ	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
o-Xylene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.1 UJ
sec-Butylbenzene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	1,200	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
tert-Butylbenzene	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	12	NV	NV	NV	NV	NV	NV	8,900	44,000	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Toluene	1,100	NV	NV	NV	NV	NV	NV	110,000	1,100,000	0.0904 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene	360	560	10,000	NV	NV	NV	NV	200,000	2,000,000	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

**Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens**

Location:	RBC, Groundwater, Ingestion and Inhalation from Tapwater, Residential ⁽¹⁾	Ecological RBC, Freshwater ^{(a)(b)(2)}				Ecological RBC for Wildlife Ingestion of Surface Water ⁽³⁾				MFA-B3A	MW-1	MW-2	MW-3		MW-4	MW-5	MW-6
Sample Name:		Aquatic Life		Aquatic-Dependent Wildlife		Birds		Mammals		MFA-B3A- 20230207- GW-36.0	MW1- 20230220- GW-70	MW2- 20230220-GW- 60	MW3- 20230214- GW-35	MW3- 20230214- GW-35-DUP	MW4- 20230214- GW-40	MW5- 20230214- GW-40	MW6- 20230214- GW-40.25
Collection Date:										2/7/2023	2/20/2023	2/20/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/14/2023
Collection Depth (ft) ^(c) :		Chronic	Acute	Chronic	Acute	TE	Non-TE	TE	Non-TE	36	70	60	35	35	40	40	40.25
trans-1,3-Dichloropropene	NV	NV	NV	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Trichloroethene	0.49	NV	NV	NV	NV	NV	440,000	4,400,000	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Trichlorofluoromethane (Freon 11)	1,100	NV	NV	NV	NV	NV	NV	NV	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.027	930	8,400	NV	NV	NV	NV	NV	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Total xylenes ⁽¹⁾	190	27	240	NV	NV	440,000	4,400,000	9,400	1,100,000	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 UJ

Table 4-2
Summary of Groundwater Analytical Results
Phase 1B Lagoon Repurposing
City of St. Helens

Notes

Detected results are shown in **bold font**.

Shading (color key below) indicates values that exceed screening criteria; non-detects (U and UJ) and rejected data (R) were not compared with screening criteria. When multiple screening criteria are exceeded, the result is shaded based on the highest criterion. When multiple screening criteria with the same value are exceeded, the result is shaded based on the criterion presented to the right.

DEQ RBC, groundwater, ingestion, and inhalation from tapwater, residential
DEQ freshwater RBC for aquatic life, chronic exposure
DEQ freshwater RBC for aquatic life, acute exposure
DEQ freshwater RBC for aquatic-dependent wildlife, chronic exposure
DEQ freshwater RBC for aquatic-dependent wildlife, acute exposure
DEQ ecological surface water RBC for wildlife ingestion of surface water, birds, TE
DEQ ecological surface water RBC for wildlife ingestion of surface water, mammals, TE

-- = result qualified as rejected.

cPAH TEQ = carcinogenic polycyclic aromatic hydrocarbon.

DEQ = Oregon Department of Environmental Quality.

EPA = U.S. Environmental Protection Agency.

ft bgs = feet below ground surface.

J = result is estimated.

J+ = result is estimated but may be biased high.

J- = result is estimated but may be biased low.

NV = no value.

PCB = polychlorinated biphenyl.

pg/L = picograms per liter.

R = result is rejected. The analyte may or may not be present in the sample.

RBC = risk-based concentration.

SVOC = semivolatile organic compound.

TE = threatened and endangered.

TEF = toxic equivalency factor.

TEQ = toxicity equivalence.

TPH = total petroleum hydrocarbon.

U = result is non-detect at the detection limit.

ug/L = micrograms per liter.

UJ = result is non-detect with an estimated detection limit.

UK = result is non-detect at the estimated maximum potential concentration.

VOC = volatile organic compound.

^(b)Screening levels for arsenic, cadmium, hexavalent chromium, lead, nickel, selenium, silver, and zinc are expressed in terms of the dissolved concentration in the water column. Total metals concentrations are screened against criteria to evaluate the risk of the mobile colloidal transport of metals for particles 0.01 to 10 um in both the unsaturated and saturated zones of the subsurface.

^(b)Metals screening levels are based on Willamette Valley default values for hardness (25 mg/L), DOC (1.25 mg/L), and pH (7.0).

^(c)The reconnaissance groundwater sample (MFA-B3A-20230207-GW-36.0) collection depth is measured from the barge deck to the center point of the well screen, the remaining monitoring well sample collection depths are measured from top of well casing to center point of the well screen.

^(d)Dioxin/furan TEQs are calculated as the sum of each detected congener concentration multiplied by the corresponding TEF value. Non-detect congeners are multiplied by one-half as well as the corresponding TEF value. When all of the congeners are non-detect in a given sample, the reported TEQ value is the highest congener detection limit.

^(e)Total chlordane is the sum of alpha-chlordane, gamma-chlordane, heptachlor, and trans-nonachlor.

^(f)Total DDX is the sum of 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Non-detect results are summed at one-half the detection limit. When all results are non-detect the highest detection limit is used.

^(g)Total endosulfans is the sum of endosulfan I, endosulfan II, and endosulfan sulfate. Non-detect results are summed at one-half the detection limit. When all results are non-detect the highest detection limit is used.

^(h)Total hexacyclohexanes is the sum of alpha-, beta-, gamma-, and delta-BHC (lindane). Non-detect results are summed at one-half the detection limit. When all results are non-detect the highest detection limit is used.

⁽ⁱ⁾Total PCBs is the sum of all PCB congeners. Non-detect results are not included in the sum. When all results are non-detect the highest detection limit is used.

^(j)cPAH TEQ calculated as the sum of each cPAH multiplied by the corresponding TEF with non-detect results also multiplied by one-half. When all cPAHs are non-detect, the highest detection limit is provided.

^(k)Value is for generic diesel/heating oil, since generic residual-range hydrocarbon values are not available.

^(l)Total xylenes is the sum of m,p-xylene and o-xylene. When both results are non-detect, the higher detection limit is used.

References

⁽¹⁾DEQ. 2018. Table: Risk-Based Concentrations for Individual Chemicals. Oregon Department of Environmental Quality. May.

⁽²⁾DEQ. 2021. Conducting Ecological Risk Assessments. Table 2: Risk Based Concentrations for Water. Oregon Department of Environmental Quality, Land Quality Division. April.

⁽³⁾DEQ. 2020. Conducting Ecological Risk Assessments. Table 1b: Risk Based Concentrations for Wildlife Ingestion of Surface Water. Oregon Department of Environmental Quality, Land Quality Division. September.

⁽⁴⁾Van den Berg, M., Linda S. Birnbaum, Michael Denison, Mike De Vito, William Farland, Mark Feeley, Heidelore Fiedler, Helen Hakansson, Annika Hanberg, Laurie Haws, Martin Rose, Stephen Safe, Dieter Schrenk, Chiharu Tohyama, Angelika Tritscher, Jouko Tuomisto, Mats Tysklind, Nigel Walker, and Richard E. Peterson. 2006. "The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds." *Toxicological Sciences*, 93(2): 223-241. [doi:10.1093/toxsci/kfl055]

⁽⁵⁾EPA. 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. 600/R-93/089. U.S. Environmental Protection Agency. July.

**Table 4-3
Groundwater Elevation Data
City of St. Helens
Wastewater Treatment Lagoon**



Location	Well Depth (feet bgs)	Casing Diameter (inches)	Screen Interval (feet bgs)	Measuring Point Elevation (feet NGVD)	Water Level Measurement Date	Depth to Water (feet below TOC)	Water Level Elevation (feet NGVD)
MW-1	80	2	60-80	56.07	08/06/2019	29.80	26.27
					03/11/2020	29.51	26.56
					02/20/2023	28.98	27.09
MW-2	70	2	50-70	68.94	08/07/2019	39.77	29.17
					03/11/2020	40.17	28.77
					02/20/2023	40.40	28.54
MW-3	45	2	25-45	31.18	08/06/2019	17.36	13.82
					03/11/2020	15.53	15.65
					02/14/2023	15.60	15.58
MW-4	50	2	30-50	31.14	08/07/2019	22.63	8.51
					03/11/2020	20.15	10.99
					02/14/2023	19.99	11.15
MW-5	50	2	30-50	30.89	08/06/2019	20.42	10.47
					03/11/2020	18.90	11.99
					02/14/2023	18.80	12.09
MW-6	50.5	2	30.5-50.5	30.86	08/07/2019	22.29	8.57
					03/11/2020	19.90	10.96
					02/14/2023	19.75	11.11
MFA B-3A	10	2	6-10	--	02/07/2023	--	15.30

NOTES:

-- = See report Section 3.3.5 and the boring log for MFA B-3A in Appendix A for a description of how the groundwater elevation was calculated.

bgs = below ground surface.

NAVD = North American vertical datum.

TOC = top of casing.

FIGURES



Path: C:\Users\aguse\Desktop\0830.03 City of St. Helens\04_GA_Phase II\Projects\Fig 1-1_Site_Location.mxd
Approved By: aguse
Print Date: 10/24/2019
Produced By: aguse
Project: 0830.03

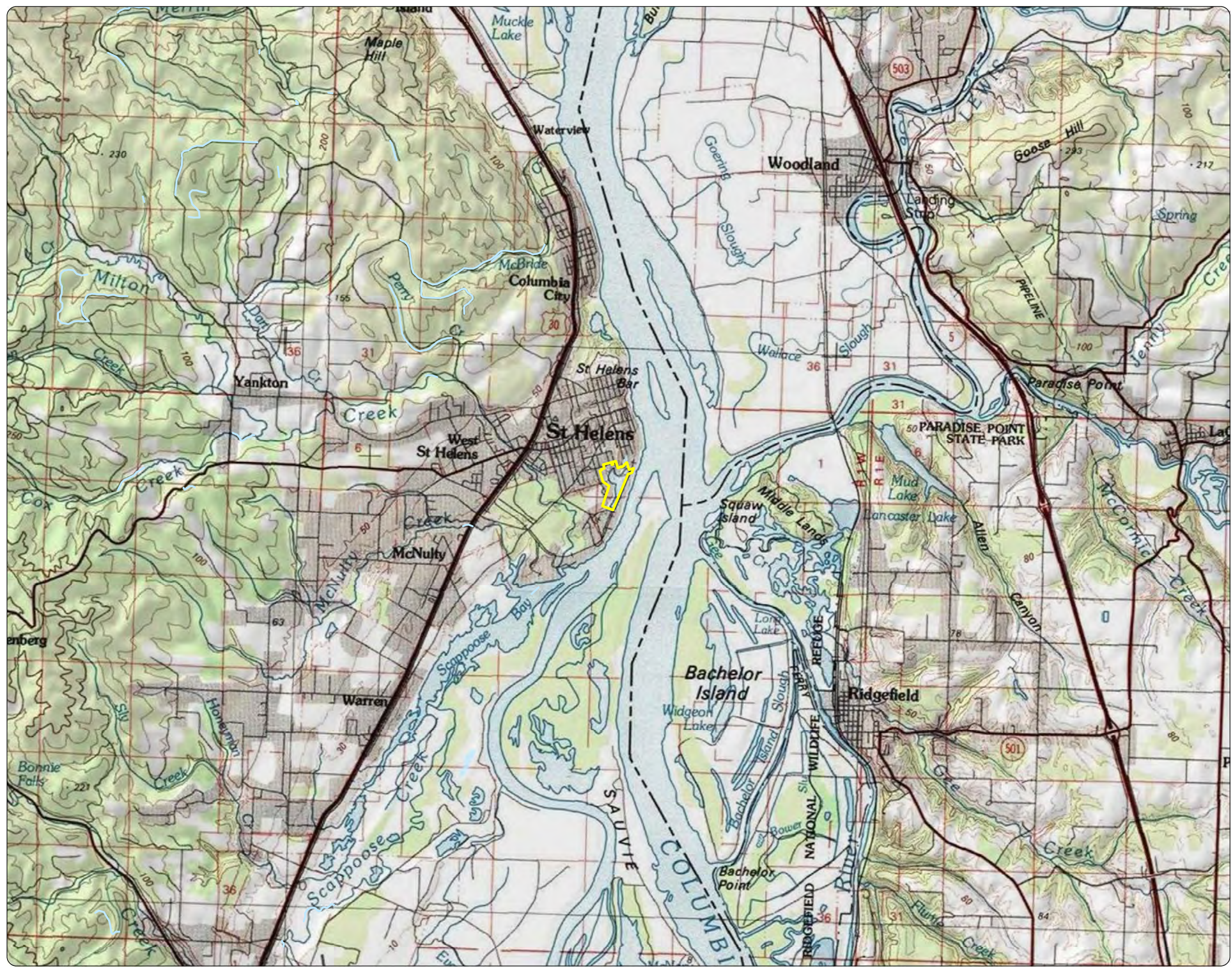


Figure 1-1
Site Location
City of St. Helens
Wastewater Treatment
Lagoon St. Helens, Oregon

Legend
 Property Boundary



Source: U.S. Geological Survey (1990) 7.5-minute topographic quadrangle: St. Helens Section 3 and 10, township 4 north, range 1 west

 MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfooster.com

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Project: M0830.03.006 Produced By: jrb/bts Reviewed By: cweatherby Print Date: 9/8/2023 Path: X:\0830.03 City of St. Helens\06\Proj\M0830_03_006_002_00D.aprx Fig 3-1 Sample Locations

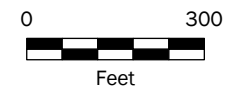


Figure 3-1 Boring, Monitoring Well, and ISM Sample Locations

City of St. Helens
Wastewater Treatment Lagoon
St. Helens, OR

Legend

- Monitoring Well Location
- Boring Location
- Borings Completed by GRI,
2019, 2023
- ISM Sample Location
- Property Boundary



Data Source
Aerial photograph obtained from the State of Oregon (2022).

MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfooster.com

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
© 2023 Maul Foster & Alongi, Inc.

Path: X:\0830_03 City of St. Helens\06 Pro\M0830_03_006_002_00D.dwg Fig 4-1 Site Geology
Reviewed By: dweatherby
Print Date: 9/11/2023
Produced By: jroberts
Project: M0830_03_006

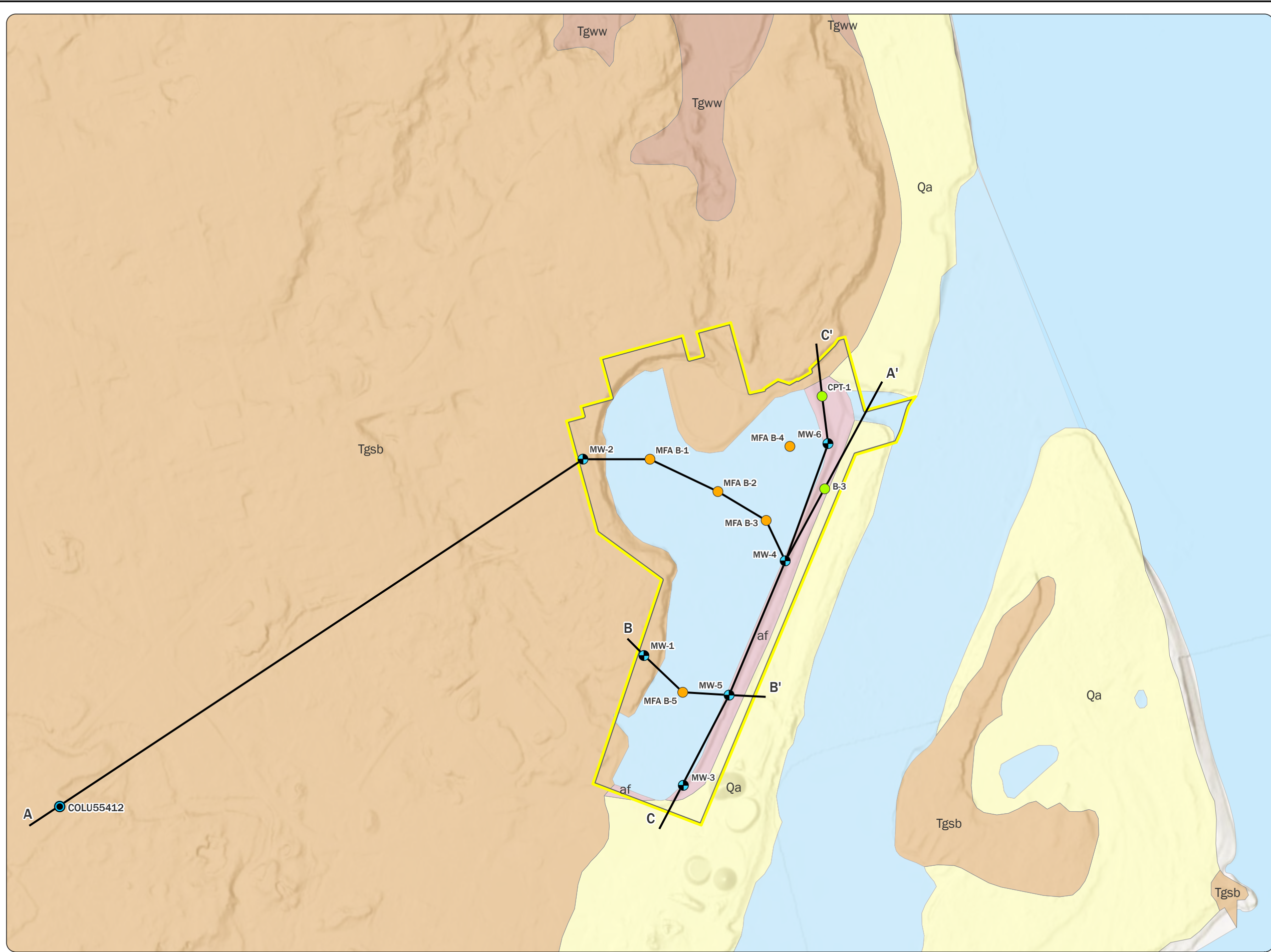











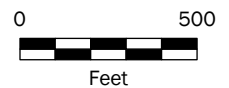


Figure 4-1 Site Geology

City of St. Helens
Wastewater Treatment Lagoon
St. Helens, OR

Legend

-  Water Well
-  Monitoring Well Location
-  Boring Location
-  Boring and Cone Penetrometer Test Completed by GRI, 2019, 2023
-  Cross Section
-  Property Boundary
- Geologic Map Unit, Group Member**
-  Qa (Alluvium), Columbia River alluvium
-  Tgsb, Sentinel Bluffs Member of the Columbia River Basalt Group
-  Tgww, Winter Water Member of the Columbia River Basalt Group
-  af, Artificial fill
-  Water

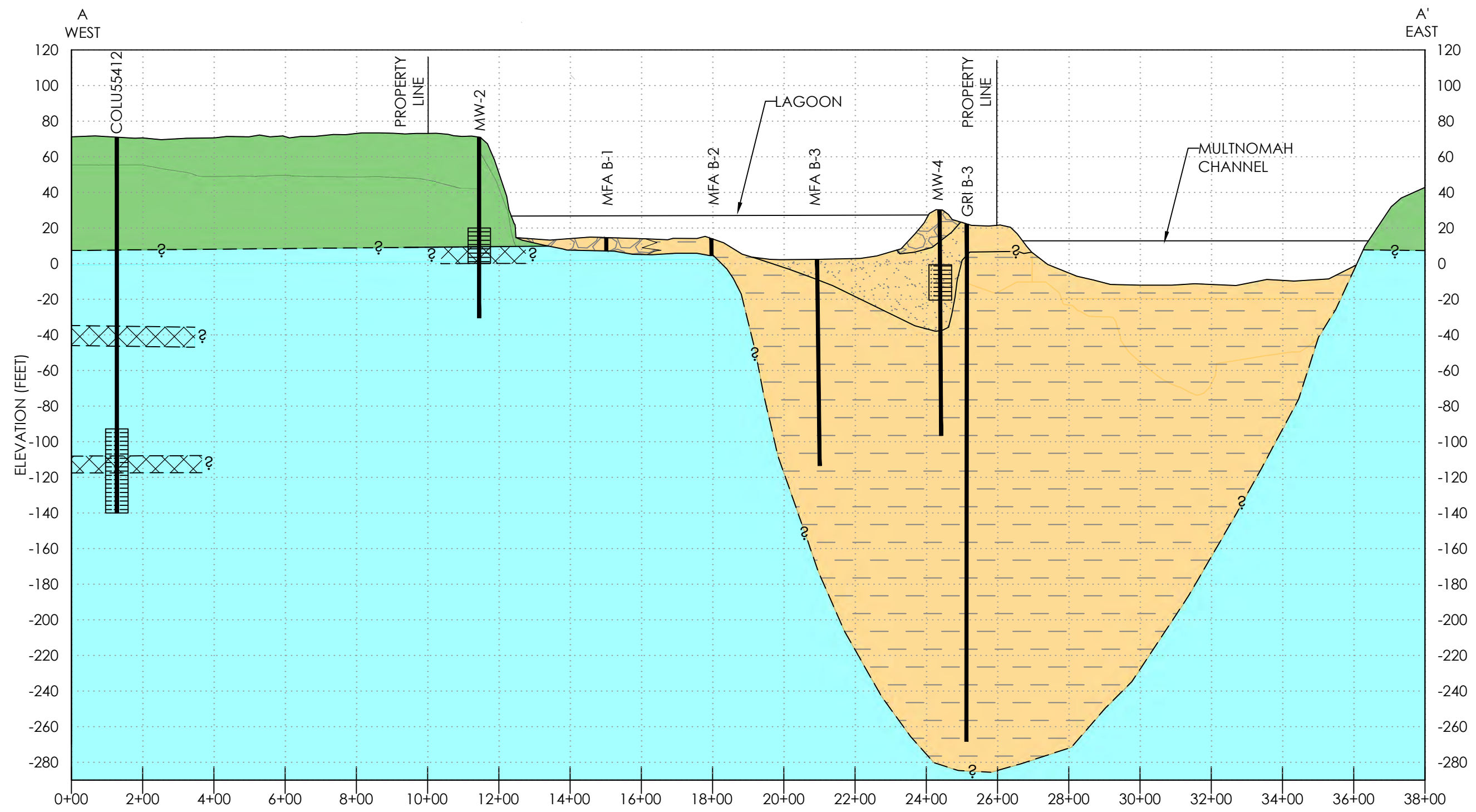


Data Sources
Geologic map units obtained from the Oregon Department of Geology and Mineral Industries; water well obtained from the Oregon Water Resources Department.



This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
© 2023 Maul Foster & Alongi, Inc.

FILENAME: L:\Projects\0630.03 City of St. Helens\06_Scope 1B\Draft Documents\Phase 1B\Report\Figures\Fig-Geo Section-6-27-23.dwg
 PLOTTED BY: Lashina Daniel
 PLOTTED ON: 2023-09-08 12:48 PM



- LEGEND**
- | | | | | | |
|--|--|--|--|--|----------------------|
| | SAND AND SILTY SAND | | SILT WITH OCCASIONAL SAND AND SILTY SAND INTERBEDS (NOT SHOWN) | | INTERFLOW ZONE |
| | GRAVELLY FILL WITH VARIABLE AMOUNTS OF SAND, SILT AND CLAY | | SENTINEL BLUFFS BASALT | | LITHOLOGIC CONTACT |
| | WINTER WATER BASALT | | INFERRED LITHOLOGIC CONTACT | | WELL SCREEN INTERVAL |

HORIZONTAL SCALE: 1" = 300'
 VERTICAL SCALE: 1" = 60'
 VERTICAL EXAGGERATION: 5

NOTE:
 CONTACTS SHOWN OUTSIDE OF AREAS PENETRATED BY A BORING OR WELL ARE BASED ON SURFICIAL MAPPING AND CROSS-SECTIONS PRESENTED IN EVARTS, R. C. 2004. GEOLOGIC MAP OF THE SAINT HELENS QUADRANGLE, COLUMBIA COUNTY, OREGON, AND COWILTZ AND CLARK COUNTIES, WASHINGTON, U.S. GEOLOGICAL SURVEY INVESTIGATIONS MAP 2834.



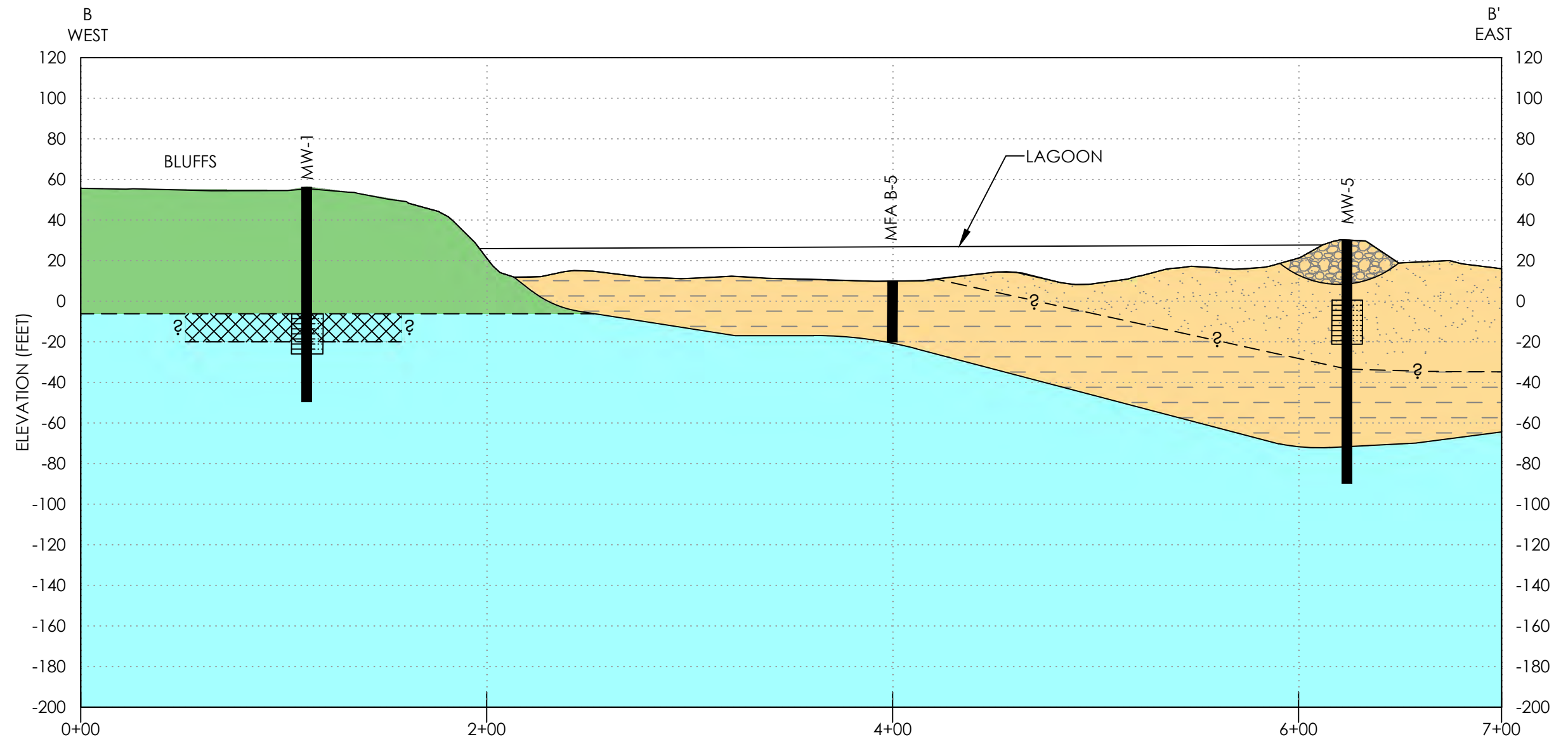
THIS FIGURE PREPARED AS SUPPLEMENTAL VISUAL INFORMATION ONLY AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. ONLY PLAN SHEETS APPROVED, STAMPED AND SIGNED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF GOVERNING JURISDICTION SHALL BE USED FOR CONSTRUCTION. ADDITIONALLY, ONLY PLANS APPROVED BY THE APPLICABLE GOVERNING JURISDICTION(S) SHALL BE USED FOR FINAL CONSTRUCTION UNLESS OTHERWISE EXPRESSLY NOTED IN WRITING BY THE ENGINEER OF RECORD.

SCALE AS NOTED

 NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Figure 4-2
Generalized Geologic Cross Section A-A'
 Phase 1 Lagoon Repurposing
 St. Helens, Oregon

FILENAME: L:\Projects\0630.03 City of St. Helens\06_Scope 1B\Draft Documents\Phase 1B Report\Figures\Fig-Geo SECTION-6-27-23.dwg
 PLOTTED BY: Lashina Daniel
 PLOTTED ON: 2023-09-12 6:06 AM



LEGEND

- | | | | | | |
|--|--|--|--|--|-----------------------------|
| | SAND AND SILTY SAND | | SILT WITH OCCASIONAL SAND AND SILTY SAND INTERBEDS (NOT SHOWN) | | INTERFLOW ZONE |
| | GRAVELLY FILL WITH VARIABLE AMOUNTS OF SAND, SILT AND CLAY | | SENTINEL BLUFFS BASALT | | LITHOLOGIC CONTACT |
| | | | WINTER WATER BASALT | | INFERRED LITHOLOGIC CONTACT |
| | | | | | WELL SCREEN INTERVAL |

HORIZONTAL SCALE: 1" = 60'
 VERTICAL SCALE: 1" = 60'
 VERTICAL EXAGGERATION: 1

NOTE:
 CONTACTS SHOWN OUTSIDE OF AREAS PENETRATED BY A BORING OR WELL ARE BASED ON SURFICIAL MAPPING AND CROSS-SECTIONS PRESENTED IN EVARTS, R. C. 2004, GEOLOGIC MAP OF THE SAINT HELENS QUADRANGLE, COLUMBIA COUNTY, OREGON, AND COWILTZ AND CLARK COUNTIES, WASHINGTON, U.S. GEOLOGICAL SURVEY INVESTIGATIONS MAP 2834.

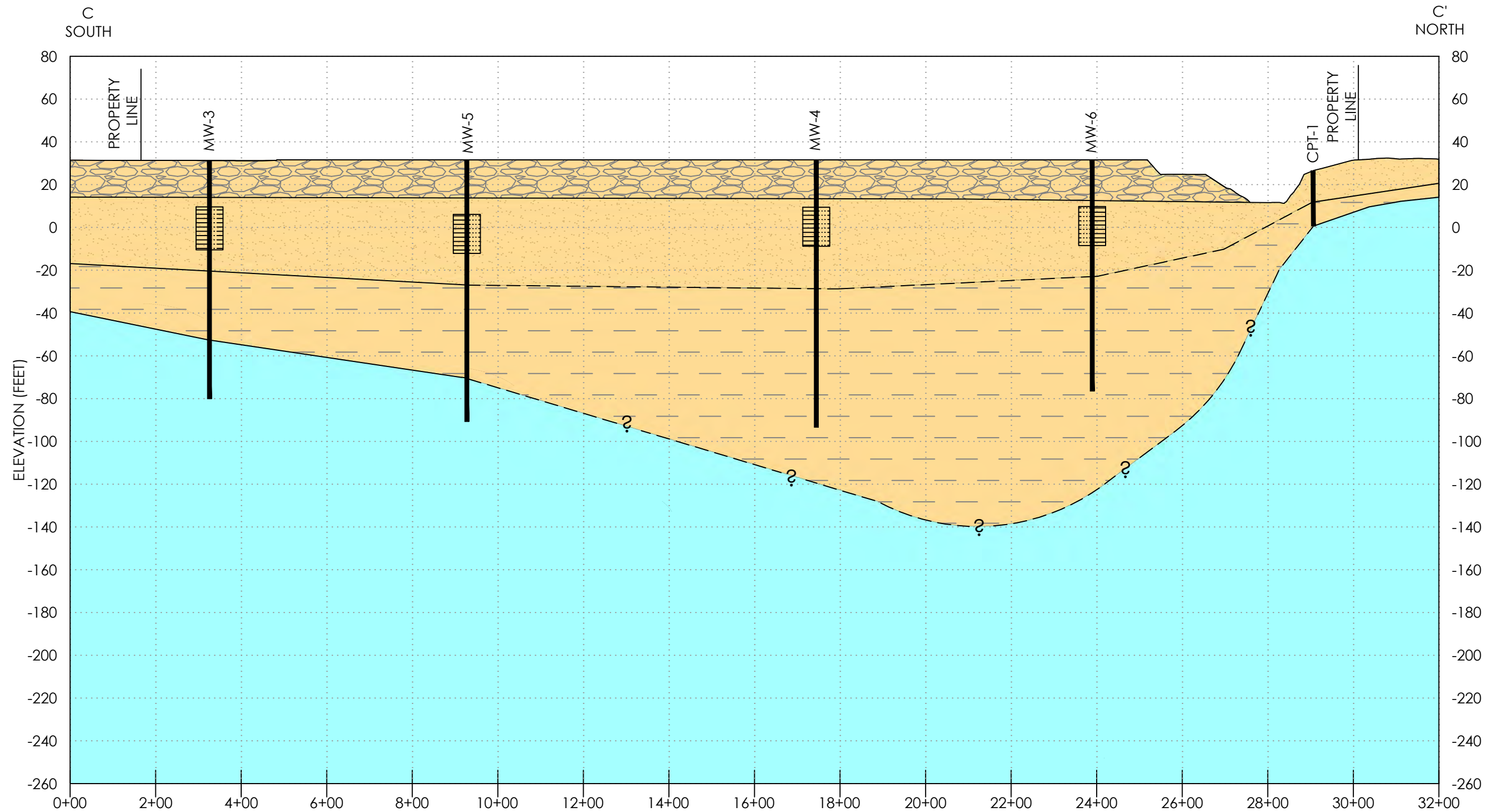
MAUL FOSTER ALONGI
 971.544.2139 | www.maulfoster.com
THIS FIGURE PREPARED AS SUPPLEMENTAL VISUAL INFORMATION ONLY AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. ONLY PLAN SHEETS APPROVED, STAMPED AND SIGNED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF GOVERNING JURISDICTION SHALL BE USED FOR CONSTRUCTION. ADDITIONALLY, ONLY PLANS APPROVED BY THE APPLICABLE GOVERNING JURISDICTION(S) SHALL BE USED FOR FINAL CONSTRUCTION UNLESS OTHERWISE EXPRESSLY NOTED IN WRITING BY THE ENGINEER OF RECORD.

SCALE AS NOTED

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Figure 4-3
Generalized Geologic Cross Section B-B'
 Phase 1 Lagoon Repurposing
 St. Helens, Oregon

PLOTTED ON: 2023-09-12 6:20 AM
 PLOTTED BY: Lindsay Daniel
 FILENAME: L:\Projects\0630.03 City of St. Helens\06_Scope 1B\Draft Documents\Phase 1B Report\Figures\Fig-Geo Section-6-27-23.dwg



LEGEND

- | | | | |
|--|--|--|--|
| | SAND AND SILTY SAND | | SILT WITH OCCASIONAL SAND AND SILTY SAND INTERBEDS (NOT SHOWN) |
| | GRAVELLY FILL WITH VARIABLE AMOUNTS OF SAND, SILT AND CLAY | | SENTINEL BLUFFS BASALT |
| | | | WINTER WATER BASALT |
| | | | LITHOLOGIC CONTACT |
| | | | INFERRED LITHOLOGIC CONTACT |



HORIZONTAL SCALE: 1" = 250'
 VERTICAL SCALE: 1" = 50'
 VERTICAL EXAGGERATION: 5

NOTE:
 CONTACTS SHOWN OUTSIDE OF AREAS PENETRATED BY A BORING OR WELL ARE BASED ON SURFICIAL MAPPING AND CROSS-SECTIONS PRESENTED IN EVARTS, R. C. 2004. GEOLOGIC MAP OF THE SAINT HELENS QUADRANGLE, COLUMBIA COUNTY, OREGON, AND COWILTZ AND CLARK COUNTIES, WASHINGTON, U.S. GEOLOGICAL SURVEY INVESTIGATIONS MAP 2834.

MAUL FOSTER ALONGI
 971.544.2139 | www.maulfoster.com
THIS FIGURE PREPARED AS SUPPLEMENTAL VISUAL INFORMATION ONLY AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. ONLY PLAN SHEETS APPROVED, STAMPED AND SIGNED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF GOVERNING JURISDICTION SHALL BE USED FOR CONSTRUCTION. ADDITIONALLY, ONLY PLANS APPROVED BY THE APPLICABLE GOVERNING JURISDICTION(S) SHALL BE USED FOR FINAL CONSTRUCTION UNLESS OTHERWISE EXPRESSLY NOTED IN WRITING BY THE ENGINEER OF RECORD.

SCALE AS NOTED

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Figure 4-4
Generalized Geologic Cross Section C-C'
 Phase 1 Lagoon Repurposing
 St. Helens, Oregon

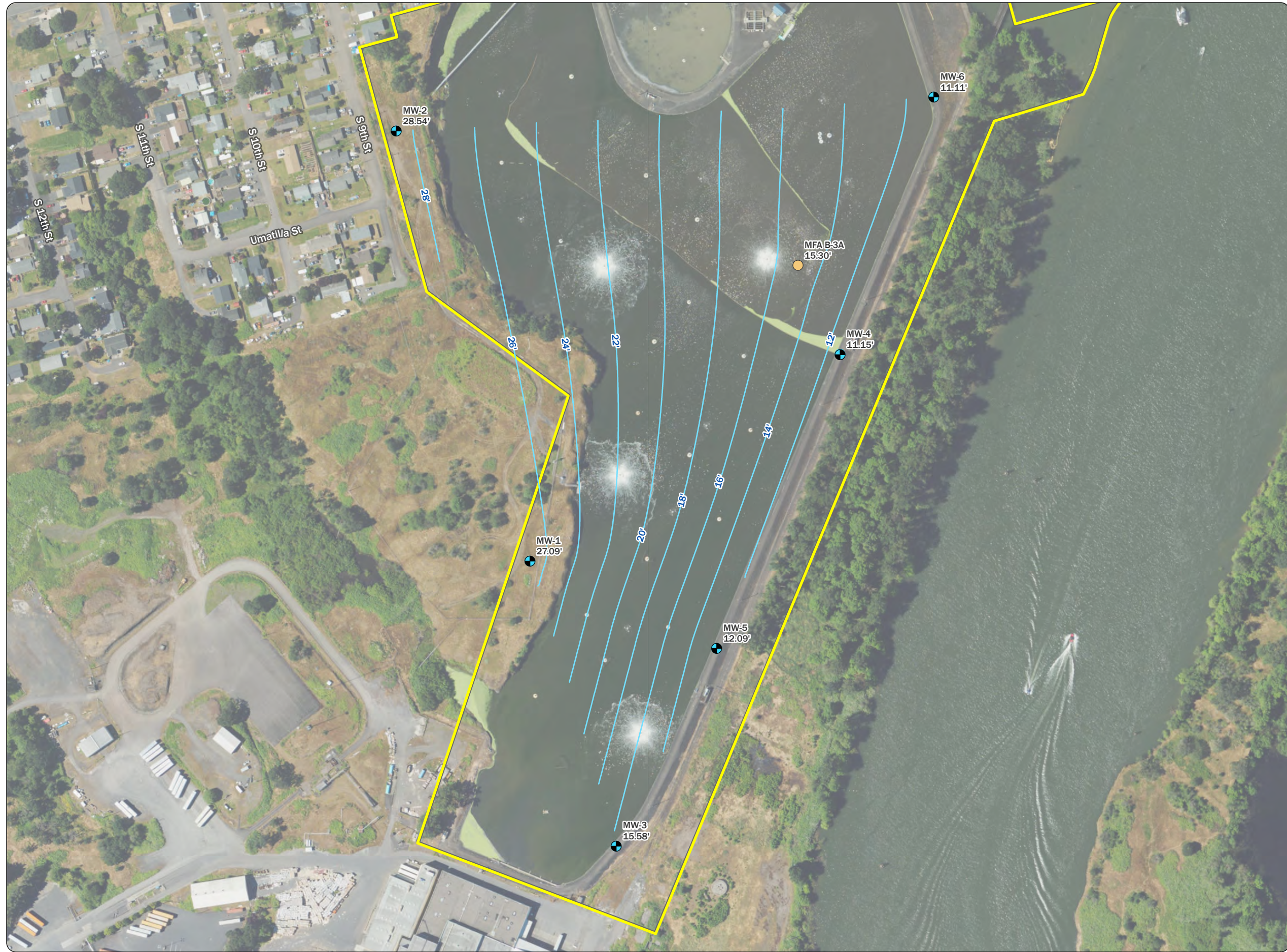




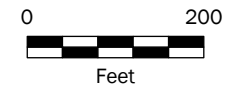


Figure 4-5
February 2023
Groundwater Elevations
 City of St. Helens
 Wastewater Treatment Lagoon
 St. Helens, OR

Legend

-  Boring and Monitoring Well Location
-  Reconnaissance Groundwater Boring
-  Groundwater Elevation Contour (2-feet)
-  Property Boundary

Notes
 Groundwater levels measured on February 7, 14, and 20, 2023.
 Vertical reference is the North American Vertical Datum of 1988.



Data Source
 Aerial photograph obtained from the State of Oregon (2022).

 **MAUL FOSTER ALONGI**
 p. 971 544 2139 | www.maulfooster.com

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
 © 2023 Maul Foster & Alongi, Inc.

APPENDIX A

BORING LOGS





Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-1

Sheet
1 of 1

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 9.0
Project Location	St. Helens, OR	Northing	
Start/End Date	01/30/2023 to 01/30/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	5.0 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description	
			Sample ID			
1			MFA-B1-20230130-21.9		0.0 to 1.0 feet: LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.	
2		100			1.0 to 3.0 feet: GRAVEL WITH SAND (GW); dark gray to black; 5% fines; 15% sand, fine to coarse; 80% gravel, fine to coarse; compact; wet.	
3					At 2.2 feet: Color change to dark gray to black with slight greenish tint.	
4						3.0 to 5.0 feet: BEDROCK; weathered basalt with reddish brown mottles; refusal at 5.0 feet.
5						

Total Depth = 5.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 21.5 feet. 5. Top of sludge surface elevation of 9.0 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (21.5 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 5.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 5.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-2

Sheet
1 of 1

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 8.5
Project Location	St. Helens, OR	Northing	
Start/End Date	01/31/2023 to 01/31/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	5.0 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		
1			MFA-B2-20230131-23.0		0.0 to 2.0 feet: LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
2		2.0 to 4.8 feet: SILT (ML); dark gray to black; 100% fines, low plasticity; soft; moist. At 2.3 feet: Color change to gray with some iron oxide/orange mottling.			
3					
4					
5					
		100			At 4.5 feet: Color change to dark gray. 4.8 to 5.0 feet: GRAVEL WITH SILT (GW-GM); dark gray; 15% fines; 85% gravel, fine to coarse, subangular; loose; refusal on vesicular basalt bedrock at 5.0 feet.

Total Depth = 5.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 22.0 feet. 5. Top of sludge surface elevation of 8.5 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (22.0 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 5.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 5.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
1 of 6

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 0.5
Project Location	St. Helens, OR	Northing	
Start/End Date	01/31/2023 to 02/01/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	110.0 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data		Soil Description
			Sample ID	Lithologic Column	
0.0 to 2.5			MFA-B3-20230131-31.0	[Hatched pattern]	LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
2.5 to 3.0				[Dotted pattern]	SAND (SP); dark gray; 100% sand, fine to medium; loose; faint sheen; wet.
3.0 to 14.5		0			No recovery.
14.5 to 17.5				[Vertical line pattern]	SILT (ML); gray; 100% fines, low plasticity; soft; trace organics, plant matter, and rootlets; moist.
17.5 to 19.5		60			No recovery.
19.5 to 23.5		80		[Vertical line pattern]	Same as above from 14.5 to 17.5 feet.

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
2 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23

21					
22		80			
23					
24					23.5 to 24.5 feet: No recovery.
25					24.5 to 27.5 feet: Same as above from 14.5 to 17.5 feet.
26					
27		60			
28					27.5 to 29.5 feet: No recovery.
29					
30					29.5 to 39.0 feet: Same as above from 14.5 to 17.5 feet.
31					
32		100			
33					
34					
35					
36					
37		90			
38					
39					39.0 to 39.5 feet: No recovery.
40					39.5 to 54.0 feet: Same as above from 14.5 to 17.5 feet.
41		100			
42					



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
3 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

43					
44		100			
45					
46					
47		100			
48					
49					
50					
51					
52		90			
53					
54					54.0 to 54.5 feet: No recovery.
55					54.5 to 68.5 feet: Same as above from 14.5 to 17.5 feet.
56					
57		100			
58					
59					
60					
61					
62		100			
63					
64					

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



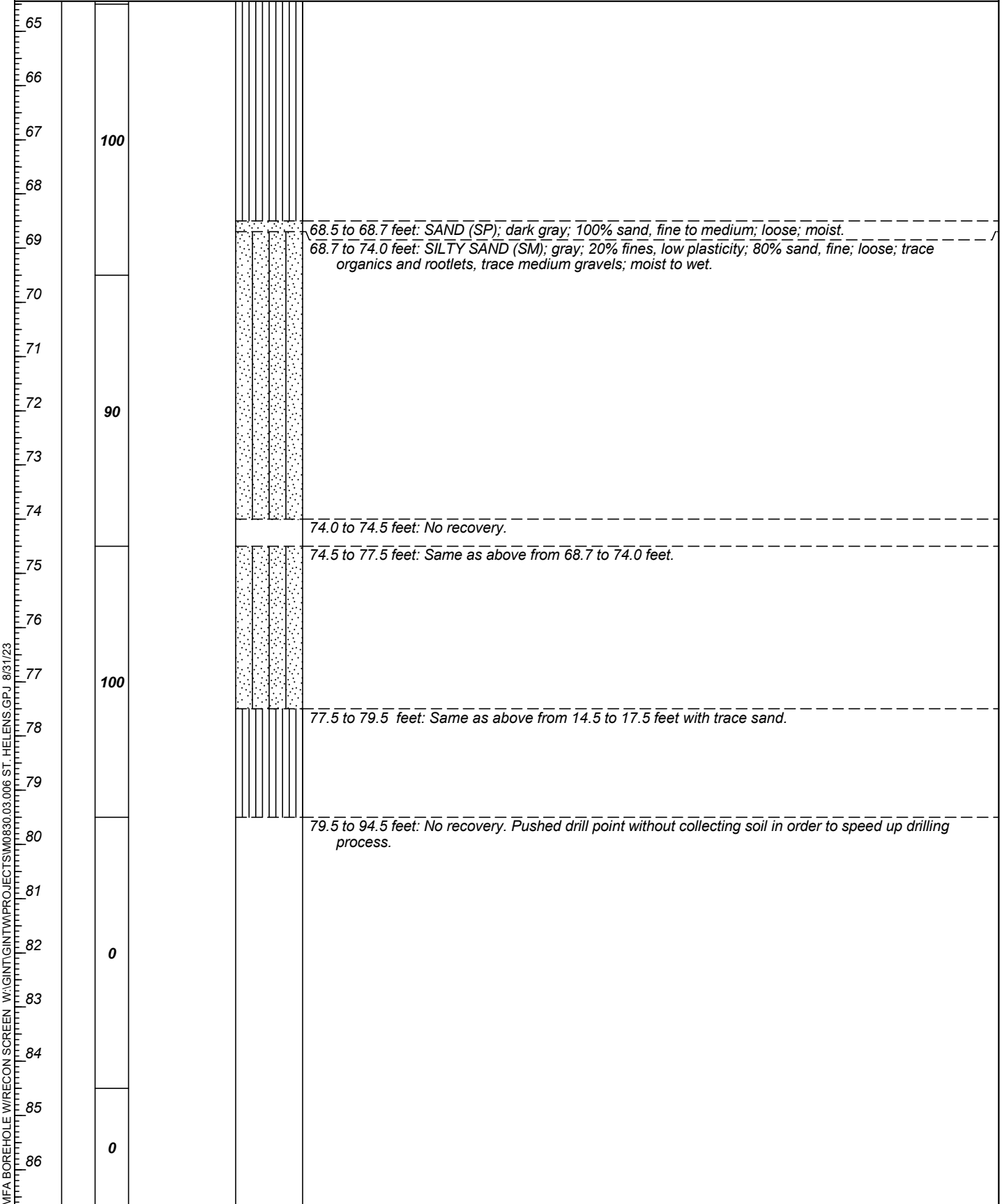
Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
4 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		





MAUL FOSTER ALONG


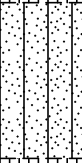
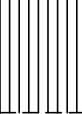

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
5 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

87					
88		0			
89					
90					
91					
92		0			
93					
94					
95					94.5 to 95.0 feet: Same as above from 14.5 to 17.5 feet with trace sand.
96					95.0 to 97.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, fine; loose; moist.
97		90			97.0 to 98.5 feet: Same as above from 14.5 to 17.5 feet.
98					
99					
100					
101					
102		0			
103					
104					
105					
106		0			
107					
108					
109					
110					108.5 to 110.0 feet: Same as above from 14.5 to 17.5 feet.

MFA BOREHOLE WIRECON SCREEN WAGINTGINTWPROJECTSM0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
6 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

110		100			
-----	--	-----	--	--	--

Total Depth = 110.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 30.0 feet. 5. Top of sludge surface elevation of 0.5 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (30.0 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 110.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 110.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3A

Sheet
1 of 2

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 2.5
Project Location	St. Helens, OR	Northing	
Start/End Date	02/06/2023 to 02/06/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	21.5 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Screen Int.	Sample Data		Lithologic Column	Soil Description
				Sample ID			
0.0 to 1.0							LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
1.0 to 3.3							SILT (ML); gray; 100% fines, low plasticity; soft; moist.
3.3 to 5.5							SAND (SP); gray; 100% sand, fine to medium; loose; moist.
5.5 to 6.5							No recovery.
6.5 to 6.8							SILT (ML); gray; 100% fines, low plasticity; trace organics and rootlets; soft; moist.
6.8 to 9.0							SAND (SP); gray; 100% sand, fine to medium; loose; moist.
9.0 to 10.5							SILT (ML); gray; 100% fines, low plasticity; trace organics and rootlets; soft; moist.
10.5 to 11.5							No recovery.
11.5 to 15.0							Same as above from 9.0 to 10.5 feet.
15.0 to 16.5							No recovery.
16.5 to 20.5							Same as above from 9.0 to 10.5 feet.

MFA-B3A-20230207-GW-36.0

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3A

Sheet
2 of 2

Depth (feet, bgs)	Water Levels	Percent Recovery	Screen Int.	Sample Data	Lithologic Column	Soil Description
				Sample ID		
21		80				20.5 to 21.5 feet: No recovery.

Total Depth = 21.5 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 28.0 feet. 5. Top of sludge surface elevation of 2.5 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (28.0 feet). 6. ID = identification. 7. bgs = below ground surface.

8. Water level measured inside casing with an electric water level meter after sitting overnight to equilibrate. Lagoon water level elevation (28 feet); Casing height above lagoon water (4.9 feet); Depth of water level below casing (17.60 feet); Groundwater elevation = lagoon level (28 feet) plus PVC casing height above lagoon water level (4.9 feet) minus depth to water from top of casing (17.60 feet) = 15.3 feet

Borehole Completion Details

0.0 to 21.5 feet below lagoon bottom: 2.25-inch borehole.

Reconnaissance Well Completion Details

Temporary polyvinyl chloride well screen set from 6.0 to 10.0 feet below lagoon bottom.

Borehole Abandonment Details

0.0 to 21.5 feet below lagoon bottom: Bentonite chips hydrated with potable water.



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens, OR**
 Start/End Date **02/02/2023 to 02/03/2023**
 Driller/Equipment **Cascade Environmental/Geoprobe 7822 DT**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Macro-core**

Surface Elevation (feet) **Approx. 6.0**
 Northing
 Easting
 Total Depth of Borehole **110.0 feet**
 Outer Hole Diam **2.25 inch**

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		
0.0 to 2.0					LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
2.0 to 3.5			MFA-B4-20230202-SL-26.5		SILT (ML); dark gray to black; 100% fines, low plasticity; soft; trace organics, plant matter and rootlets; wet.
3.5 to 4.5					SAND (SP); dark gray; 100% sand, fine to medium; loose; wet.
4.0 to 5.0					No recovery.
5.0 to 6.5					Same as above from 3.5 to 4.5 feet.
6.5 to 10.0					SILT (ML); gray; 100% fines, low plasticity; soft; trace organics, plant matter, and rootlets; moist.
10.0 to 11.0					SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, fine; loose; moist to wet.
11.0 to 18.5					Same as above from 6.5 to 10.0 feet.
18.5 to 20.0					No recovery.

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
2 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

21					20.0 to 23.5 feet: Same as above from 6.5 to 10.0 feet.
22					
23		70			
24					23.5 to 25.0 feet: No recovery.
25					
26					25.0 to 29.0 feet: Same as above from 6.5 to 10.0 feet.
27					
28		80			
29					29.0 to 30.0 feet: No recovery.
30					
31					30.0 to 34.5 feet: Same as above from 6.5 to 10.0 feet.
32					
33		90			
34					
35					34.5 to 35.0 feet: No recovery.
36					35.0 to 39.5 feet: Same as above from 6.5 to 10.0 feet.
37					
38		90			
39					
40					39.5 to 40.0 feet: No recovery.
41					40.0 to 44.5 feet: Same as above from 6.5 to 10.0 feet.
42		90			

MFA BOREHOLE WIRECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
3 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

43					
44		90			
45					44.5 to 45.0 feet: No recovery.
46					45.0 to 64.5 feet: Same as above from 6.5 to 10.0 feet.
47					
48		100			
49					
50					
51					
52					
53		100			
54					
55					
56					
57					
58		100			
59					
60					
61					
62		90			
63					
64					

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
4 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23

65		90			64.5 to 65.0 feet: No recovery.
66					65.0 to 69.5 feet: Same as above from 6.5 to 10.0 feet.
67					
68		90			
69					
70					69.5 to 70.0 feet: No recovery.
71					70.0 to 74.5 feet: Same as above from 6.5 to 10.0 feet.
72					
73		100			
74					At 73.5 to 74.5 feet: Multiple thin sand lenses.
75					74.5 to 75.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, fine to medium; loose; moist.
76					75.0 to 76.5 feet: Same as above from 6.5 to 10.0 feet.
77					76.5 to 76.8 feet: Same as above from 74.5 to 75.0 feet.
78		100			76.8 to 83.5 feet: SILT (ML); gray; 100% fines, low plasticity; soft; moist.
79					
80					
81					
82					
83		70			
84					83.5 to 100.0 feet: No recovery. Pushed drill point without collecting soil in order to speed up drilling process.
85					
86		0			



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
5 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

87					
88		0			
89					
90					
91					
92		0			
93					
94					
95					
96					
97		0			
98					
99					
100					
101					100.0 to 104.0 feet: Same as above from 76.8 to 83.5 feet.
102		90			
103					
104					
105					104.5 to 105.0 feet: No recovery.
106					
107		90			105.0 to 109.5 feet: Same as above from 76.8 to 83.5 feet.
108					

MFA BOREHOLE WIRECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
6 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

110		90			109.5 to 110.0 feet: No recovery.
-----	--	----	--	--	-----------------------------------

Total Depth = 110.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 24.5 feet. 5. Top of sludge surface elevation of 6.0 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (24.5 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 110.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 110.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-5

Sheet
1 of 2

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 5.0
Project Location	St. Helens, OR	Northing	
Start/End Date	02/03/2023 to 02/06/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	30.25 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		
0.0 to 1.5				[Hatched pattern]	LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
1.5 to 12.0			MFA-B5-20230203-SL-27.0	[Vertical line pattern]	SILT (ML); dark gray to black; 100% fines, low plasticity; soft; moist. At 2.5 feet: Color change to gray.
12.0 to 14.0				[Blank]	No recovery.
14.0 to 20.5				[Vertical line pattern]	SILT (ML); brownish gray; 100% fines, low plasticity; soft; moist. At 19.0 feet: Color change to gray.
20.5 to 30.25				[Vertical line pattern]	

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23

100

60

100

30



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-5

Sheet
2 of 2

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		
21					20.5 to 24.0 feet: No recovery.
22		30			
23					
24					
25					24.0 to 27.0 feet: SILT (ML); gray; 100% fines, low plasticity; soft; moist.
26					At 25.0 feet: Wood piece.
27		60			
28					27.0 to 29.0 feet: No recovery.
29					
30					29.0 to 29.75 feet: GRAVEL WITH SAND (GW); gray; 5% fines; 15% sand, coarse; 80% gravel, fine to coarse, angular; loose; moist.
		90			29.75 to 30.0 feet: BEDROCK; refusal on vesicular basalt pieces.
					30.0 to 30.25 feet: No recovery.

Total Depth = 30.25 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 25.5 feet. 5. Top of sludge surface elevation of 5.0 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (25.5 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 30.25 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 30.25 feet below lagoon bottom: Bentonite chips hydrated with potable water.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-1

Sheet
1 of 5

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/10/19 to 7/11/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **100.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
1		100		CB					0.0 to 44.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.	
2										
3										
4										
5										
6										
7										
8										
9										
10		100		CB						
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REFURPOSING\FIELD WORK\INTWELL_LOGS_A.GPJ 12/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21			100	CB						
22										
23										
24										
25										
26										
27										
28										
29										
30			100	CB						
31										
32										
33										
34										
35										
36										
37										
38										
39										
40			100	CB						
41										
42										

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REFURPOSING\FIELD WORKING\TWEEL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-1

Sheet
3 of 5

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
44										
45										44.0 to 45.5 feet: SANDY CLAY WITH GRAVEL (CL); gray; 70% fines, medium plasticity; 20% sand, coarse to very coarse; 10% gravel, very fine to coarse; soft; trace weathered bedrock; some fresh, angular bedrock.
46										45.5 to 50.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.
47										
48										
49										
50			0							50.0 to 60.0 feet: No recovery.
51										
52										
53										
54										
55										
56										
57										
58										
59										
60			100							60.0 to 64.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.
61										
62										
63										
64										
65										64.0 to 71.0 feet: SANDY CLAY WITH GRAVEL (CL); gray with brown mottling; 70% fines, medium plasticity; 20% sand, medium to very coarse, angular; 10% gravel, very fine to coarse, angular; soft; highly weathered in situ basalt bedrock in a fine matrix of weathered material with weathering rinds, slight porosity, slight

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\WELL_LOGS_A.GPJ 12/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										intact bedrock.
67										
68										
69										
70										
71		100				CB				
72										71.0 to 75.0 feet: GRAVELLY CLAY WITH SAND (CL); dark gray when wet; 60% fines; 10% sand, very fine to coarse; 30% gravel, fine to very coarse, angular; soft; trace weathered bedrock; wet.
73										
74										
75										75.0 to 80.0 feet: Highly vesicular basalt >20%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are open and filled with firm dark gray clay material that encapsulates the bedrock.
76										
77										
78										
79										
80		100				CB				80.0 to 100.0 feet: Highly vesicular basalt <20%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (high to low angle), joints are closed.
81										
82										
83										
84										
85										
86										
87										
88										

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
89										
90			100	CB						@ 90.0 feet: Becomes less vesicular <10%.
91										
92										
93										
94										
95										@ 95.0 feet: Becomes less vesicular <5%, and increase in jointing.
96										
97										
98										
99										
100										

Total Depth = 100.0 feet bgs.

Borehole Details:

0.0 to 80.0 feet bgs: 6-inch borehole.
80.0 to 100.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 5.0 feet bgs: Concrete.
5.0 to 58.0 feet bgs: Bentonite chips hydrated with potable water.
58.0 to 81.5 feet bgs: 12/20 Silica Sand.
81.5 to 100.0 feet bgs: Bentonite chips hydrated with potable water.

Monitoring Well Completion

Well Tag Number: L133559
Flushmount monitoring well.
0.0 to 60.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
60.0 to 80.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
80.0 to 80.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-2

Sheet
1 of 5

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/8/19 to 7/10/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **100.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Lithologic Column	Soil Description
					Number	Name (Type)	Blows/6"		
1		100		CB				0.0 to 62.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.	
2									
3									
4									
5									
6									
7									
8									
9									
10		100		CB					
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REFURPOSING\FIELD WORK\INTWELL_LOGS_A.GPJ 12/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21			100	CB						
22										
23										
24										
25										
26										
27										
28										
29										
30			100	CB						
31										
32										
33										
34										
35										
36										
37										
38										
39										
40			100	CB						
41										
42										

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REFURPOSING\FIELD WORKING\TWEEL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data		Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)			
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									

100 CB

100 CB

62.0 to 68.0 feet: SANDY CLAY WITH GRAVEL (CL); gray with brown mottling; 70% fines; 20% sand, medium to very coarse; 10% gravel, very fine to medium, angular; soft; highly weathered in situ bedrock in a fine matrix, with slight porosity; some intact bedrock with weathering rinds.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										@ 66.0 feet: Becomes gray with more intact rock only moderately weathered.
67										
68										
69										
70										
71			100			CB				
72										
73										
74										
75										
76										
77										
78										
79										
80										
81			100			CB				@ 80.0 feet: Becomes less vesicular, <10%.
82										
83										
84										
85										@ 85.0 feet: Becomes less vesicular, <5%, with an increase in joints.
86										
87										
88										

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
89										
90			100	CB						
91										
92										
93										
94										
95										
96										
97										
98										
99										
100										

Total Depth = 100.0 feet bgs.

Borehole Details:

0.0 to 70.0 feet bgs: 6-inch borehole.
70.0 to 100.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 2.0 feet bgs: Concrete.
2.0 to 48.0 feet bgs: Bentonite chips hydrated with potable water.
48.0 to 71.0 feet bgs: 12/20 Silica Sand.
71.0 to 100.0 feet bgs: Bentonite chips hydrated with potable water.

Monitoring Well Completion

Well Tag Number: L133560
Flushmount monitoring well.
0.0 to 50.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
50.0 to 70.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
70.0 to 70.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-3

Sheet
1 of 5

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/17/19 to 7/17/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **100.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Lithologic Column	Soil Description
					Number	Name (Type)	Blows/6"		
1			100	CB				0.0 to 1.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to coarse, angular; loose; no odor; no sheen; moist.	
2								1.0 to 2.0 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
3								2.0 to 5.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
4									
5			100	CB					
6								5.0 to 5.5 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
7								5.5 to 8.0 feet: SANDY CLAYEY GRAVEL (GW); gray; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, fine to coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
8									
9								8.0 to 10.0 feet: GRAVELLY SAND (SW); brown; 0% fines; 80% sand, fine to coarse; 20% gravel, fine to very coarse, angular; loose; trace silt clasts; no odor; no sheen; moist.	
10									
11								10.0 to 15.0 feet: No recovery.	
12									
13									
14									
15			100	CB					
16				SPT			21, 11, 15	15.0 to 22.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, fine to medium; 10% gravel, fine to very coarse, angular; loose; trace silt clasts; no odor; no sheen; moist.	
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\WELL LOGS A.GPJ 12/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21										
22										
23										
24										
25			0			CB				
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40			100			CB				
41										
42										

22.0 to 48.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\T\WELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
44										
45										
46										
47										
48										
49										
50			100			CB				
51										
52										
53										
54										
55										
56										
57										
58										
59										
60			100			CB				
61										
62										
63										
64										
65										

48.0 to 75.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, plant matter, and rootlets; no odor; no sheen; moist to wet.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										
67										
68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										

100 CB

100 CB

75.0 to 80.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, very fine to fine; 0% gravel; loose; trace organics and wood fragments; no odor; no sheen; wet.

80.0 to 100.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data		Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)			
89			100	CB					
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

Total Depth = 100.0 feet bgs.

Borehole Details:

0.0 to 90.0 feet bgs: 6-inch borehole.
90.0 to 100.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 3.0 feet bgs: Concrete.
3.0 to 5.0 feet bgs: 12/20 Silica Sand.
5.0 to 23.0 feet bgs: Bentonite chips hydrated with potable water.
23.0 to 46.5 feet bgs: 12/20 Silica Sand.
46.5.0 to 70.0 feet bgs: Bentonite chips hydrated with potable water.
70.0 to 100.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133572
Flushmount monitoring well.
0.0 to 25.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
25.0 to 45.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
45.0 to 45.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-4

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/15/19 to 7/15/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **120.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Lithologic Column	Soil Description
					Number	Name (Type)	Blows/6"		
1			100	CB				0.0 to 2.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to very coarse, angular; loose; no odor; no sheen; moist.	
2								@ 1.5 feet: Becomes brown.	
3								2.0 to 4.0 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
4								4.0 to 8.5 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
5			100	CB SH		Shelby tube at 5.0'		@ 4.1 feet: Piece of black plastic.	
6									
7									
8									
9								8.5 to 11.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 70% sand, very fine to coarse; 30% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
10									
11									
12								11.0 to 12.0 feet: SANDY CLAYEY GRAVEL (GW); brown; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, very fine to coarse, angular; loose; trace slightly weathered vesicular basalt cobbles; no odor; no sheen; moist.	
13								12.0 to 13.0 feet: SANDY GRAVELLY CLAY (CL); brown fines with gray sand; 50% fines, medium plasticity; 30% sand, very fine to medium; 20% gravel, very fine to medium, angular; very soft; no odor; no sheen; wet.	
14								13.0 to 16.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 80% sand, fine to coarse; 20% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; wet.	
15			100	CB SPT			25, 21, 16		
16								16.0 to 20.0 feet: SANDY GRAVEL WITH CLAY (GW); brown; 10% fines; 40% sand, fine to very coarse; 50% gravel, fine to very coarse, angular; loose; some cobbles; no odor; no sheen; wet.	
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

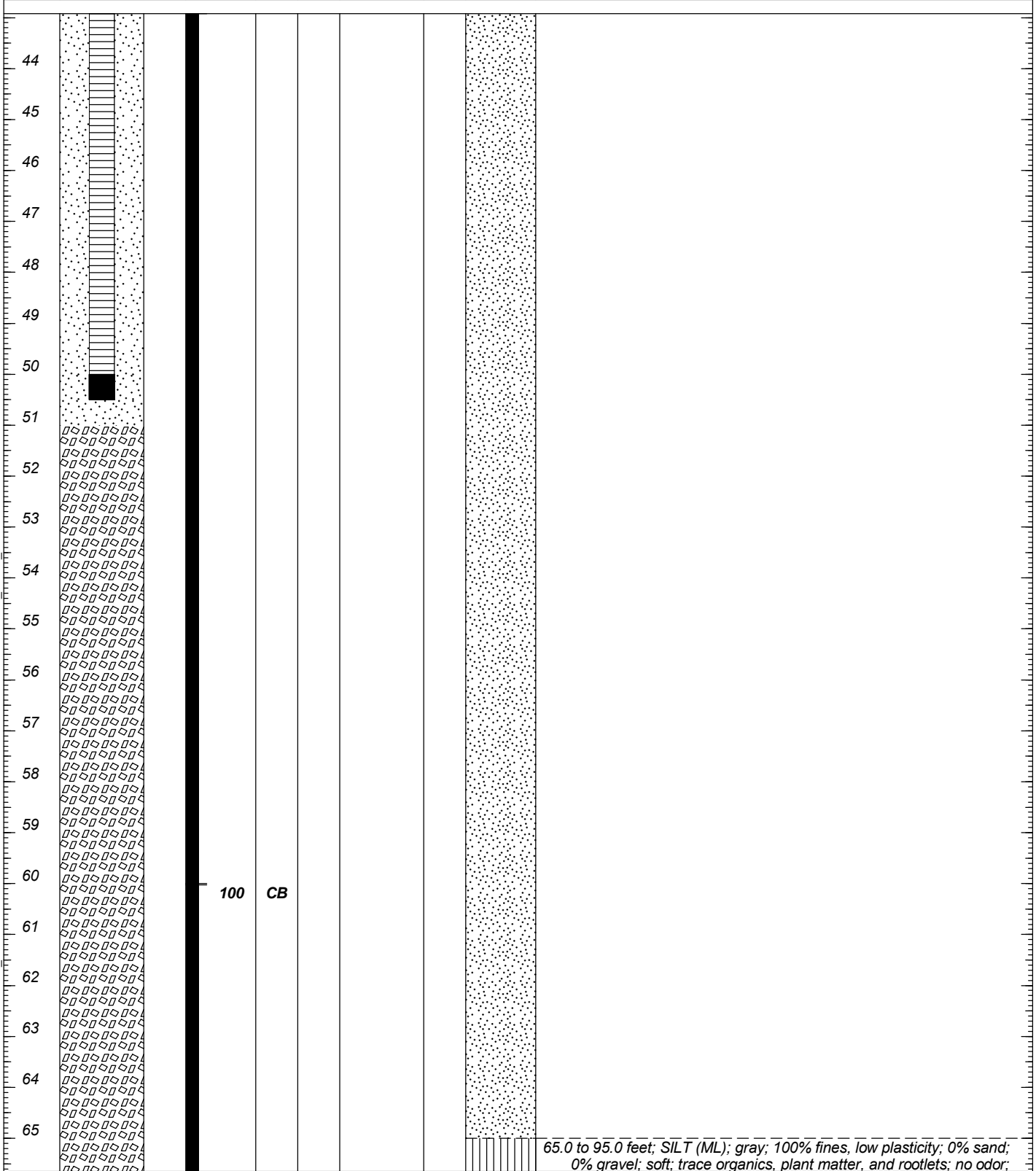
G:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\WELL LOGS A.GPJ 12/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21										20.0 to 23.0 feet: SAND WITH GRAVEL (SW); brown; 0% fines; 90% sand, fine to very coarse; 10% gravel, fine to very coarse, angular; loose; no odor; no sheen; wet.
22										
23										23.0 to 65.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.
24										
25			0							CB
26										
27										
28										
29										
30										
31										
32										
33										
34										
35			0							CB
36										
37										
38										
39										
40										
41										
42										

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\TWEELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data		Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)			



GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										no sheen; moist to wet.
67										
68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\TWEELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
89		100	100	CB				95.0 to 105.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, very fine to fine; 0% gravel; loose; trace organics and rootlets; no odor; no sheen; wet.	
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100	100	100	CB				105.0 to 113.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics and rootlets; no odor; no sheen; moist.		
101									
102									
103									
104									
105									
106									
107									
108									
109									
110	100	100	CB						
111									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
112										
113										
114										
115										
116										
117										
118										
119										
120										

Total Depth = 120.0 feet bgs.

Borehole Details:

0.0 to 90.0 feet bgs: 6-inch borehole.
90.0 to 120.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 2.0 feet bgs: Concrete.
2.0 to 27.0 feet bgs: Bentonite chips hydrated with potable water.
27.0 to 51.0 feet bgs: 12/20 Silica Sand.
51.0.0 to 75.0 feet bgs: Bentonite chips hydrated with potable water.
75.0 to 120.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133571
Flushmount monitoring well.
0.0 to 30.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
30.0 to 50.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
50.0 to 50.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-5

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/16/19 to 7/16/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **120.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Lithologic Column	Soil Description
					Number	Name (Type)	Blows/6"		
1								0.0 to 2.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to coarse, angular; loose; no odor; no sheen; moist.	
2								2.0 to 3.0 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
3								3.0 to 6.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
4									
5			100	CB			10, 11, 15	@ 5.0 feet: Thin brown silt bed.	
6				SPT					
7								6.0 to 9.0 feet: SANDY CLAYEY GRAVEL (GW); gray; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, very fine to coarse, angular; loose; no odor; no sheen; moist.	
8									
9									
10								9.0 to 15.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 80% sand, fine to coarse; 20% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
11									
12									
13									
14									
15			100	CB				15.0 to 16.0 feet: SANDY GRAVELLY CLAY (CL); brown fines with gray sand and gravel; 50% fines, medium plasticity; 30% sand, very fine to medium; 20% gravel, fine to medium, angular; very soft; no odor; no sheen; wet.	
16								16.0 to 23.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, fine to medium; 10% gravel, fine to very coarse, angular; loose; no odor; no sheen; wet.	
17									
18									
19									
20									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\INTWELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										

100 CB SPT

2, 3, 6

0 CB

23.0 to 63.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\TWEELL_LOGS_A.GPJ 12/18/19

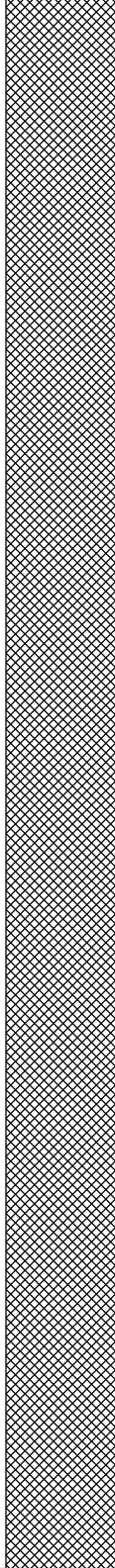

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data		Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)			
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									

100 CB

63.0 to 103.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, plant matter, and rootlets; no odor; no sheen; moist to wet.

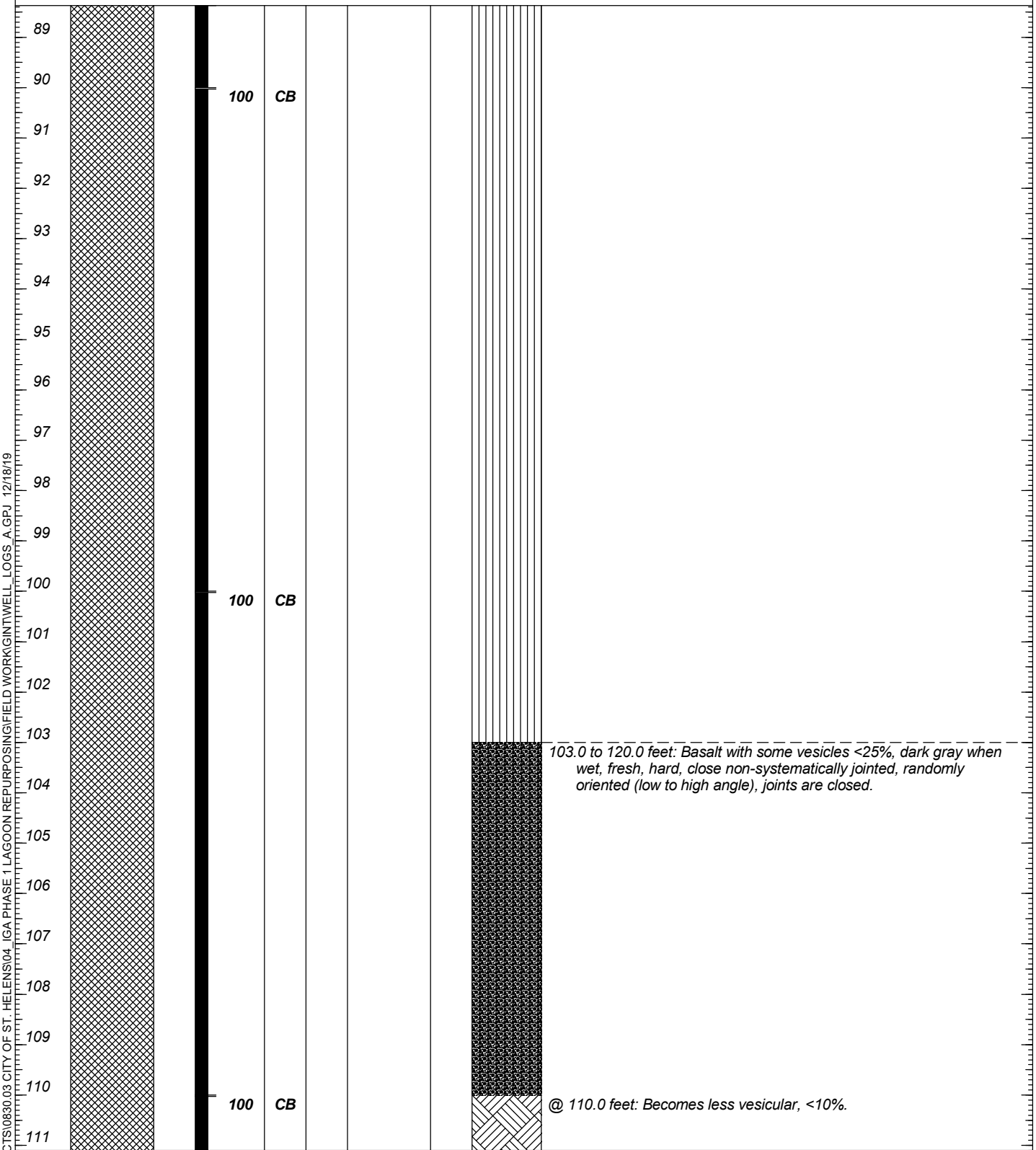
NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description	
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"		Lithologic Column
66									
67									
68									
69									
70				100	CB				
71									
72									
73									
74									
75									
76									
77									
78									
79									
80				100	CB				
81									
82									
83									
84									
85									
86									
87									
88									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\TWEEL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data		Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)			



NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
112										
113										
114										
115										
116										@ 115.0 feet: Becomes less vesicular, <5%.
117										
118										
119										
120										

Total Depth = 120.0 feet bgs.

Borehole Details:

0.0 to 90.0 feet bgs: 6-inch borehole.
90.0 to 120.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 5.0 feet bgs: Concrete.
5.0 to 27.0 feet bgs: Bentonite chips hydrated with potable water.
27.0 to 51.0 feet bgs: 12/20 Silica Sand.
51.0.0 to 54.0 feet bgs: Bentonite chips hydrated with potable water.
54.0 to 120.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133553
Flushmount monitoring well.
0.0 to 30.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
30.0 to 50.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
50.0 to 50.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SPT = Standard Penetration Test.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-6

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/11/19 to 7/12/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **120.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Lithologic Column	Soil Description
					Number	Name (Type)	Blows/6"		
1		100		CB				0.0 to 4.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to very coarse, angular; loose; no odor; no sheen; moist.	
2									
3								@ 2.5 feet: Becomes brown.	
4									
5		100		CB SPT			6, 4, 5	4.0 to 5.0 feet: GRAVELLY CLAY (CL); brown; 60% fines, medium plasticity; 0% sand; 40% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
6								5.0 to 6.0 feet: SANDY CLAYEY GRAVEL (GW); brown with dark gray sand and gravel; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, very fine to coarse, angular; loose; fines in clumps; no odor; no sheen; moist.	
7								6.0 to 10.0 feet: SAND WITH GRAVEL (SW); brown; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles up to 2 inch; no odor; no sheen; moist.	
8									
9									
10									
11								10.0 to 11.0 feet: SILTY GRAVELLY SAND (SM); dark gray; 30% fines, low plasticity; 50% sand, very fine to medium; 20% gravel, fine to medium, angular; loose; trace cobbles up to 3 inch; no odor; no sheen; moist.	
12								11.0 to 20.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 80% sand, fine to very coarse; 20% gravel, fine to very coarse, angular; loose; trace cobbles up to 2 inch; no odor; no sheen; moist.	
13								@ 13.0 feet: Becomes brown, with a thin silt bed.	
14									
15		100		CB SH					
16								@ 16.0 feet: Becomes gray, with a thin silt bed.	
17									
18								@ 18.0 feet: Becomes brown.	
19									
20									

Shelby Tube at 15.0'

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\INTWELL_LOGS_A.GPJ 12/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
21										20.0 to 55.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.
22										
23										
24										
25										
26			0		CB			1,		
27					SPT			2,		
28								5		
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										

G:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\T\WELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data		Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)			
44									
45									
46									
47									
48									
49									
50									
51			100			CB			
52									
53									
54									
55									
56									55.0 to 120.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, plant matter, and rootlets; trace light interbedded zones of light gray sand; no odor; no sheen; moist to wet.
57									
58									
59									
60			100			CB			
61									
62									
63									
64									
65									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description						
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"		Lithologic Column					
66														
67														
68														
69														
70									100	CB				
71														
72														
73														
74														
75														
76														
77														
78														
79														
80									100	CB				
81														
82														
83														
84														
85														
86														
87														
88														

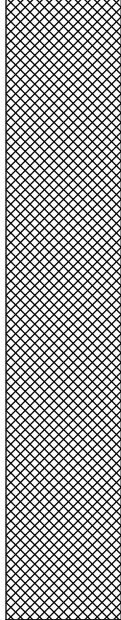

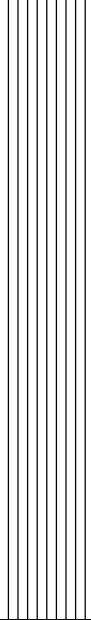
GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORKING\TWEELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data					Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)			
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100		100		CB					
101									
102									
103									
104									
105									
106									
107									
108									
109									
110		100		CB					
111									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL_LOGS_A.GPJ 12/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
112										
113										
114										
115										
116										
117										
118										
119										
120										

Total Depth = 120.0 feet bgs.

Borehole Details:

0.0 to 120.0 feet bgs: 6-inch borehole.

Borehole Completion Details:

0.0 to 3.5 feet bgs: Concrete.

3.5 to 28.0 feet bgs: Bentonite chips hydrated with potable water.

28.0 to 51.0 feet bgs: 12/20 Silica Sand.

51.0 to 120.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133558

Flushmount monitoring well.

0.0 to 30.5 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.

30.5 to 50.5 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.

50.5 to 51.0 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

COLU 55412

1/22/2019

WELL I.D. LABEL# L 132783
START CARD # 1041592
ORIGINAL LOG #

(1) LAND OWNER
Owner Well I.D.
First Name GARY Last Name KERVIN
Company
Address PO BOX 780
City SCAPPOOSE State OR Zip 97056

(2) TYPE OF WORK
[X] New Well [] Deepening [] Conversion
[] Alteration (complete 2a & 10) [] Abandonment (complete 5a)

(2a) PRE-ALTERATION
Dia + From To Gauge Stl Plstc Wld Thrld
Casing:
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD
[X] Rotary Air [] Rotary Mud [] Cable [] Auger [] Cable Mud
[] Reverse Rotary [] Other

(4) PROPOSED USE
[X] Domestic [] Irrigation [] Community
[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION
Special Standard [] (Attach copy)
Depth of Completed Well 200.00 ft.
BORE HOLE
Dia From To Material From To Amt sacks/lbs

How was seal placed: Method [] A [] B [] C [] D [] E
[X] Other POUR
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER
Casing Liner Dia + From To Gauge Stl Plstc Wld Thrld
Shoe [] Inside [X] Outside [] Other Location of shoe(s) 20
Temp casing [] Yes Dia From + To

(7) PERFORATIONS/SCREENS
Perforations Method saw cut
Screens Type Material
Perf/ Casing/ Screen Dia From To Scrn/slot Slot # of Tele/
Screen Liner Dia From To width length slots pipe size

(8) WELL TESTS: Minimum testing time is 1 hour
[] Pump [] Bailer [X] Air [] Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration (hr)

Temperature 41 °F Lab analysis [] Yes By
Water quality concerns? [] Yes (describe below) TDS amount 192 ppm
From To Description Amount Units

(9) LOCATION OF WELL (legal description)
County COLUMBIA Twp 4.00 N N/S Range 1.00 W E/W WM
Sec 9 NW 1/4 of the NE 1/4 Tax Lot 1000
Tax Map Number Lot
Lat " or 45.84953100 DMS or DD
Long " or -122.81478500 DMS or DD
[] Street address of well [X] Nearest address
NEAR 1875 OLD PORTLAND ROAD, N.E. HELENS, OREGON 97051

(10) STATIC WATER LEVEL
Date SWL(psi) + SWL(ft)
Existing Well / Pre-Alteration
Completed Well 12/26/2018 54
Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES
Depth water was first found 170.00
SWL Date From To Est Flow SWL(psi) + SWL(ft)
12/28/2018 170 180 40 54

(11) WELL LOG
Ground Elevation
Material From To
basalt weatherd 0 5
tan claystone 5 14
gray basalt 14 98
gray brn sandstone 98 110
gray basalt 110 170
pours gray basalt 170 180
gray basalt 180 200

Date Started 12/26/2018 Completed 12/28/2018

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 1975 Date 1/22/2019
Signed AARON MORLEY (E-filed)

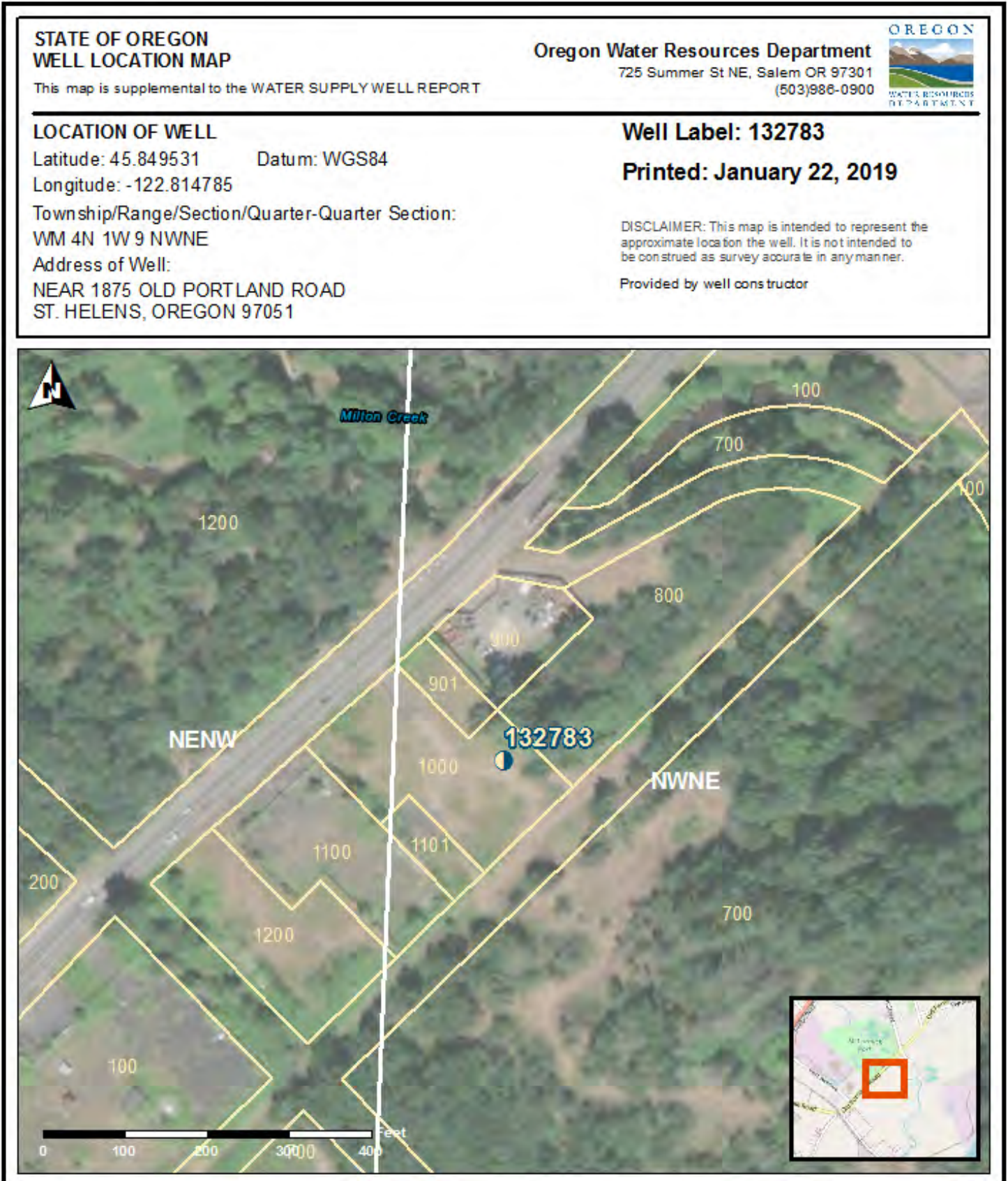
(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1480 Date 1/22/2019
Signed ARTHUR MCMULLEN (E-filed)
Contact Info (optional) 503 397 2356

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

COLU 55412

1/22/2019

Map of Hole



APPENDIX B

FIELD SAMPLING DATA SHEET





Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MW-1
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoon Phase 1B	Sampling Date:	2/20/2023
Sampling Event:	Q1 2023	Sample Name:	MW1-20230220-GW-70
Sub Area:		Sample Depth:	~70
FSDS QA:	K. Crossley		
Easting:		Northing:	TOC:

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/20/2023	9:50			28.98			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(1) Submersible Pump	10:10	2.0	-	0.10	7.58	14.0	562.6	1.84	145.0	3.58
	10:17	2.7	33.70	0.10	7.40	14.1	661	1.17	120.2	18.8
	10:20	3.0	-	0.10	7.41	14.1	670	1.17	114.8	19.8
	10:23	3.3	34.60	0.10	7.40	13.9	672	1.22	116.7	19.7

Final Field Parameters	10:26	3.6	34.90	0.10	7.38	14.1	685	1.19	119.5	11.0
------------------------	-------	-----	-------	------	------	------	-----	------	-------	------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

clear; colorless

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(1) Submersible Pump	Groundwater	10:26	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

Screened from 60.0 - 80.0 feet bgs
Final DTW: 37.30

Signature

Cody Schweitzer



Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MW-2
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoon Phase 1B	Sampling Date:	2/20/2023
Sampling Event:	Q1 2023	Sample Name:	MW2-20230220-GW-60
Sub Area:		Sample Depth:	~60
FSDS QA:	K. Crossley		
Easting:		Northing:	
		TOC:	

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/20/2023	13:30			40.40			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(1) Submersible Pump	13:55	2.0	41.50	0.15	8.46	14.1	605.9	0.98	283.8	73.5
	14:05	3.0	-	0.10	8.43	13.4	530.6	0.78	229.0	70.5
	14:15	4.5	43.20	0.15	8.46	14.3	524.8	0.57	182.1	56.0
	14:35	6.5	-	0.10	8.54	13.8	521.5	0.43	100.2	41.6
	14:38	6.8	-	0.10	8.55	13.7	520.8	0.42	94.9	39.8

Final Field Parameters	14:41	7.1	-	0.10	8.57	14.0	520.0	0.39	90.9	40.7
------------------------	-------	-----	---	------	------	------	-------	------	------	------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

cloudy; colorless

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(1) Submersible Pump	Groundwater	14:41	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

Gave extra purge time at beginning due to turbidity
Screened from 50.0 to 70.0 feet
Final DTW: 46.42

Signature

Cody Schweitzer



Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MW-3
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoon Phase 1B	Sampling Date:	2/14/2023
Sampling Event:	Q1 2023	Sample Name:	MW3-20230214-GW-35
Sub Area:		Sample Depth:	~35
FSDS QA:	K. Crossley		
Easting:		Northing:	
		TOC:	

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/14/2023	9:20			15.60			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(2) Peristaltic Pump	9:40	2.00	-	0.25	7.00	14.5	478.2	2.79	-87.2	7.07
	9:43	2.75	15.78	0.25	6.89	14.2	538.3	0.92	-109.4	5.81
	9:46	3.50	15.78	0.25	6.89	14.3	535.6	0.67	-117.2	0.05
	9:56	6.00	15.78	0.25	6.95	14.5	478.0	0.58	-113.7	0.02
	9:59	6.75	15.79	0.25	6.98	14.1	460.0	0.75	-115.8	0.02
	10:02	7.50	15.80	0.25	7.01	14.2	459.8	0.75	-115.9	0.02

Final Field Parameters	10:05	8.25	15.80	0.25	7.02	14.3	458.1	0.70	-125.4	0.02
------------------------	-------	------	-------	------	------	------	-------	------	--------	------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

clear; colorless; slightly effervescent

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(2) Peristaltic Pump	Groundwater	10:05	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

DUP collected here: MW3-20230214-GW-35-DUP
 Screened from 25.0 - 45.0 feet
 Final DTW: 15.79

Signature

Cody Schweitzer



Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MW-4
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoond Phase 1B	Sampling Date:	2/14/2023
Sampling Event:	Q1 2023	Sample Name:	MW4-20230214-GW-40
Sub Area:		Sample Depth:	~40
FSDS QA:	K. Crossley		
Easting:		Northing:	TOC:

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/14/2023	13:50			19.99			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(2) Peristaltic Pump	14:05	2.0	19.99	0.40	6.84	16.0	2085	1.59	-139.1	>1100
	14:15	6.0	19.99	0.40	6.94	16.2	2096	0.27	-137.2	71.2
	14:25	10.0	19.99	0.40	6.92	16.2	2105	0.21	-156.5	54.8
	14:28	11.2	19.99	0.40	6.92	16.0	2107	0.22	-156.0	42.0
	14:31	12.4	19.99	0.40	6.92	15.9	2096	0.23	-155.5	38.4
	14:34	13.6	19.99	0.40	6.92	16.1	2103	0.22	-155.4	27.6

Final Field Parameters	14:37	14.8	19.99	0.40	6.93	16.0	2102	0.23	-155.0	22.3
------------------------	-------	------	-------	------	------	------	------	------	--------	------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

slightly cloudy; slight brown tint

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(2) Peristaltic Pump	Groundwater	14:37	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

Well under pressure when opened. Very turbid to start, gave it extra purge time at start to help lower turbidity, and gave it extra time after "stable" for more time to lower turbidity.
 Screened from 30.0 - 50.0 feet bgs
 Final DTW: 19.99

Signature

Cody Schweitzer



Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MW-5
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoon Phase 1B	Sampling Date:	2/14/2023
Sampling Event:	Q1 2023	Sample Name:	MW5-20230214-GW-40
Sub Area:		Sample Depth:	~40
FSDS QA:	K. Crossley		
Easting:		Northing:	TOC:

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/14/2023	12:25			18.80			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(2) Peristaltic Pump	12:35	2.00	18.85	0.35	6.97	15.5	1725	2.45	-135.2	0.36
	12:45	5.50	18.85	0.35	6.85	15.6	1813	0.42	-151.0	0.26
	12:48	6.55	18.85	0.35	6.86	15.5	1814	0.40	-151.4	0.02

Final Field Parameters	12:51	7.60	18.85	0.35	6.87	15.5	1812	0.37	-151.3	0.71
------------------------	-------	------	-------	------	------	------	------	------	--------	------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

clear; colorless; effervescent

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(2) Peristaltic Pump	Groundwater	12:51	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

Screened from 30.0 - 50.0 feet bgs
Final DTW: 18.85

Signature

Cody Schweitzer



Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MW-6
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoon Phase 1B	Sampling Date:	2/14/2023
Sampling Event:	Q1 2023	Sample Name:	MW1-20230214-GW-40.25
Sub Area:		Sample Depth:	~40.25
FSDS QA:	K. Crossley		
Easting:		Northing:	TOC:

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/14/2023	15:50			19.75			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(2) Peristaltic Pump	16:01	2.0	19.75	0.40	6.92	14.8	1855	0.74	-137.7	3.12
	16:11	6.0	19.75	0.40	6.95	14.8	1858	0.32	-150.1	3.02
	16:14	7.2	19.75	0.40	6.95	14.9	1853	0.24	-150.6	0.84

Final Field Parameters	16:17	8.4	19.75	0.40	6.95	14.9	1849	0.19	-151.2	3.58
------------------------	-------	-----	-------	------	------	------	------	------	--------	------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

clear; colorless; slightly effervescent

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(2) Peristaltic Pump	Groundwater	16:17	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

Screened from 30.5 - 50.5 feet bgs
Final DTW: 19.75

Signature

Cody Schweitzer



Water Field Sampling Data Sheet

Client Name:	St. Helens	Sample Location:	MFA-B3A
Project #:	M0830.03.006	Staff:	C. Schweitzer
Project Name:	St. Helens Lagoon Phase 1B	Sampling Date:	2/7/2023
Sampling Event:	Q1 2023	Sample Name:	MFA-B3A-20230207-GW-36.0
Sub Area:		Sample Depth:	~36
FSDS QA:	K. Crossley		
Easting:		Northing:	
		TOC:	

Hydrology/Level Measurements

Date	Time	DT-Bottom	DT -Product	DT-Water	DTP-DTW	DTB-DTW	Pore Volume
2/7/2023	8:00			17.60			

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (L)	WLE (ft)	Flowrate (l/min)	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
(2) Peristaltic Pump										

Final Field Parameters	8:30	-	17.60	-	6.97	7.6	706.2	6.51	100.0	overrange
------------------------	------	---	-------	---	------	-----	-------	------	-------	-----------

Purge and Sample Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

cloudy; brown tint; highly turbid

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	# of Bottles	Filtered (Yes/No)
(2) Peristaltic Pump	Groundwater	8:30	VOA-Glass	5	No
			Amber-Glass	11	No
			White Poly	3	No
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly		
			Total Bottles	20	

Sample Type: Groundwater, Surfacewater, Stormwater, Process Water, Grab Sample, Field Blank, or Other (specify).

General Sampling Comments

Initial WL after well install: 2/6 @ 1500 = ~31.0 / WL prior to purge after setting for 45 min: 2/6 @ 1545 = ~25.70 / WL after purgin ~2-3 gallons = dry
 WL the next morning: 2/7 @ 0800: 17.60 / DTB the next morning: 2/7 @ 0800: 40.0
 TOD: 2.5' above water level of lagoon / TOC: 2.4' above top of deck
 WL measurement point: Top of casing 4.9' above lagoon WL / Screened from 34.0 - 38.0 feet below TOD

Signature

Cody Schweitzer

APPENDIX C

LAB REPORTS





ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Monday, December 12, 2022

David Weatherby
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A2H0382 - St. Helens Lagoon - [none]

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A2H0382, which was received by the laboratory on 8/10/2022 at 6:25:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: pnerenberg@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 3.1 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DU1-20220810-ISM-COMP	A2H0382-01	Sediment	08/10/22 09:15	08/10/22 18:25
DU1-20220810-ISM-COMP	A2H0382-02	Sediment	08/10/22 09:15	08/10/22 18:25
DU1-20220810-ISM-COMP	A2H0382-03	Sediment	08/10/22 09:15	08/10/22 18:25

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

ANALYTICAL CASE NARRATIVE

Work Order: A2H0382

Amended Report Revision 1:

8270E Organophosphorus Pesticides Data Correction

This report supersedes all previous reports.

Sample DU1-20220810-ISM-COMP (A2H0382-02): Originally reported Merphos with a positive result. Corrected result is Non-Detect at 18,200ug/kg. Reporting limit is raised due to non-target analyte matrix interference

Mark Zehr
Organics Manager
11/28/2022



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0779		PRO
Diesel	20500	2110	4230	mg/kg dry	100	08/23/22 06:03	NWTPH-Dx	F-13
Oil	ND	4230	8460	mg/kg dry	100	08/23/22 06:03	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: %</i>	<i>Limits: 50-150 %</i>	<i>100</i>	<i>08/23/22 06:03</i>	<i>NWTPH-Dx</i>	<i>S-01</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0476		
Gasoline Range Organics	ND	182	182	mg/kg dry	50	08/12/22 17:17	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 105 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>08/12/22 17:17</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>101 %</i>		<i>50-150 %</i>		<i>1</i>	<i>08/12/22 17:17</i>	<i>NWTPH-Gx (MS)</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0476		
Acetone	ND	18200	36500	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Acrylonitrile	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Benzene	ND	182	365	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Bromobenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Bromochloromethane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Bromodichloromethane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Bromoform	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Bromomethane	ND	18200	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
2-Butanone (MEK)	ND	9110	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
n-Butylbenzene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
sec-Butylbenzene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
tert-Butylbenzene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Carbon disulfide	ND	9110	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Carbon tetrachloride	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Chlorobenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Chloroethane	ND	9110	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Chloroform	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Chloromethane	ND	4560	9110	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
2-Chlorotoluene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
4-Chlorotoluene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Dibromochloromethane	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2-Dibromo-3-chloropropane	ND	4560	9110	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2-Dibromoethane (EDB)	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Dibromomethane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2-Dichlorobenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,3-Dichlorobenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,4-Dichlorobenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Dichlorodifluoromethane	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1-Dichloroethane	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2-Dichloroethane (EDC)	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1-Dichloroethene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
cis-1,2-Dichloroethene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
trans-1,2-Dichloroethene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0476		
1,2-Dichloropropane	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,3-Dichloropropane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
2,2-Dichloropropane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1-Dichloropropene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
cis-1,3-Dichloropropene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
trans-1,3-Dichloropropene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Ethylbenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Hexachlorobutadiene	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
2-Hexanone	ND	18200	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Isopropylbenzene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
4-Isopropyltoluene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Methylene chloride	ND	9110	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
4-Methyl-2-pentanone (MIBK)	ND	9110	18200	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Methyl tert-butyl ether (MTBE)	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Naphthalene	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
n-Propylbenzene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Styrene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1,1,2-Tetrachloroethane	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1,2,2-Tetrachloroethane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Tetrachloroethene (PCE)	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Toluene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2,3-Trichlorobenzene	ND	4560	9110	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2,4-Trichlorobenzene	ND	4560	9110	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1,1-Trichloroethane	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,1,2-Trichloroethane	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Trichloroethene (TCE)	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Trichlorofluoromethane	ND	1820	3650	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2,3-Trichloropropane	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,2,4-Trimethylbenzene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
1,3,5-Trimethylbenzene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
Vinyl chloride	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
m,p-Xylene	ND	911	1820	ug/kg dry	50	08/12/22 17:17	5035A/8260D	
o-Xylene	ND	456	911	ug/kg dry	50	08/12/22 17:17	5035A/8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0476		
Surrogate: 1,4-Difluorobenzene (Surr)			Recovery: 103 %	Limits: 80-120 %	1	08/12/22 17:17	5035A/8260D	
Toluene-d8 (Surr)			95 %	80-120 %	1	08/12/22 17:17	5035A/8260D	
4-Bromofluorobenzene (Surr)			101 %	79-120 %	1	08/12/22 17:17	5035A/8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<p><u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232</p>	<p>Project: <u>St. Helens Lagoon</u> Project Number: [none] Project Manager: David Weatherby</p>	<p>Report ID: A2H0382 - 12 12 22 1538</p>
--	--	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0946		H-01
Benzene	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Toluene	ND	182	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Ethylbenzene	ND	91.1	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
m,p-Xylene	ND	182	365	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
o-Xylene	ND	91.1	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,2,4-Trimethylbenzene	ND	182	365	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,3,5-Trimethylbenzene	ND	182	365	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Chloroform	ND	182	365	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,2-Dibromo-3-chloropropane	ND	91.1	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,2-Dibromoethane (EDB)	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,1-Dichloroethane	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,2-Dichloroethane (EDC)	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,1-Dichloroethene	ND	72.9	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	Q-30
cis-1,2-Dichloroethene	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
trans-1,2-Dichloroethene	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,2-Dichloropropane	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
cis-1,3-Dichloropropene	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
trans-1,3-Dichloropropene	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Tetrachloroethene (PCE)	ND	583	583	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	B-07

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<p><u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232</p>	<p>Project: <u>St. Helens Lagoon</u> Project Number: [none] Project Manager: David Weatherby</p>	<p>Report ID: A2H0382 - 12 12 22 1538</p>
--	--	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0946		H-01
1,1,2,2-Tetrachloroethane	ND	91.1	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Trichloroethene (TCE)	ND	36.5	72.9	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,2,3-Trichloropropane	ND	91.1	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
Vinyl chloride	ND	182	365	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
1,1,2-Trichloroethane	ND	91.1	182	ug/kg dry	100	08/26/22 15:07	5035A/8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>08/26/22 15:07</i>	<i>5035A/8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>08/26/22 15:07</i>	<i>5035A/8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>79-120 %</i>		<i>1</i>	<i>08/26/22 15:07</i>	<i>5035A/8260D SIM</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0777		PRO
Acenaphthene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Acenaphthylene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Anthracene	211	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	Ja
Benz(a)anthracene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Benzo(a)pyrene	ND	212	424	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Benzo(b)fluoranthene	ND	212	424	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Benzo(k)fluoranthene	ND	212	424	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Benzo(g,h,i)perylene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Chrysene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Dibenz(a,h)anthracene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Fluoranthene	179	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	Ja
Fluorene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1-Methylnaphthalene	ND	283	565	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2-Methylnaphthalene	ND	283	565	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Naphthalene	ND	283	565	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Phenanthrene	366	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Pyrene	189	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	Ja
Carbazole	ND	212	424	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Dibenzofuran	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2-Chlorophenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4-Chloro-3-methylphenol	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,4-Dichlorophenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,4-Dimethylphenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,4-Dinitrophenol	ND	3530	7070	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	3530	7070	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2-Methylphenol	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
3+4-Methylphenol(s)	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2-Nitrophenol	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4-Nitrophenol	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Pentachlorophenol (PCP)	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Phenol	ND	283	565	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0777		PRO
2,3,5,6-Tetrachlorophenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,4,5-Trichlorophenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Nitrobenzene	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,4,6-Trichlorophenol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Bis(2-ethylhexyl)phthalate	11800	2120	4240	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Butyl benzyl phthalate	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Diethylphthalate	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Dimethylphthalate	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Di-n-butylphthalate	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Di-n-octyl phthalate	ND	1130	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
N-Nitrosodimethylamine	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
N-Nitrosodiphenylamine	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Bis(2-Chloroethyl) ether	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Hexachlorobenzene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Hexachlorobutadiene	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Hexachlorocyclopentadiene	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Hexachloroethane	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2-Chloronaphthalene	ND	141	283	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1,2,4-Trichlorobenzene	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4-Bromophenyl phenyl ether	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4-Chlorophenyl phenyl ether	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Aniline	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4-Chloroaniline	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2-Nitroaniline	ND	2830	5650	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
3-Nitroaniline	ND	2830	5650	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
4-Nitroaniline	ND	2830	5650	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,4-Dinitrotoluene	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
2,6-Dinitrotoluene	ND	1410	2830	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Benzoic acid	ND	17700	35300	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Benzyl alcohol	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0777		PRO
Isophorone	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Azobenzene (1,2-DPH)	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Bis(2-Ethylhexyl) adipate	ND	3530	7070	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
3,3'-Dichlorobenzidine	ND	2830	5650	ug/kg dry	40	08/23/22 11:47	EPA 8270E	Q-52
1,2-Dinitrobenzene	ND	3530	7070	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1,3-Dinitrobenzene	ND	3530	7070	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1,4-Dinitrobenzene	ND	3530	7070	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
Pyridine	ND	707	1410	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1,2-Dichlorobenzene	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1,3-Dichlorobenzene	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
1,4-Dichlorobenzene	ND	353	707	ug/kg dry	40	08/23/22 11:47	EPA 8270E	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 46 %</i>		<i>Limits: 37-122 %</i>		08/23/22 11:47	EPA 8270E	S-05
<i>2-Fluorobiphenyl (Surr)</i>		<i>48 %</i>		<i>44-120 %</i>		08/23/22 11:47	EPA 8270E	S-05
<i>Phenol-d6 (Surr)</i>		<i>37 %</i>		<i>33-122 %</i>		08/23/22 11:47	EPA 8270E	S-05
<i>p-Terphenyl-d14 (Surr)</i>		<i>55 %</i>		<i>54-127 %</i>		08/23/22 11:47	EPA 8270E	S-05
<i>2-Fluorophenol (Surr)</i>		<i>9 %</i>		<i>35-120 %</i>		08/23/22 11:47	EPA 8270E	S-05
<i>2,4,6-Tribromophenol (Surr)</i>		<i>32 %</i>		<i>39-132 %</i>		08/23/22 11:47	EPA 8270E	S-05

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
---	---	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0778		PRO, R-04
Azinphos methyl (Guthion)	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Chlorpyrifos	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Coumaphos	ND	4230	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Demeton O	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Demeton S	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Diazinon	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Dichlorvos	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Dimethoate	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Disulfoton	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
EPN	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Ethoprop	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Fensulfothion	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Fenthion	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Malathion	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Merphos	ND	18200	18200	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	R-02, AMEND
Methyl parathion	ND	4230	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Monocrotophos	ND	4230	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Naled (Dibrom)	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Parathion, ethyl	ND	6170	6170	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	R-02
Phorate	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Ronnel (Fenclorophos)	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Sulfotep	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
TEPP	ND	8460	16900	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	9640	9640	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	R-02
Tokuthion (Prothiofos)	ND	2110	4230	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	
Trichloronate	ND	6090	6090	ug/kg dry	40	08/23/22 10:48	EPA 8270E OPPs	R-02
<i>Surrogate: Tributyl phosphate (Surr)</i>			<i>Recovery: 574 %</i>	<i>Limits: 10-136 %</i>	<i>40</i>	<i>08/23/22 10:48</i>	<i>EPA 8270E OPPs</i>	<i>S-05</i>
<i>Triphenyl phosphate (Surr)</i>			<i>368 %</i>	<i>34-121 %</i>	<i>40</i>	<i>08/23/22 10:48</i>	<i>EPA 8270E OPPs</i>	<i>S-05</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

ANALYTICAL SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 2210773		H-08, PRO
Aldrin	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
alpha-BHC	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
beta-BHC	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
gamma-BHC (Lindane)	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
delta-BHC	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
cis-Chlordane	1.46	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
cis-Nonachlor	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
2,4'-DDD	ND	1.06	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
2,4'-DDE	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
2,4'-DDT	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
4,4'-DDD	ND	1.06	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
4,4'-DDE	5.48	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
4,4'-DDT	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Dieldrin	ND	1.17	1.17	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	R-02
Endosulfan I	ND	10.7	10.7	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	R-02
Endosulfan II	ND	3.71	3.71	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	R-02
Endosulfan sulfate	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Endrin	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Endrin Aldehyde	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Endrin ketone	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Heptachlor	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Heptachlor epoxide	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Hexachlorobutadiene	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Methoxychlor	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Mirex	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
Oxychlordane	ND	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
trans-Chlordane	1.99	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
trans-Nonachlor	1.08	0.530	1.06	ug/kg dry	1	09/26/22 16:15	EPA 8270E OCPs	
<i>Surrogate: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 70 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>09/26/22 16:15</i>	<i>EPA 8270E OCPs</i>
<i>4,4'-DDT-d8 (Surr)</i>		<i>107 %</i>		<i>50-150 %</i>		<i>1</i>	<i>09/26/22 16:15</i>	<i>EPA 8270E OCPs</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment					
Batch: 22H0793									
Antimony	2.62	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Arsenic	4.21	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Barium	339	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Beryllium	0.327	0.0571	0.114	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Cadmium	2.97	0.0571	0.114	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Chromium	70.1	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Copper	259	0.571	1.14	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Lead	27.1	0.0571	0.114	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Manganese	711	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Mercury	0.485	0.0228	0.0457	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Nickel	37.8	0.571	1.14	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Selenium	2.46	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Silver	2.27	0.0571	0.114	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Thallium	ND	0.286	0.571	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	
Zinc	817	1.14	2.28	mg/kg dry	5	08/23/22 20:31	EPA 6020B	PRO	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

ANALYTICAL SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0747		PRO
Chromium (VI)	ND	10.7	21.3	mg/kg dry	50	08/23/22 14:05	EPA 7196A	Q-57

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	--

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-01)				Matrix: Sediment		Batch: 22H0481		
% Solids	6.71	1.00	1.00	%	1	08/26/22 08:44	EPA 8000D	
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: 22H0773		PRO
% Solids	93.7	1.00	1.00	%	1	08/22/22 15:57	EPA 8000D	
DU1-20220810-ISM-COMP (A2H0382-03)				Matrix: Sediment		Batch: 22H0481		
% Solids	6.71	1.00	1.00	%	1	08/15/22 07:02	EPA 8000D	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)			Matrix: Sediment		Batch: W2H1928			
<u>Batch: W2H1928</u>								
2,4-D	ND	330	1400	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
2,4-DB	ND	580	2900	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
2,4,5-T	ND	150	720	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
2,4,5-TP (Silvex)	ND	180	720	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
Dalapon	ND	260	1400	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
Dicamba	ND	240	1400	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
Dichloroprop	ND	240	1400	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
Dinoseb	ND	83	720	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
MCPA	ND	54000	140000	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
MCPP	ND	140000	140000	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
Pentachlorophenol	ND	230	720	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
Picloram	ND	220	720	ug/kg	10	09/01/22 10:47	EPA 8151A	M-02, M-04
<u>Batch: W2H1928</u>								
<i>Surrogate: 2,4-DCAA</i>		<i>Recovery: 78 %</i>		<i>Limits: 13-119 %</i>		<i>10</i>	<i>09/01/22 10:47</i>	<i>EPA 8151A</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
DU1-20220810-ISM-COMP (A2H0382-02)				Matrix: Sediment		Batch: W2H1882		
Batch: W2H1882								
% Solids	93.9		0.100	% by Weight	1	08/24/22 16:39	EPA 160.3M	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0779 - EPA 3546 (Fuels)						Sediment						
Blank (22H0779-BLK1)						Prepared: 08/22/22 16:14 Analyzed: 08/23/22 05:23						
<u>NWTPH-Dx</u>												
Diesel	ND	9.09	18.2	mg/kg wet	1	---	---	---	---	---	---	
Oil	ND	18.2	36.4	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (22H0779-BS1)						Prepared: 08/22/22 16:14 Analyzed: 08/23/22 05:43						
<u>NWTPH-Dx</u>												
Diesel	121	10.0	20.0	mg/kg wet	1	125	---	97	38-132%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Duplicate (22H0779-DUP1)						Prepared: 08/22/22 16:14 Analyzed: 08/23/22 06:23						
PRO												
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)</u>												
<u>NWTPH-Dx</u>												
Diesel	23300	2130	4250	mg/kg dry	100	---	20500	---	---	12	30%	F-13
Oil	ND	4250	8500	mg/kg dry	100	---	ND	---	---	---	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 100x</i>						S-01

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
Blank (22H0476-BLK1)			Prepared: 08/12/22 08:22 Analyzed: 08/12/22 16:01									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	1.67	3.33	mg/kg wet	50	---	---	---	---	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 101 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>103 %</i>		<i>50-150 %</i>		<i>"</i>						
LCS (22H0476-BS2)						Prepared: 08/12/22 08:22 Analyzed: 08/12/22 14:44						
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	23.0	2.50	5.00	mg/kg wet	50	25.0	---	92	80-120%	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>100 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (22H0476-DUP1)						Prepared: 08/10/22 09:15 Analyzed: 08/12/22 17:42						
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)</u>												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	91.1	182	mg/kg dry	50	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 104 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>100 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
Blank (22H0476-BLK1)			Prepared: 08/12/22 08:22 Analyzed: 08/12/22 16:01									
<u>5035A/8260D</u>												
Acetone	ND	333	667	ug/kg wet	50	---	---	---	---	---	---	
Acrylonitrile	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
Benzene	ND	3.33	6.67	ug/kg wet	50	---	---	---	---	---	---	
Bromobenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Bromochloromethane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Bromodichloromethane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Bromoform	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
Bromomethane	ND	333	333	ug/kg wet	50	---	---	---	---	---	---	
2-Butanone (MEK)	ND	167	333	ug/kg wet	50	---	---	---	---	---	---	
n-Butylbenzene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
sec-Butylbenzene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
tert-Butylbenzene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Carbon disulfide	ND	167	333	ug/kg wet	50	---	---	---	---	---	---	
Carbon tetrachloride	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Chlorobenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Chloroethane	ND	167	333	ug/kg wet	50	---	---	---	---	---	---	
Chloroform	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Chloromethane	ND	83.3	167	ug/kg wet	50	---	---	---	---	---	---	
2-Chlorotoluene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
4-Chlorotoluene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Dibromochloromethane	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	83.3	167	ug/kg wet	50	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Dibromomethane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
1,1-Dichloroethane	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,1-Dichloroethene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
Blank (22H0476-BLK1)			Prepared: 08/12/22 08:22 Analyzed: 08/12/22 16:01									
1,2-Dichloropropane	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,3-Dichloropropane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
2,2-Dichloropropane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
1,1-Dichloropropene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Ethylbenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Hexachlorobutadiene	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
2-Hexanone	ND	333	333	ug/kg wet	50	---	---	---	---	---	---	
Isopropylbenzene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
4-Isopropyltoluene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Methylene chloride	ND	167	333	ug/kg wet	50	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	167	333	ug/kg wet	50	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Naphthalene	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
n-Propylbenzene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Styrene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Toluene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	83.3	167	ug/kg wet	50	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	83.3	167	ug/kg wet	50	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
Trichlorofluoromethane	ND	33.3	66.7	ug/kg wet	50	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
Vinyl chloride	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	
m,p-Xylene	ND	16.7	33.3	ug/kg wet	50	---	---	---	---	---	---	
o-Xylene	ND	8.33	16.7	ug/kg wet	50	---	---	---	---	---	---	

Surr: 1,4-Difluorobenzene (Surr) Recovery: 105 % Limits: 80-120 % Dilution: 1x

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
Blank (22H0476-BLK1)						Prepared: 08/12/22 08:22 Analyzed: 08/12/22 16:01						
<i>Surr: Toluene-d8 (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>79-120 %</i>		<i>"</i>						
LCS (22H0476-BS1)						Prepared: 08/12/22 08:22 Analyzed: 08/12/22 15:10						
5035A/8260D												
Acetone	2450	500	1000	ug/kg wet	50	2000	---	122	80-120%	---	---	Q-56
Acrylonitrile	1040	50.0	100	ug/kg wet	50	1000	---	104	80-120%	---	---	
Benzene	1080	5.00	10.0	ug/kg wet	50	1000	---	108	80-120%	---	---	
Bromobenzene	966	12.5	25.0	ug/kg wet	50	1000	---	97	80-120%	---	---	
Bromochloromethane	1130	25.0	50.0	ug/kg wet	50	1000	---	113	80-120%	---	---	
Bromodichloromethane	1150	25.0	50.0	ug/kg wet	50	1000	---	115	80-120%	---	---	
Bromoform	1080	50.0	100	ug/kg wet	50	1000	---	108	80-120%	---	---	
Bromomethane	1390	500	500	ug/kg wet	50	1000	---	139	80-120%	---	---	Q-56
2-Butanone (MEK)	1920	250	500	ug/kg wet	50	2000	---	96	80-120%	---	---	
n-Butylbenzene	914	25.0	50.0	ug/kg wet	50	1000	---	91	80-120%	---	---	
sec-Butylbenzene	963	25.0	50.0	ug/kg wet	50	1000	---	96	80-120%	---	---	
tert-Butylbenzene	880	25.0	50.0	ug/kg wet	50	1000	---	88	80-120%	---	---	
Carbon disulfide	1020	250	500	ug/kg wet	50	1000	---	102	80-120%	---	---	
Carbon tetrachloride	1200	25.0	50.0	ug/kg wet	50	1000	---	120	80-120%	---	---	
Chlorobenzene	1040	12.5	25.0	ug/kg wet	50	1000	---	104	80-120%	---	---	
Chloroethane	1390	250	500	ug/kg wet	50	1000	---	139	80-120%	---	---	Q-56
Chloroform	1100	25.0	50.0	ug/kg wet	50	1000	---	110	80-120%	---	---	
Chloromethane	1090	125	250	ug/kg wet	50	1000	---	109	80-120%	---	---	
2-Chlorotoluene	977	25.0	50.0	ug/kg wet	50	1000	---	98	80-120%	---	---	
4-Chlorotoluene	916	25.0	50.0	ug/kg wet	50	1000	---	92	80-120%	---	---	
Dibromochloromethane	1040	50.0	100	ug/kg wet	50	1000	---	104	80-120%	---	---	
1,2-Dibromo-3-chloropropane	826	125	250	ug/kg wet	50	1000	---	83	80-120%	---	---	
1,2-Dibromoethane (EDB)	1040	25.0	50.0	ug/kg wet	50	1000	---	104	80-120%	---	---	
Dibromomethane	1140	25.0	50.0	ug/kg wet	50	1000	---	114	80-120%	---	---	
1,2-Dichlorobenzene	970	12.5	25.0	ug/kg wet	50	1000	---	97	80-120%	---	---	
1,3-Dichlorobenzene	988	12.5	25.0	ug/kg wet	50	1000	---	99	80-120%	---	---	
1,4-Dichlorobenzene	990	12.5	25.0	ug/kg wet	50	1000	---	99	80-120%	---	---	
Dichlorodifluoromethane	1050	50.0	100	ug/kg wet	50	1000	---	105	80-120%	---	---	
1,1-Dichloroethane	1100	12.5	25.0	ug/kg wet	50	1000	---	110	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<p><u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232</p>	<p>Project: <u>St. Helens Lagoon</u> Project Number: [none] Project Manager: David Weatherby</p>	<p>Report ID: A2H0382 - 12 12 22 1538</p>
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
LCS (22H0476-BS1)			Prepared: 08/12/22 08:22 Analyzed: 08/12/22 15:10									
1,2-Dichloroethane (EDC)	1140	12.5	25.0	ug/kg wet	50	1000	---	114	80-120%	---	---	
1,1-Dichloroethene	1070	12.5	25.0	ug/kg wet	50	1000	---	107	80-120%	---	---	
cis-1,2-Dichloroethene	978	12.5	25.0	ug/kg wet	50	1000	---	98	80-120%	---	---	
trans-1,2-Dichloroethene	1020	12.5	25.0	ug/kg wet	50	1000	---	102	80-120%	---	---	
1,2-Dichloropropane	1060	12.5	25.0	ug/kg wet	50	1000	---	106	80-120%	---	---	
1,3-Dichloropropane	1010	25.0	50.0	ug/kg wet	50	1000	---	101	80-120%	---	---	
2,2-Dichloropropane	1260	25.0	50.0	ug/kg wet	50	1000	---	126	80-120%	---	---	Q-56
1,1-Dichloropropene	1090	25.0	50.0	ug/kg wet	50	1000	---	109	80-120%	---	---	
cis-1,3-Dichloropropene	1050	25.0	50.0	ug/kg wet	50	1000	---	105	80-120%	---	---	
trans-1,3-Dichloropropene	1110	25.0	50.0	ug/kg wet	50	1000	---	111	80-120%	---	---	
Ethylbenzene	1010	12.5	25.0	ug/kg wet	50	1000	---	101	80-120%	---	---	
Hexachlorobutadiene	968	50.0	100	ug/kg wet	50	1000	---	97	80-120%	---	---	
2-Hexanone	1530	500	500	ug/kg wet	50	2000	---	76	80-120%	---	---	Q-55
Isopropylbenzene	986	25.0	50.0	ug/kg wet	50	1000	---	99	80-120%	---	---	
4-Isopropyltoluene	952	25.0	50.0	ug/kg wet	50	1000	---	95	80-120%	---	---	
Methylene chloride	1170	250	500	ug/kg wet	50	1000	---	117	80-120%	---	---	
4-Methyl-2-pentanone (MiBK)	1680	250	500	ug/kg wet	50	2000	---	84	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	1020	25.0	50.0	ug/kg wet	50	1000	---	102	80-120%	---	---	
Naphthalene	673	50.0	100	ug/kg wet	50	1000	---	67	80-120%	---	---	Q-55
n-Propylbenzene	956	12.5	25.0	ug/kg wet	50	1000	---	96	80-120%	---	---	
Styrene	954	25.0	50.0	ug/kg wet	50	1000	---	95	80-120%	---	---	
1,1,1,2-Tetrachloroethane	1160	12.5	25.0	ug/kg wet	50	1000	---	116	80-120%	---	---	
1,1,2,2-Tetrachloroethane	974	25.0	50.0	ug/kg wet	50	1000	---	97	80-120%	---	---	
Tetrachloroethene (PCE)	1130	12.5	25.0	ug/kg wet	50	1000	---	113	80-120%	---	---	
Toluene	980	25.0	50.0	ug/kg wet	50	1000	---	98	80-120%	---	---	
1,2,3-Trichlorobenzene	852	125	250	ug/kg wet	50	1000	---	85	80-120%	---	---	
1,2,4-Trichlorobenzene	904	125	250	ug/kg wet	50	1000	---	90	80-120%	---	---	
1,1,1-Trichloroethane	1140	12.5	25.0	ug/kg wet	50	1000	---	114	80-120%	---	---	
1,1,2-Trichloroethane	1050	12.5	25.0	ug/kg wet	50	1000	---	105	80-120%	---	---	
Trichloroethene (TCE)	1130	12.5	25.0	ug/kg wet	50	1000	---	113	80-120%	---	---	
Trichlorofluoromethane	888	50.0	100	ug/kg wet	50	1000	---	89	80-120%	---	---	
1,2,3-Trichloropropane	964	25.0	50.0	ug/kg wet	50	1000	---	96	80-120%	---	---	
1,2,4-Trimethylbenzene	980	25.0	50.0	ug/kg wet	50	1000	---	98	80-120%	---	---	
1,3,5-Trimethylbenzene	992	25.0	50.0	ug/kg wet	50	1000	---	99	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
LCS (22H0476-BS1)			Prepared: 08/12/22 08:22 Analyzed: 08/12/22 15:10									
Vinyl chloride	1180	12.5	25.0	ug/kg wet	50	1000	---	118	80-120%	---	---	
m,p-Xylene	2040	25.0	50.0	ug/kg wet	50	2000	---	102	80-120%	---	---	
o-Xylene	926	12.5	25.0	ug/kg wet	50	1000	---	93	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>79-120 %</i>		<i>"</i>						

Duplicate (22H0476-DUP1) Prepared: 08/10/22 09:15 Analyzed: 08/12/22 17:42

QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)

5035A/8260D

Acetone	ND	18200	36500	ug/kg dry	50	---	ND	---	---	---	30%
Acrylonitrile	ND	1820	3650	ug/kg dry	50	---	ND	---	---	---	30%
Benzene	ND	182	365	ug/kg dry	50	---	ND	---	---	---	30%
Bromobenzene	ND	456	911	ug/kg dry	50	---	ND	---	---	---	30%
Bromochloromethane	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Bromodichloromethane	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Bromoform	ND	1820	3650	ug/kg dry	50	---	ND	---	---	---	30%
Bromomethane	ND	18200	18200	ug/kg dry	50	---	ND	---	---	---	30%
2-Butanone (MEK)	ND	9110	18200	ug/kg dry	50	---	ND	---	---	---	30%
n-Butylbenzene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
sec-Butylbenzene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
tert-Butylbenzene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Carbon disulfide	ND	9110	18200	ug/kg dry	50	---	ND	---	---	---	30%
Carbon tetrachloride	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Chlorobenzene	ND	456	911	ug/kg dry	50	---	ND	---	---	---	30%
Chloroethane	ND	9110	18200	ug/kg dry	50	---	ND	---	---	---	30%
Chloroform	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Chloromethane	ND	4560	9110	ug/kg dry	50	---	ND	---	---	---	30%
2-Chlorotoluene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
4-Chlorotoluene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Dibromochloromethane	ND	1820	3650	ug/kg dry	50	---	ND	---	---	---	30%
1,2-Dibromo-3-chloropropane	ND	4560	9110	ug/kg dry	50	---	ND	---	---	---	30%
1,2-Dibromoethane (EDB)	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%
Dibromomethane	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes a list of 30 analytes and their corresponding results and limits.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]
Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A												
Soil												
Duplicate (22H0476-DUP1)												
Prepared: 08/10/22 09:15 Analyzed: 08/12/22 17:42												
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)												
1,1,2-Trichloroethane	ND	456	911	ug/kg dry	50	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	456	911	ug/kg dry	50	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1820	3650	ug/kg dry	50	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%	
Vinyl chloride	ND	456	911	ug/kg dry	50	---	ND	---	---	---	30%	
m,p-Xylene	ND	911	1820	ug/kg dry	50	---	ND	---	---	---	30%	
o-Xylene	ND	456	911	ug/kg dry	50	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>79-120 %</i>		<i>"</i>						

Matrix Spike (22H0476-MS1)												
Prepared: 08/11/22 12:00 Analyzed: 08/13/22 01:45												
QC Source Sample: Non-SDG (A2H0414-15)												
5035A/8260D												
Acetone	36400	9100	18200	ug/kg dry	50	36300	ND	100	36-164%	---	---	Q-54b
Acrylonitrile	19600	910	1820	ug/kg dry	50	18200	ND	108	65-134%	---	---	
Benzene	20400	91.0	182	ug/kg dry	50	18200	ND	112	77-121%	---	---	
Bromobenzene	19500	227	455	ug/kg dry	50	18200	ND	107	78-121%	---	---	
Bromochloromethane	21600	455	910	ug/kg dry	50	18200	ND	119	78-125%	---	---	
Bromodichloromethane	21300	455	910	ug/kg dry	50	18200	ND	117	75-127%	---	---	
Bromoform	20200	910	1820	ug/kg dry	50	18200	ND	111	67-132%	---	---	
Bromomethane	26000	9100	9100	ug/kg dry	50	18200	ND	143	53-143%	---	---	Q-54a
2-Butanone (MEK)	26200	4550	9100	ug/kg dry	50	36300	ND	72	51-148%	---	---	
n-Butylbenzene	17700	455	910	ug/kg dry	50	18200	ND	97	70-128%	---	---	
sec-Butylbenzene	19200	455	910	ug/kg dry	50	18200	ND	106	73-126%	---	---	
tert-Butylbenzene	17500	455	910	ug/kg dry	50	18200	ND	96	73-125%	---	---	
Carbon disulfide	20100	4550	9100	ug/kg dry	50	18200	ND	110	63-132%	---	---	
Carbon tetrachloride	25900	455	910	ug/kg dry	50	18200	ND	143	70-135%	---	---	Q-01
Chlorobenzene	20000	227	455	ug/kg dry	50	18200	ND	110	79-120%	---	---	
Chloroethane	32800	4550	9100	ug/kg dry	50	18200	ND	180	59-139%	---	---	Q-54a
Chloroform	21000	455	910	ug/kg dry	50	18200	ND	116	78-123%	---	---	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A							Soil					
Matrix Spike (22H0476-MS1)							Prepared: 08/11/22 12:00		Analyzed: 08/13/22 01:45		A-01	
QC Source Sample: Non-SDG (A2H0414-15)												
Chloromethane	20700	2270	4550	ug/kg dry	50	18200	ND	114	50-136%	---	---	
2-Chlorotoluene	19500	455	910	ug/kg dry	50	18200	ND	107	75-122%	---	---	
4-Chlorotoluene	18100	455	910	ug/kg dry	50	18200	ND	99	72-124%	---	---	
Dibromochloromethane	19800	910	1820	ug/kg dry	50	18200	ND	109	74-126%	---	---	
1,2-Dibromo-3-chloropropane	16200	2270	4550	ug/kg dry	50	18200	ND	89	61-132%	---	---	
1,2-Dibromoethane (EDB)	20000	455	910	ug/kg dry	50	18200	ND	110	78-122%	---	---	
Dibromomethane	21500	455	910	ug/kg dry	50	18200	ND	118	78-125%	---	---	
1,2-Dichlorobenzene	19000	227	455	ug/kg dry	50	18200	ND	104	78-121%	---	---	
1,3-Dichlorobenzene	19500	227	455	ug/kg dry	50	18200	ND	107	77-121%	---	---	
1,4-Dichlorobenzene	19300	227	455	ug/kg dry	50	18200	ND	106	75-120%	---	---	
Dichlorodifluoromethane	20800	910	1820	ug/kg dry	50	18200	ND	115	29-149%	---	---	
1,1-Dichloroethane	21000	227	455	ug/kg dry	50	18200	ND	115	76-125%	---	---	
1,2-Dichloroethane (EDC)	21600	227	455	ug/kg dry	50	18200	ND	119	73-128%	---	---	
1,1-Dichloroethene	21200	227	455	ug/kg dry	50	18200	ND	117	70-131%	---	---	
cis-1,2-Dichloroethene	18300	227	455	ug/kg dry	50	18200	ND	101	77-123%	---	---	
trans-1,2-Dichloroethene	20000	227	455	ug/kg dry	50	18200	ND	110	74-125%	---	---	
1,2-Dichloropropane	20000	227	455	ug/kg dry	50	18200	ND	110	76-123%	---	---	
1,3-Dichloropropane	19100	455	910	ug/kg dry	50	18200	ND	105	77-121%	---	---	
2,2-Dichloropropane	19500	455	910	ug/kg dry	50	18200	ND	107	67-133%	---	---	Q-54c
1,1-Dichloropropene	20500	455	910	ug/kg dry	50	18200	ND	113	76-125%	---	---	
cis-1,3-Dichloropropene	19500	455	910	ug/kg dry	50	18200	ND	107	74-126%	---	---	
trans-1,3-Dichloropropene	20200	455	910	ug/kg dry	50	18200	ND	111	71-130%	---	---	
Ethylbenzene	19600	227	455	ug/kg dry	50	18200	ND	108	76-122%	---	---	
Hexachlorobutadiene	19300	910	1820	ug/kg dry	50	18200	ND	106	61-135%	---	---	
2-Hexanone	24900	9100	9100	ug/kg dry	50	36300	ND	68	53-145%	---	---	Q-54e
Isopropylbenzene	19000	455	910	ug/kg dry	50	18200	ND	105	68-134%	---	---	
4-Isopropyltoluene	18800	455	910	ug/kg dry	50	18200	ND	104	73-127%	---	---	
Methylene chloride	22600	4550	9100	ug/kg dry	50	18200	ND	124	70-128%	---	---	
4-Methyl-2-pentanone (MiBK)	31900	4550	9100	ug/kg dry	50	36300	ND	88	65-135%	---	---	
Methyl tert-butyl ether (MTBE)	19000	455	910	ug/kg dry	50	18200	ND	104	73-125%	---	---	
Naphthalene	12900	910	1820	ug/kg dry	50	18200	ND	71	62-129%	---	---	Q-54d
n-Propylbenzene	19200	227	455	ug/kg dry	50	18200	ND	105	73-125%	---	---	
Styrene	18200	455	910	ug/kg dry	50	18200	ND	100	76-124%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0476 - EPA 5035A						Soil						
Matrix Spike (22H0476-MS1)						Prepared: 08/11/22 12:00 Analyzed: 08/13/22 01:45						A-01
QC Source Sample: Non-SDG (A2H0414-15)												
1,1,1,2-Tetrachloroethane	22300	227	455	ug/kg dry	50	18200	ND	123	78-125%	---	---	
1,1,2,2-Tetrachloroethane	19000	455	910	ug/kg dry	50	18200	ND	105	70-124%	---	---	
Tetrachloroethene (PCE)	22100	227	455	ug/kg dry	50	18200	ND	122	73-128%	---	---	
Toluene	18900	455	910	ug/kg dry	50	18200	ND	104	77-121%	---	---	
1,2,3-Trichlorobenzene	16600	2270	4550	ug/kg dry	50	18200	ND	92	66-130%	---	---	
1,2,4-Trichlorobenzene	17200	2270	4550	ug/kg dry	50	18200	ND	95	67-129%	---	---	
1,1,1-Trichloroethane	21900	227	455	ug/kg dry	50	18200	ND	121	73-130%	---	---	
1,1,2-Trichloroethane	19800	227	455	ug/kg dry	50	18200	ND	109	78-121%	---	---	
Trichloroethene (TCE)	21500	227	455	ug/kg dry	50	18200	ND	119	77-123%	---	---	
Trichlorofluoromethane	140000	910	1820	ug/kg dry	50	18200	ND	773	62-140%	---	---	Q-01
1,2,3-Trichloropropane	19200	455	910	ug/kg dry	50	18200	ND	106	73-125%	---	---	
1,2,4-Trimethylbenzene	19500	455	910	ug/kg dry	50	18200	ND	107	75-123%	---	---	
1,3,5-Trimethylbenzene	20000	455	910	ug/kg dry	50	18200	ND	110	73-124%	---	---	
Vinyl chloride	23200	227	455	ug/kg dry	50	18200	ND	128	56-135%	---	---	
m,p-Xylene	39400	455	910	ug/kg dry	50	36300	ND	108	77-124%	---	---	
o-Xylene	17800	227	455	ug/kg dry	50	18200	ND	98	77-123%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>79-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0946 - EPA 5035A						Soil						
Blank (22H0946-BLK1)			Prepared: 08/26/22 10:08 Analyzed: 08/26/22 14:40									
<u>5035A/8260D SIM</u>												
Benzene	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
Toluene	2.96	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	B-02, Ja
Ethylbenzene	ND	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	
m,p-Xylene	ND	3.33	6.67	ug/kg wet	100	---	---	---	---	---	---	
o-Xylene	ND	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	3.33	6.67	ug/kg wet	100	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	3.33	6.67	ug/kg wet	100	---	---	---	---	---	---	
Chloroform	ND	3.33	6.67	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
1,1-Dichloroethene	ND	1.33	1.33	ug/kg wet	100	---	---	---	---	---	---	Q-30
cis-1,2-Dichloroethene	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dichloropropane	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
Tetrachloroethene (PCE)	13.4	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	B
1,1,2,2-Tetrachloroethane	ND	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.667	1.33	ug/kg wet	100	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	
Vinyl chloride	ND	3.33	6.67	ug/kg wet	100	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	1.67	3.33	ug/kg wet	100	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 100 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>79-120 %</i>		<i>"</i>						

LCS (22H0946-BS1)						Prepared: 08/26/22 10:08 Analyzed: 08/26/22 11:56						
<u>5035A/8260D SIM</u>												
Benzene	19.7	1.00	2.00	ug/kg wet	100	20.0	---	99	80-120%	---	---	
Toluene	21.3	2.50	5.00	ug/kg wet	100	20.0	---	107	80-120%	---	---	B-02

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: **David Weatherby**

Report ID:

A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0946 - EPA 5035A												
Soil												
LCS (22H0946-BS1)			Prepared: 08/26/22 10:08 Analyzed: 08/26/22 11:56									
Ethylbenzene	20.4	2.50	5.00	ug/kg wet	100	20.0	---	102	80-120%	---	---	
m,p-Xylene	40.9	5.00	10.0	ug/kg wet	100	40.0	---	102	80-120%	---	---	
o-Xylene	20.3	2.50	5.00	ug/kg wet	100	20.0	---	101	80-120%	---	---	
1,2,4-Trimethylbenzene	19.1	5.00	10.0	ug/kg wet	100	20.0	---	95	80-120%	---	---	
1,3,5-Trimethylbenzene	20.4	5.00	10.0	ug/kg wet	100	20.0	---	102	80-120%	---	---	
Chloroform	17.5	5.00	10.0	ug/kg wet	100	20.0	---	88	80-120%	---	---	
1,2-Dibromo-3-chloropropane	16.0	2.50	5.00	ug/kg wet	100	20.0	---	80	80-120%	---	---	
1,2-Dibromoethane (EDB)	19.9	1.00	2.00	ug/kg wet	100	20.0	---	100	80-120%	---	---	
1,1-Dichloroethane	20.2	1.00	2.00	ug/kg wet	100	20.0	---	101	80-120%	---	---	
1,2-Dichloroethane (EDC)	19.5	1.00	2.00	ug/kg wet	100	20.0	---	98	80-120%	---	---	
1,1-Dichloroethene	13.5	2.00	2.00	ug/kg wet	100	20.0	---	67	80-120%	---	---	Q-30
cis-1,2-Dichloroethene	21.2	1.00	2.00	ug/kg wet	100	20.0	---	106	80-120%	---	---	
trans-1,2-Dichloroethene	20.9	1.00	2.00	ug/kg wet	100	20.0	---	105	80-120%	---	---	
1,2-Dichloropropane	20.8	1.00	2.00	ug/kg wet	100	20.0	---	104	80-120%	---	---	
cis-1,3-Dichloropropene	20.5	1.00	2.00	ug/kg wet	100	20.0	---	103	80-120%	---	---	
trans-1,3-Dichloropropene	21.2	1.00	2.00	ug/kg wet	100	20.0	---	106	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	20.0	1.00	2.00	ug/kg wet	100	20.0	---	100	80-120%	---	---	
Tetrachloroethene (PCE)	27.2	1.00	2.00	ug/kg wet	100	20.0	---	136	80-120%	---	---	B, Q-56
1,1,2,2-Tetrachloroethane	17.6	2.50	5.00	ug/kg wet	100	20.0	---	88	80-120%	---	---	
Trichloroethene (TCE)	20.0	1.00	2.00	ug/kg wet	100	20.0	---	100	80-120%	---	---	
1,2,3-Trichloropropane	17.3	2.50	5.00	ug/kg wet	100	20.0	---	87	80-120%	---	---	
Vinyl chloride	22.6	5.00	10.0	ug/kg wet	100	20.0	---	113	80-120%	---	---	
1,1,2-Trichloroethane	18.9	2.50	5.00	ug/kg wet	100	20.0	---	94	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr) Recovery: 98 % Limits: 80-120 % Dilution: 1x</i>												
<i>Toluene-d8 (Surr) 100 % 80-120 % "</i>												
<i>4-Bromofluorobenzene (Surr) 101 % 79-120 % "</i>												

Duplicate (22H0946-DUP1)												
Prepared: 08/10/22 09:15 Analyzed: 08/26/22 15:34												
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)												
5035A/8260D SIM												
Benzene	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
Toluene	ND	182	182	ug/kg dry	100	---	ND	---	---	---	30%	
Ethylbenzene	ND	91.1	182	ug/kg dry	100	---	ND	---	---	---	30%	
m,p-Xylene	ND	182	365	ug/kg dry	100	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0946 - EPA 5035A						Soil						
Duplicate (22H0946-DUP1)						Prepared: 08/10/22 09:15 Analyzed: 08/26/22 15:34						H-01
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)												
o-Xylene	ND	91.1	182	ug/kg dry	100	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	182	365	ug/kg dry	100	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	182	365	ug/kg dry	100	---	ND	---	---	---	30%	
Chloroform	ND	182	365	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	91.1	182	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	72.9	72.9	ug/kg dry	100	---	ND	---	---	---	30%	Q-30
cis-1,2-Dichloroethene	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	583	583	ug/kg dry	100	---	ND	---	---	---	30%	B-07
1,1,2,2-Tetrachloroethane	ND	91.1	182	ug/kg dry	100	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	36.5	72.9	ug/kg dry	100	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	91.1	182	ug/kg dry	100	---	ND	---	---	---	30%	
Vinyl chloride	ND	182	365	ug/kg dry	100	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	91.1	182	ug/kg dry	100	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 100 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>79-120 %</i>		<i>"</i>						

Matrix Spike (22H0946-MS1)						Prepared: 08/10/22 09:15 Analyzed: 08/26/22 16:00						H-01
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)												
5035A/8260D SIM												
Benzene	862	36.5	72.9	ug/kg dry	100	729	ND	118	77-121%	---	---	
Toluene	844	91.1	182	ug/kg dry	100	729	ND	102	77-121%	---	---	B-02
Ethylbenzene	778	91.1	182	ug/kg dry	100	729	ND	107	76-122%	---	---	
m,p-Xylene	1550	182	365	ug/kg dry	100	1460	ND	106	77-124%	---	---	
o-Xylene	786	91.1	182	ug/kg dry	100	729	ND	108	77-123%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0946 - EPA 5035A						Soil						
Matrix Spike (22H0946-MS1)						Prepared: 08/10/22 09:15 Analyzed: 08/26/22 16:00						H-01
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-01)												
1,2,4-Trimethylbenzene	725	182	365	ug/kg dry	100	729	ND	100	75-123%	---	---	
1,3,5-Trimethylbenzene	793	182	365	ug/kg dry	100	729	ND	109	73-124%	---	---	
Chloroform	732	182	365	ug/kg dry	100	729	ND	100	78-123%	---	---	
1,2-Dibromo-3-chloropropane	751	91.1	182	ug/kg dry	100	729	ND	103	61-132%	---	---	
1,2-Dibromoethane (EDB)	801	36.5	72.9	ug/kg dry	100	729	ND	110	78-122%	---	---	
1,1-Dichloroethane	831	36.5	72.9	ug/kg dry	100	729	ND	114	76-125%	---	---	
1,2-Dichloroethane (EDC)	805	36.5	72.9	ug/kg dry	100	729	ND	110	73-128%	---	---	
1,1-Dichloroethene	549	72.9	72.9	ug/kg dry	100	729	ND	75	70-131%	---	---	Q-30
cis-1,2-Dichloroethene	826	36.5	72.9	ug/kg dry	100	729	ND	113	77-123%	---	---	
trans-1,2-Dichloroethene	844	36.5	72.9	ug/kg dry	100	729	ND	116	74-125%	---	---	
1,2-Dichloropropane	840	36.5	72.9	ug/kg dry	100	729	ND	115	76-123%	---	---	
cis-1,3-Dichloropropene	790	36.5	72.9	ug/kg dry	100	729	ND	108	74-126%	---	---	
trans-1,3-Dichloropropene	822	36.5	72.9	ug/kg dry	100	729	ND	113	71-130%	---	---	
Methyl tert-butyl ether (MTBE)	753	36.5	72.9	ug/kg dry	100	729	ND	103	73-125%	---	---	
Tetrachloroethene (PCE)	1250	36.5	72.9	ug/kg dry	100	729	ND	95	73-128%	---	---	B, Q-54
1,1,2,2-Tetrachloroethane	743	91.1	182	ug/kg dry	100	729	ND	102	70-124%	---	---	
Trichloroethene (TCE)	792	36.5	72.9	ug/kg dry	100	729	ND	109	77-123%	---	---	
1,2,3-Trichloropropane	713	91.1	182	ug/kg dry	100	729	ND	98	73-125%	---	---	
Vinyl chloride	902	182	365	ug/kg dry	100	729	ND	124	56-135%	---	---	
1,1,2-Trichloroethane	773	91.1	182	ug/kg dry	100	729	ND	106	78-121%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>79-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
Blank (22H0777-BLK1)			Prepared: 08/22/22 16:07 Analyzed: 08/23/22 09:31									
<u>EPA 8270E</u>												
Acenaphthene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Anthracene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	1.87	3.75	ug/kg wet	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	1.87	3.75	ug/kg wet	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	1.87	3.75	ug/kg wet	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Chrysene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Fluoranthene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Fluorene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	2.50	5.00	ug/kg wet	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	2.50	5.00	ug/kg wet	1	---	---	---	---	---	---	
Naphthalene	ND	2.50	5.00	ug/kg wet	1	---	---	---	---	---	---	
Phenanthrene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Pyrene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Carbazole	ND	1.87	3.75	ug/kg wet	1	---	---	---	---	---	---	
Dibenzofuran	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
2-Chlorophenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	31.2	62.5	ug/kg wet	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	31.2	62.5	ug/kg wet	1	---	---	---	---	---	---	
2-Methylphenol	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
2-Nitrophenol	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
4-Nitrophenol	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
Phenol	ND	2.50	5.00	ug/kg wet	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
Blank (22H0777-BLK1)			Prepared: 08/22/22 16:07 Analyzed: 08/23/22 09:31									
2,3,5,6-Tetrachlorophenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Nitrobenzene	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	18.7	37.5	ug/kg wet	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Diethylphthalate	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Dimethylphthalate	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	10.0	12.5	ug/kg wet	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Hexachloroethane	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	1.25	2.50	ug/kg wet	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
Aniline	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
4-Chloroaniline	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
2-Nitroaniline	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
3-Nitroaniline	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
4-Nitroaniline	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	12.5	25.0	ug/kg wet	1	---	---	---	---	---	---	
Benzoic acid	ND	157	312	ug/kg wet	1	---	---	---	---	---	---	
Benzyl alcohol	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
Isophorone	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: [none]

Project Manager: David Weatherby

Report ID:

A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
Blank (22H0777-BLK1)			Prepared: 08/22/22 16:07 Analyzed: 08/23/22 09:31									
Azobenzene (1,2-DPH)	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	31.2	62.5	ug/kg wet	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	31.2	62.5	ug/kg wet	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	31.2	62.5	ug/kg wet	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	31.2	62.5	ug/kg wet	1	---	---	---	---	---	---	
Pyridine	ND	6.25	12.5	ug/kg wet	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	3.12	6.25	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 86 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 1x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>76 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>68 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>87 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>72 %</i>		<i>35-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>82 %</i>		<i>39-132 %</i>		<i>"</i>						
LCS (22H0777-BS1)						Prepared: 08/22/22 16:07 Analyzed: 08/23/22 10:05						Q-18
EPA 8270E												
Acenaphthene	502	5.32	10.7	ug/kg wet	4	533	---	94	40-123%	---	---	
Acenaphthylene	509	5.32	10.7	ug/kg wet	4	533	---	95	32-132%	---	---	
Anthracene	526	5.32	10.7	ug/kg wet	4	533	---	99	47-123%	---	---	
Benz(a)anthracene	521	5.32	10.7	ug/kg wet	4	533	---	98	49-126%	---	---	
Benzo(a)pyrene	553	8.00	16.0	ug/kg wet	4	533	---	104	45-129%	---	---	
Benzo(b)fluoranthene	546	8.00	16.0	ug/kg wet	4	533	---	102	45-132%	---	---	
Benzo(k)fluoranthene	531	8.00	16.0	ug/kg wet	4	533	---	100	47-132%	---	---	
Benzo(g,h,i)perylene	544	5.32	10.7	ug/kg wet	4	533	---	102	43-134%	---	---	
Chrysene	522	5.32	10.7	ug/kg wet	4	533	---	98	50-124%	---	---	
Dibenz(a,h)anthracene	524	5.32	10.7	ug/kg wet	4	533	---	98	45-134%	---	---	
Fluoranthene	521	5.32	10.7	ug/kg wet	4	533	---	98	50-127%	---	---	
Fluorene	486	5.32	10.7	ug/kg wet	4	533	---	91	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	535	5.32	10.7	ug/kg wet	4	533	---	100	45-133%	---	---	
1-Methylnaphthalene	501	10.7	21.3	ug/kg wet	4	533	---	94	40-120%	---	---	
2-Methylnaphthalene	517	10.7	21.3	ug/kg wet	4	533	---	97	38-122%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
LCS (22H0777-BS1)						Prepared: 08/22/22 16:07 Analyzed: 08/23/22 10:05						Q-18
Naphthalene	486	10.7	21.3	ug/kg wet	4	533	---	91	35-123%	---	---	
Phenanthrene	498	5.32	10.7	ug/kg wet	4	533	---	93	50-121%	---	---	
Pyrene	522	5.32	10.7	ug/kg wet	4	533	---	98	47-127%	---	---	
Carbazole	548	8.00	16.0	ug/kg wet	4	533	---	103	50-123%	---	---	
Dibenzofuran	500	5.32	10.7	ug/kg wet	4	533	---	94	44-120%	---	---	
2-Chlorophenol	490	26.7	53.2	ug/kg wet	4	533	---	92	34-121%	---	---	
4-Chloro-3-methylphenol	539	53.2	107	ug/kg wet	4	533	---	101	45-122%	---	---	
2,4-Dichlorophenol	487	26.7	53.2	ug/kg wet	4	533	---	91	40-122%	---	---	
2,4-Dimethylphenol	547	26.7	53.2	ug/kg wet	4	533	---	103	30-127%	---	---	
2,4-Dinitrophenol	489	133	267	ug/kg wet	4	533	---	92	10-137%	---	---	
4,6-Dinitro-2-methylphenol	491	133	267	ug/kg wet	4	533	---	92	29-132%	---	---	
2-Methylphenol	514	13.3	26.7	ug/kg wet	4	533	---	96	32-122%	---	---	
3+4-Methylphenol(s)	544	13.3	26.7	ug/kg wet	4	533	---	102	34-120%	---	---	
2-Nitrophenol	579	53.2	107	ug/kg wet	4	533	---	108	36-123%	---	---	Q-41
4-Nitrophenol	563	53.2	107	ug/kg wet	4	533	---	106	30-132%	---	---	
Pentachlorophenol (PCP)	468	53.2	107	ug/kg wet	4	533	---	88	25-133%	---	---	
Phenol	496	10.7	21.3	ug/kg wet	4	533	---	93	34-121%	---	---	
2,3,4,6-Tetrachlorophenol	504	26.7	53.2	ug/kg wet	4	533	---	94	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	503	26.7	53.2	ug/kg wet	4	533	---	94	40-120%	---	---	
2,4,5-Trichlorophenol	493	26.7	53.2	ug/kg wet	4	533	---	93	41-124%	---	---	
Nitrobenzene	515	53.2	107	ug/kg wet	4	533	---	97	34-122%	---	---	
2,4,6-Trichlorophenol	483	26.7	53.2	ug/kg wet	4	533	---	91	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	554	80.0	160	ug/kg wet	4	533	---	104	51-133%	---	---	
Butyl benzyl phthalate	544	26.7	53.2	ug/kg wet	4	533	---	102	48-132%	---	---	
Diethylphthalate	494	26.7	53.2	ug/kg wet	4	533	---	93	50-124%	---	---	
Dimethylphthalate	483	26.7	53.2	ug/kg wet	4	533	---	91	48-124%	---	---	
Di-n-butylphthalate	572	26.7	53.2	ug/kg wet	4	533	---	107	51-128%	---	---	
Di-n-octyl phthalate	582	42.8	53.2	ug/kg wet	4	533	---	109	45-140%	---	---	
N-Nitrosodimethylamine	420	13.3	26.7	ug/kg wet	4	533	---	79	23-120%	---	---	
N-Nitroso-di-n-propylamine	518	13.3	26.7	ug/kg wet	4	533	---	97	36-120%	---	---	
N-Nitrosodiphenylamine	527	13.3	26.7	ug/kg wet	4	533	---	99	38-127%	---	---	
Bis(2-Chloroethoxy) methane	515	13.3	26.7	ug/kg wet	4	533	---	97	36-121%	---	---	
Bis(2-Chloroethyl) ether	418	13.3	26.7	ug/kg wet	4	533	---	78	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	542	13.3	26.7	ug/kg wet	4	533	---	102	39-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
LCS (22H0777-BS1)						Prepared: 08/22/22 16:07 Analyzed: 08/23/22 10:05						Q-18
Hexachlorobenzene	468	5.32	10.7	ug/kg wet	4	533	---	88	45-122%	---	---	
Hexachlorobutadiene	437	13.3	26.7	ug/kg wet	4	533	---	82	32-123%	---	---	
Hexachlorocyclopentadiene	431	26.7	53.2	ug/kg wet	4	533	---	81	10-140%	---	---	
Hexachloroethane	444	13.3	26.7	ug/kg wet	4	533	---	83	28-120%	---	---	
2-Chloronaphthalene	514	5.32	10.7	ug/kg wet	4	533	---	96	41-120%	---	---	
1,2,4-Trichlorobenzene	467	13.3	26.7	ug/kg wet	4	533	---	88	34-120%	---	---	
4-Bromophenyl phenyl ether	492	13.3	26.7	ug/kg wet	4	533	---	92	46-124%	---	---	
4-Chlorophenyl phenyl ether	485	13.3	26.7	ug/kg wet	4	533	---	91	45-121%	---	---	
Aniline	343	26.7	53.2	ug/kg wet	4	533	---	64	10-120%	---	---	Q-36
4-Chloroaniline	351	13.3	26.7	ug/kg wet	4	533	---	66	17-120%	---	---	
2-Nitroaniline	560	107	213	ug/kg wet	4	533	---	105	44-127%	---	---	
3-Nitroaniline	529	107	213	ug/kg wet	4	533	---	99	33-120%	---	---	
4-Nitroaniline	564	107	213	ug/kg wet	4	533	---	106	51-125%	---	---	
2,4-Dinitrotoluene	551	53.2	107	ug/kg wet	4	533	---	103	48-126%	---	---	
2,6-Dinitrotoluene	512	53.2	107	ug/kg wet	4	533	---	96	46-124%	---	---	
Benzoic acid	974	668	1330	ug/kg wet	4	1070	---	91	10-140%	---	---	Ja
Benzyl alcohol	476	26.7	53.2	ug/kg wet	4	533	---	89	29-122%	---	---	
Isophorone	505	13.3	26.7	ug/kg wet	4	533	---	95	30-122%	---	---	
Azobenzene (1,2-DPH)	566	13.3	26.7	ug/kg wet	4	533	---	106	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	549	133	267	ug/kg wet	4	533	---	103	61-121%	---	---	
3,3'-Dichlorobenzidine	3010	107	213	ug/kg wet	4	1070	---	282	22-121%	---	---	Q-29
1,2-Dinitrobenzene	523	133	267	ug/kg wet	4	533	---	98	44-120%	---	---	
1,3-Dinitrobenzene	532	133	267	ug/kg wet	4	533	---	100	43-127%	---	---	
1,4-Dinitrobenzene	515	133	267	ug/kg wet	4	533	---	97	37-132%	---	---	
Pyridine	337	26.7	53.2	ug/kg wet	4	533	---	63	10-120%	---	---	
1,2-Dichlorobenzene	452	13.3	26.7	ug/kg wet	4	533	---	85	33-120%	---	---	
1,3-Dichlorobenzene	426	13.3	26.7	ug/kg wet	4	533	---	80	30-120%	---	---	
1,4-Dichlorobenzene	444	13.3	26.7	ug/kg wet	4	533	---	83	31-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>90 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>90 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>101 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>82 %</i>		<i>35-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>90 %</i>		<i>39-132 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546												
Sediment												
Duplicate (22H0777-DUP1)												
						Prepared: 08/22/22 16:07 Analyzed: 08/23/22 12:21				PRO		
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
EPA 8270E												
Acenaphthene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Acenaphthylene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Anthracene	254	141	284	ug/kg dry	40	---	211	---	---	19	30%	Ja
Benz(a)anthracene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Benzo(a)pyrene	ND	212	425	ug/kg dry	40	---	ND	---	---	---	30%	
Benzo(b)fluoranthene	ND	212	425	ug/kg dry	40	---	ND	---	---	---	30%	
Benzo(k)fluoranthene	ND	425	425	ug/kg dry	40	---	ND	---	---	---	30%	
Benzo(g,h,i)perylene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Chrysene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Dibenz(a,h)anthracene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Fluoranthene	191	141	284	ug/kg dry	40	---	179	---	---	6	30%	Ja
Fluorene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Indeno(1,2,3-cd)pyrene	ND	284	284	ug/kg dry	40	---	ND	---	---	---	30%	
1-Methylnaphthalene	ND	284	566	ug/kg dry	40	---	ND	---	---	---	30%	
2-Methylnaphthalene	ND	284	566	ug/kg dry	40	---	ND	---	---	---	30%	
Naphthalene	ND	284	566	ug/kg dry	40	---	ND	---	---	---	30%	
Phenanthrene	321	141	284	ug/kg dry	40	---	366	---	---	13	30%	
Pyrene	178	141	284	ug/kg dry	40	---	189	---	---	6	30%	Ja
Carbazole	ND	212	425	ug/kg dry	40	---	ND	---	---	---	30%	
Dibenzofuran	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
2-Chlorophenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
4-Chloro-3-methylphenol	ND	1410	2840	ug/kg dry	40	---	ND	---	---	---	30%	
2,4-Dichlorophenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
2,4-Dimethylphenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
2,4-Dinitrophenol	ND	3540	7080	ug/kg dry	40	---	ND	---	---	---	30%	
4,6-Dinitro-2-methylphenol	ND	3540	7080	ug/kg dry	40	---	ND	---	---	---	30%	
2-Methylphenol	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
3+4-Methylphenol(s)	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
2-Nitrophenol	ND	1410	2840	ug/kg dry	40	---	ND	---	---	---	30%	
4-Nitrophenol	ND	1410	2840	ug/kg dry	40	---	ND	---	---	---	30%	
Pentachlorophenol (PCP)	ND	2840	2840	ug/kg dry	40	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
Duplicate (22H0777-DUP1)						Prepared: 08/22/22 16:07 Analyzed: 08/23/22 12:21						PRO
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
Phenol	ND	284	566	ug/kg dry	40	---	ND	---	---	---	30%	
2,3,4,6-Tetrachlorophenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
2,3,5,6-Tetrachlorophenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
2,4,5-Trichlorophenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Nitrobenzene	ND	1410	2840	ug/kg dry	40	---	ND	---	---	---	30%	
2,4,6-Trichlorophenol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Bis(2-ethylhexyl)phthalate	12900	2120	4250	ug/kg dry	40	---	11800	---	---	10	30%	
Butyl benzyl phthalate	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Diethylphthalate	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Dimethylphthalate	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Di-n-butylphthalate	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Di-n-octyl phthalate	ND	1140	1410	ug/kg dry	40	---	ND	---	---	---	30%	
N-Nitrosodimethylamine	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
N-Nitroso-di-n-propylamine	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
N-Nitrosodiphenylamine	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Bis(2-Chloroethoxy) methane	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Bis(2-Chloroethyl) ether	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
2,2'-Oxybis(1-Chloropropane)	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Hexachlorobenzene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Hexachlorocyclopentadiene	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Hexachloroethane	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
2-Chloronaphthalene	ND	141	284	ug/kg dry	40	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
4-Bromophenyl phenyl ether	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
4-Chlorophenyl phenyl ether	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Aniline	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
4-Chloroaniline	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
2-Nitroaniline	ND	2840	5660	ug/kg dry	40	---	ND	---	---	---	30%	
3-Nitroaniline	ND	2840	5660	ug/kg dry	40	---	ND	---	---	---	30%	
4-Nitroaniline	ND	2840	5660	ug/kg dry	40	---	ND	---	---	---	30%	
2,4-Dinitrotoluene	ND	1410	2840	ug/kg dry	40	---	ND	---	---	---	30%	
2,6-Dinitrotoluene	ND	1410	2840	ug/kg dry	40	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: [none]	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0777 - EPA 3546						Sediment						
Duplicate (22H0777-DUP1)						Prepared: 08/22/22 16:07 Analyzed: 08/23/22 12:21						PRO
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
Benzoic acid	ND	17700	35400	ug/kg dry	40	---	ND	---	---	---	30%	
Benzyl alcohol	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
Isophorone	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Azobenzene (1,2-DPH)	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
Bis(2-Ethylhexyl) adipate	ND	3540	7080	ug/kg dry	40	---	ND	---	---	---	30%	
3,3'-Dichlorobenzidine	ND	2840	5660	ug/kg dry	40	---	ND	---	---	---	30%	Q-52
1,2-Dinitrobenzene	ND	3540	7080	ug/kg dry	40	---	ND	---	---	---	30%	
1,3-Dinitrobenzene	ND	3540	7080	ug/kg dry	40	---	ND	---	---	---	30%	
1,4-Dinitrobenzene	ND	3540	7080	ug/kg dry	40	---	ND	---	---	---	30%	
Pyridine	ND	708	1410	ug/kg dry	40	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	354	708	ug/kg dry	40	---	ND	---	---	---	30%	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 57%</i>		<i>Limits: 37-122%</i>		<i>Dilution: 40x</i>						S-05
<i>2-Fluorobiphenyl (Surr)</i>		<i>59%</i>		<i>44-120%</i>		<i>"</i>						S-05
<i>Phenol-d6 (Surr)</i>		<i>26%</i>		<i>33-122%</i>		<i>"</i>						S-05
<i>p-Terphenyl-d14 (Surr)</i>		<i>64%</i>		<i>54-127%</i>		<i>"</i>						S-05
<i>2-Fluorophenol (Surr)</i>		<i>17%</i>		<i>35-120%</i>		<i>"</i>						S-05
<i>2,4,6-Tribromophenol (Surr)</i>		<i>60%</i>		<i>39-132%</i>		<i>"</i>						S-05

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0778 - EPA 3546						Sediment						
Blank (22H0778-BLK1)			Prepared: 08/22/22 16:11 Analyzed: 08/23/22 09:38									
<u>EPA 8270E OPPs</u>												
Azinphos methyl (Guthion)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Chlorpyrifos	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Coumaphos	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Demeton O	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Demeton S	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Diazinon	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Dichlorvos	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Dimethoate	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Disulfoton	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
EPN	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Ethoprop	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Fensulfothion	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Fenthion	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Malathion	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Merphos	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Methyl parathion	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Mevinphos (Phosdrin)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Monocrotophos	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Naled (Dibrom)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Parathion, ethyl	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Phorate	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Ronnel (Fenchlorphos)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Sulfotep	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Sulprofos (Bolstar)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
TEPP	ND	90.9	182	ug/kg wet	1	---	---	---	---	---	---	
Tetrachlorvinphos (Rabon)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Tokuthion (Prothiofos)	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
Trichloronate	ND	22.7	45.5	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 69 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 1x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>68 %</i>		<i>34-121 %</i>		<i>"</i>						

LCS (22H0778-BS1) Prepared: 08/22/22 16:11 Analyzed: 08/23/22 10:14 **Q-18**

EPA 8270E OPPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0778 - EPA 3546						Sediment						
LCS (22H0778-BS1)						Prepared: 08/22/22 16:11 Analyzed: 08/23/22 10:14						Q-18
Azinphos methyl (Guthion)	268	25.0	50.0	ug/kg wet	1	400	---	67	38-156%	---	---	
Chlorpyrifos	343	25.0	50.0	ug/kg wet	1	400	---	86	47-140%	---	---	
Coumaphos	307	25.0	50.0	ug/kg wet	1	400	---	77	37-160%	---	---	
Demeton O	132	25.0	50.0	ug/kg wet	1	184	---	72	66-127%	---	---	
Demeton S	137	25.0	50.0	ug/kg wet	1	194	---	70	70-121%	---	---	
Diazinon	379	25.0	50.0	ug/kg wet	1	400	---	95	42-134%	---	---	
Dichlorvos	341	25.0	50.0	ug/kg wet	1	400	---	85	39-142%	---	---	
Dimethoate	293	25.0	50.0	ug/kg wet	1	400	---	73	16-139%	---	---	
Disulfoton	327	25.0	50.0	ug/kg wet	1	400	---	82	28-145%	---	---	
EPN	329	25.0	50.0	ug/kg wet	1	400	---	82	44-137%	---	---	
Ethoprop	357	25.0	50.0	ug/kg wet	1	400	---	89	47-128%	---	---	
Fensulfothion	352	25.0	50.0	ug/kg wet	1	400	---	88	27-147%	---	---	Q-41
Fenthion	370	25.0	50.0	ug/kg wet	1	400	---	92	44-134%	---	---	
Malathion	353	25.0	50.0	ug/kg wet	1	400	---	88	46-137%	---	---	
Merphos	292	25.0	50.0	ug/kg wet	1	400	---	73	66-131%	---	---	
Methyl parathion	300	25.0	50.0	ug/kg wet	1	400	---	75	49-138%	---	---	
Mevinphos (Phosdrin)	333	25.0	50.0	ug/kg wet	1	400	---	83	12-176%	---	---	
Monocrotophos	291	25.0	50.0	ug/kg wet	1	400	---	73	10-153%	---	---	
Naled (Dibrom)	270	25.0	50.0	ug/kg wet	1	400	---	68	10-174%	---	---	
Parathion, ethyl	330	25.0	50.0	ug/kg wet	1	400	---	82	50-139%	---	---	
Phorate	314	25.0	50.0	ug/kg wet	1	400	---	79	23-142%	---	---	
Ronnel (Fenchlorphos)	373	25.0	50.0	ug/kg wet	1	400	---	93	45-138%	---	---	
Sulfotep	372	25.0	50.0	ug/kg wet	1	400	---	93	52-126%	---	---	Q-41
Sulprofos (Bolstar)	351	25.0	50.0	ug/kg wet	1	400	---	88	48-139%	---	---	
TEPP	318	100	200	ug/kg wet	1	400	---	79	16-126%	---	---	
Tetrachlorvinphos (Rabon)	326	25.0	50.0	ug/kg wet	1	400	---	81	54-129%	---	---	
Tokuthion (Prothiofos)	343	25.0	50.0	ug/kg wet	1	400	---	86	45-136%	---	---	
Trichloronate	335	25.0	50.0	ug/kg wet	1	400	---	84	37-140%	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 73 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 1x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>73 %</i>		<i>34-121 %</i>		<i>"</i>						

Duplicate (22H0778-DUP1) Prepared: 08/22/22 16:11 Analyzed: 08/23/22 11:23 **PRO, R-04**

QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)

EPA 8270E OPPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
---	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0778 - EPA 3546						Sediment						
Duplicate (22H0778-DUP1)						Prepared: 08/22/22 16:11 Analyzed: 08/23/22 11:23						PRO, R-04
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
Azinphos methyl (Guthion)	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Chlorpyrifos	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Coumaphos	ND	6140	6140	ug/kg dry	40	---	ND	---	---	---	30%	R-02
Demeton O	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Demeton S	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Diazinon	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Dichlorvos	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Dimethoate	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Disulfoton	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
EPN	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Ethoprop	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Fensulfothion	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Fenthion	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Malathion	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Merphos	ND	19500	19500	ug/kg dry	40	---	ND	---	---	---	30%	R-02
Methyl parathion	ND	4260	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Mevinphos (Phosdrin)	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Monocrotophos	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Naled (Dibrom)	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Parathion, ethyl	ND	5880	5880	ug/kg dry	40	---	ND	---	---	---	30%	R-02
Phorate	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Ronnel (Fenclorpos)	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Sulfotep	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Sulprofos (Bolstar)	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
TEPP	ND	8530	17100	ug/kg dry	40	---	ND	---	---	---	30%	
Tetrachlorvinphos (Rabon)	ND	9380	9380	ug/kg dry	40	---	ND	---	---	---	30%	R-02
Tokuthion (Prothiofos)	ND	2130	4260	ug/kg dry	40	---	ND	---	---	---	30%	
Trichloronate	ND	4690	4690	ug/kg dry	40	---	ND	---	---	---	30%	R-02
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 600 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 40x</i>						S-05
<i>Triphenyl phosphate (Surr)</i>		<i>310 %</i>		<i>34-121 %</i>		<i>"</i>						S-05

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: [none]	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 2210773 - EPA 3546						Sediment						
Blank (2210773-BLK1)			Prepared: 09/23/22 11:03 Analyzed: 09/26/22 11:03									
<u>EPA 8270E OCPs</u>												
Aldrin	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
alpha-BHC	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
beta-BHC	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
gamma-BHC (Lindane)	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
delta-BHC	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
cis-Chlordane	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
cis-Nonachlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
2,4'-DDD	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
2,4'-DDE	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
2,4'-DDT	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
4,4'-DDD	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
4,4'-DDE	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
4,4'-DDT	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Dieldrin	ND	0.0300	0.0300	ug/kg wet	1	---	---	---	---	---	---	
Endosulfan I	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endosulfan II	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endosulfan sulfate	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endrin	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endrin Aldehyde	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endrin ketone	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Heptachlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Heptachlor epoxide	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Methoxychlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Mirex	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Oxychlordane	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
trans-Chlordane	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
trans-Nonachlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 78 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>4,4'-DDT-d8 (Surr)</i>		<i>93 %</i>		<i>50-150 %</i>		<i>"</i>						

LCS (2210773-BS1) Prepared: 09/23/22 11:03 Analyzed: 09/26/22 11:31

EPA 8270E OCPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: [none]	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 2210773 - EPA 3546												
Sediment												
LCS (2210773-BS1)												
						Prepared: 09/23/22 11:03 Analyzed: 09/26/22 11:31						
Aldrin	2.17	0.0500	0.100	ug/kg wet	1	2.50	---	87	54-135%	---	---	
alpha-BHC	2.30	0.0500	0.100	ug/kg wet	1	2.50	---	92	58-132%	---	---	
beta-BHC	2.37	0.0500	0.100	ug/kg wet	1	2.50	---	95	63-140%	---	---	
gamma-BHC (Lindane)	2.33	0.0500	0.100	ug/kg wet	1	2.50	---	93	62-132%	---	---	
delta-BHC	2.40	0.0500	0.100	ug/kg wet	1	2.50	---	96	65-140%	---	---	
cis-Chlordane	2.26	0.0500	0.100	ug/kg wet	1	2.50	---	90	57-151%	---	---	
cis-Nonachlor	2.14	0.0500	0.100	ug/kg wet	1	2.50	---	86	68-151%	---	---	
2,4'-DDD	2.33	0.0500	0.100	ug/kg wet	1	2.50	---	93	71-125%	---	---	
2,4'-DDE	2.42	0.0500	0.100	ug/kg wet	1	2.50	---	97	61-131%	---	---	
2,4'-DDT	2.44	0.0500	0.100	ug/kg wet	1	2.50	---	98	78-133%	---	---	
4,4'-DDD	2.32	0.0500	0.100	ug/kg wet	1	2.50	---	93	71-126%	---	---	
4,4'-DDE	2.43	0.0500	0.100	ug/kg wet	1	2.50	---	97	67-124%	---	---	
4,4'-DDT	2.44	0.0500	0.100	ug/kg wet	1	2.50	---	98	75-130%	---	---	
Dieldrin	2.24	0.0300	0.0300	ug/kg wet	1	2.50	---	90	70-135%	---	---	
Endosulfan I	2.26	0.0500	0.100	ug/kg wet	1	2.50	---	90	62-148%	---	---	
Endosulfan II	2.38	0.0500	0.100	ug/kg wet	1	2.50	---	95	57-141%	---	---	
Endosulfan sulfate	2.17	0.0500	0.100	ug/kg wet	1	2.50	---	87	55-152%	---	---	
Endrin	2.17	0.0500	0.100	ug/kg wet	1	2.50	---	87	73-138%	---	---	
Endrin Aldehyde	1.54	0.0500	0.100	ug/kg wet	1	2.50	---	62	10-146%	---	---	
Endrin ketone	2.19	0.0500	0.100	ug/kg wet	1	2.50	---	87	62-146%	---	---	
Heptachlor	2.27	0.0500	0.100	ug/kg wet	1	2.50	---	91	60-154%	---	---	
Heptachlor epoxide	2.24	0.0500	0.100	ug/kg wet	1	2.50	---	90	65-140%	---	---	
Hexachlorobutadiene	1.63	0.0500	0.100	ug/kg wet	1	2.50	---	65	20-120%	---	---	
Methoxychlor	1.99	0.0500	0.100	ug/kg wet	1	2.50	---	79	73-135%	---	---	
Mirex	2.15	0.0500	0.100	ug/kg wet	1	2.50	---	86	61-149%	---	---	
Oxychlordane	2.26	0.0500	0.100	ug/kg wet	1	2.50	---	90	65-133%	---	---	
trans-Chlordane	2.34	0.0500	0.100	ug/kg wet	1	2.50	---	93	62-145%	---	---	
trans-Nonachlor	1.96	0.0500	0.100	ug/kg wet	1	2.50	---	78	59-153%	---	---	
<i>Surr: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 81 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>4,4'-DDT-d8 (Surr)</i>		<i>93 %</i>		<i>50-150 %</i>		<i>"</i>						

Duplicate (2210773-DUP1) Prepared: 09/23/22 11:03 Analyzed: 09/26/22 13:25 **H-08, PRO**

QC Source Sample: Non-SDG (A210266-63)												
Aldrin	ND	0.0507	0.101	ug/kg dry	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with client information: Maul Foster & Alongi, INC., Project: St. Helens Lagoon, Project Number: [none], Project Manager: David Weatherby, Report ID: A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Main data table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes sub-sections for Batch 2210773 - EPA 3546 and Matrix Spike (2210773-MS1).

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Handwritten signature of Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 2210773 - EPA 3546						Sediment						
Matrix Spike (2210773-MS1)						Prepared: 09/23/22 11:03 Analyzed: 09/26/22 13:53						H-08, PRO
QC Source Sample: Non-SDG (A210266-63)												
Aldrin	1.98	0.0508	0.102	ug/kg dry	1	2.54	ND	78	54-135%	---	---	
alpha-BHC	2.20	0.0508	0.102	ug/kg dry	1	2.54	ND	87	58-132%	---	---	
beta-BHC	1.80	0.0508	0.102	ug/kg dry	1	2.54	ND	71	63-140%	---	---	
gamma-BHC (Lindane)	2.06	0.0508	0.102	ug/kg dry	1	2.54	ND	81	62-132%	---	---	
delta-BHC	1.92	0.0508	0.102	ug/kg dry	1	2.54	ND	76	65-140%	---	---	
cis-Chlordane	1.87	0.0508	0.102	ug/kg dry	1	2.54	ND	74	57-151%	---	---	
cis-Nonachlor	1.86	0.0508	0.102	ug/kg dry	1	2.54	ND	73	68-151%	---	---	
2,4'-DDD	2.14	0.0508	0.102	ug/kg dry	1	2.54	ND	84	71-125%	---	---	
2,4'-DDE	2.22	0.0508	0.102	ug/kg dry	1	2.54	ND	87	61-131%	---	---	
2,4'-DDT	2.34	0.0508	0.102	ug/kg dry	1	2.54	ND	92	78-133%	---	---	
4,4'-DDD	2.25	0.0508	0.102	ug/kg dry	1	2.54	0.0510	86	71-126%	---	---	
4,4'-DDE	2.29	0.0508	0.102	ug/kg dry	1	2.54	0.184	83	67-124%	---	---	
4,4'-DDT	2.67	0.0508	0.102	ug/kg dry	1	2.54	0.358	91	75-130%	---	---	
Dieldrin	1.84	0.0305	0.0305	ug/kg dry	1	2.54	0.0462	70	70-135%	---	---	
Endosulfan I	1.87	0.0508	0.102	ug/kg dry	1	2.54	ND	73	62-148%	---	---	
Endosulfan II	2.16	0.0508	0.102	ug/kg dry	1	2.54	ND	85	57-141%	---	---	
Endosulfan sulfate	2.09	0.0508	0.102	ug/kg dry	1	2.54	ND	82	55-152%	---	---	
Endrin	1.82	0.0508	0.102	ug/kg dry	1	2.54	ND	71	73-138%	---	---	Q-01
Endrin Aldehyde	1.53	0.0508	0.102	ug/kg dry	1	2.54	ND	60	10-146%	---	---	
Endrin ketone	2.14	0.0508	0.102	ug/kg dry	1	2.54	ND	84	62-146%	---	---	
Heptachlor	2.22	0.0508	0.102	ug/kg dry	1	2.54	ND	87	60-154%	---	---	
Heptachlor epoxide	1.90	0.0508	0.102	ug/kg dry	1	2.54	ND	75	65-140%	---	---	
Hexachlorobutadiene	1.92	0.0508	0.102	ug/kg dry	1	2.54	ND	76	20-120%	---	---	
Methoxychlor	2.21	0.0508	0.102	ug/kg dry	1	2.54	ND	87	73-135%	---	---	
Mirex	2.07	0.0508	0.102	ug/kg dry	1	2.54	ND	81	61-149%	---	---	
Oxychlordane	1.84	0.0508	0.102	ug/kg dry	1	2.54	ND	72	65-133%	---	---	
trans-Chlordane	1.88	0.0508	0.102	ug/kg dry	1	2.54	ND	74	62-145%	---	---	
trans-Nonachlor	1.71	0.0508	0.102	ug/kg dry	1	2.54	ND	67	59-153%	---	---	
<i>Surr: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 75 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>4,4'-DDT-d8 (Surr)</i>		<i>95 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0793 - EPA 3051A												
Sediment												
Blank (22H0793-BLK1)												
						Prepared: 08/23/22 09:46 Analyzed: 08/23/22 20:20						
EPA 6020B												
Antimony	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Arsenic	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Barium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Beryllium	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Cadmium	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Copper	ND	0.481	0.962	mg/kg wet	5	---	---	---	---	---	---	
Lead	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Manganese	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Mercury	ND	0.0192	0.0385	mg/kg wet	5	---	---	---	---	---	---	
Nickel	ND	0.481	0.962	mg/kg wet	5	---	---	---	---	---	---	
Selenium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Silver	ND	0.0481	0.0962	mg/kg wet	5	---	---	---	---	---	---	
Thallium	ND	0.240	0.481	mg/kg wet	5	---	---	---	---	---	---	
Zinc	ND	0.962	1.92	mg/kg wet	5	---	---	---	---	---	---	

LCS (22H0793-BS1)												
						Prepared: 08/23/22 09:46 Analyzed: 08/23/22 20:26						
EPA 6020B												
Antimony	12.9	0.250	0.500	mg/kg wet	5	12.5	---	103	80-120%	---	---	
Arsenic	23.4	0.250	0.500	mg/kg wet	5	25.0	---	94	80-120%	---	---	
Barium	25.2	0.250	0.500	mg/kg wet	5	25.0	---	101	80-120%	---	---	
Beryllium	12.0	0.0500	0.100	mg/kg wet	5	12.5	---	96	80-120%	---	---	
Cadmium	24.4	0.0500	0.100	mg/kg wet	5	25.0	---	98	80-120%	---	---	
Chromium	24.3	0.250	0.500	mg/kg wet	5	25.0	---	97	80-120%	---	---	
Copper	24.9	0.500	1.00	mg/kg wet	5	25.0	---	100	80-120%	---	---	
Lead	23.1	0.0500	0.100	mg/kg wet	5	25.0	---	92	80-120%	---	---	
Manganese	24.1	0.250	0.500	mg/kg wet	5	25.0	---	96	80-120%	---	---	
Mercury	0.456	0.0200	0.0400	mg/kg wet	5	0.500	---	91	80-120%	---	---	
Nickel	24.7	0.500	1.00	mg/kg wet	5	25.0	---	99	80-120%	---	---	
Selenium	12.9	0.250	0.500	mg/kg wet	5	12.5	---	103	80-120%	---	---	
Silver	11.7	0.0500	0.100	mg/kg wet	5	12.5	---	93	80-120%	---	---	
Thallium	12.2	0.250	0.500	mg/kg wet	5	12.5	---	98	80-120%	---	---	
Zinc	24.5	1.00	2.00	mg/kg wet	5	25.0	---	98	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: [none]	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A2H0382 - 12 12 22 1538

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0793 - EPA 3051A												
Sediment												
Duplicate (22H0793-DUP1)												
						Prepared: 08/23/22 09:46 Analyzed: 08/23/22 20:36						
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
EPA 6020B												
Antimony	2.71	0.283	0.565	mg/kg dry	5	---	2.62	---	---	3	20%	PRO
Arsenic	4.05	0.283	0.565	mg/kg dry	5	---	4.21	---	---	4	20%	PRO
Barium	335	0.283	0.565	mg/kg dry	5	---	339	---	---	1	20%	PRO
Beryllium	0.328	0.0565	0.113	mg/kg dry	5	---	0.327	---	---	0.3	20%	PRO
Cadmium	2.91	0.0565	0.113	mg/kg dry	5	---	2.97	---	---	2	20%	PRO
Chromium	69.3	0.283	0.565	mg/kg dry	5	---	70.1	---	---	1	20%	PRO
Copper	254	0.565	1.13	mg/kg dry	5	---	259	---	---	2	20%	PRO
Lead	27.6	0.0565	0.113	mg/kg dry	5	---	27.1	---	---	2	20%	PRO
Manganese	693	0.283	0.565	mg/kg dry	5	---	711	---	---	3	20%	PRO
Mercury	0.456	0.0226	0.0452	mg/kg dry	5	---	0.485	---	---	6	20%	PRO
Nickel	36.6	0.565	1.13	mg/kg dry	5	---	37.8	---	---	3	20%	PRO
Selenium	2.68	0.283	0.565	mg/kg dry	5	---	2.46	---	---	8	20%	PRO
Silver	2.20	0.0565	0.113	mg/kg dry	5	---	2.27	---	---	3	20%	PRO
Thallium	ND	0.283	0.565	mg/kg dry	5	---	ND	---	---	---	20%	PRO
Zinc	803	1.13	2.26	mg/kg dry	5	---	817	---	---	2	20%	PRO

Matrix Spike (22H0793-MS1)												
						Prepared: 08/23/22 09:46 Analyzed: 08/23/22 20:56						
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
EPA 6020B												
Antimony	14.4	0.281	0.563	mg/kg dry	5	14.1	2.62	84	75-125%	---	---	PRO
Arsenic	29.4	0.281	0.563	mg/kg dry	5	28.1	4.21	90	75-125%	---	---	PRO
Barium	357	0.281	0.563	mg/kg dry	5	28.1	339	64	75-125%	---	---	PRO,Q-03
Beryllium	14.4	0.0563	0.113	mg/kg dry	5	14.1	0.327	100	75-125%	---	---	PRO
Cadmium	30.3	0.0563	0.113	mg/kg dry	5	28.1	2.97	97	75-125%	---	---	PRO
Chromium	94.8	0.281	0.563	mg/kg dry	5	28.1	70.1	88	75-125%	---	---	PRO
Copper	274	0.563	1.13	mg/kg dry	5	28.1	259	52	75-125%	---	---	PRO,Q-03
Lead	53.2	0.0563	0.113	mg/kg dry	5	28.1	27.1	93	75-125%	---	---	PRO
Manganese	706	0.281	0.563	mg/kg dry	5	28.1	711	-16	75-125%	---	---	PRO,Q-03
Mercury	0.997	0.0225	0.0450	mg/kg dry	5	0.563	0.485	91	75-125%	---	---	PRO
Nickel	63.2	0.563	1.13	mg/kg dry	5	28.1	37.8	90	75-125%	---	---	PRO
Selenium	17.3	0.281	0.563	mg/kg dry	5	14.1	2.46	105	75-125%	---	---	PRO

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
---	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0793 - EPA 3051A						Sediment						
Matrix Spike (22H0793-MS1)						Prepared: 08/23/22 09:46 Analyzed: 08/23/22 20:56						
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)												
Silver	15.1	0.0563	0.113	mg/kg dry	5	14.1	2.27	91	75-125%	---	---	PRO
Thallium	13.9	0.281	0.563	mg/kg dry	5	14.1	ND	99	75-125%	---	---	PRO
Zinc	806	1.13	2.25	mg/kg dry	5	28.1	817	-39	75-125%	---	---	PRO,Q-03

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 22H0747 - EPA 3060A						Soil						
Blank (22H0747-BLK2)			Prepared: 08/22/22 08:37 Analyzed: 08/23/22 14:03									
<u>EPA 7196A</u>												
Chromium (VI)	ND	0.225	0.450	mg/kg wet	1	---	---	---	---	---	---	Q-16
LCS (22H0747-BS2)			Prepared: 08/22/22 08:37 Analyzed: 08/23/22 14:03									
<u>EPA 7196A</u>												
Chromium (VI)	16.4	0.225	0.450	mg/kg wet	1	20.0	---	82	80-120%	---	---	Q-16
Duplicate (22H0747-DUP1)			Prepared: 08/22/22 08:37 Analyzed: 08/23/22 14:06 PRO									
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)</u>												
<u>EPA 7196A</u>												
Chromium (VI)	ND	10.6	21.2	mg/kg dry	50	---	ND	---	---	---	20%	Q-57
Matrix Spike (22H0747-MS1)			Prepared: 08/22/22 08:37 Analyzed: 08/23/22 14:07 PRO									
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)</u>												
<u>EPA 7196A</u>												
Chromium (VI)	ND	10.6	21.2	mg/kg dry	50	20.9	ND		75-125%	---	---	Cr6-01, Q-57
Matrix Spike (22H0747-MS2)			Prepared: 08/22/22 08:37 Analyzed: 08/23/22 14:09 PRO									
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)</u>												
<u>EPA 7196A</u>												
Chromium (VI)	ND	21.1	42.2	mg/kg dry	100	1010	ND		75-125%	---	---	Cr6-01, Q-57
Post Spike (22H0747-PS1)			Prepared: 08/22/22 08:37 Analyzed: 08/23/22 14:12 PRO									
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)</u>												
<u>EPA 7196A</u>												
Chromium (VI)	17200			ug/L	50	19900	53.7	86	85-115%	---	---	Q-57

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 22H0481 - Total Solids (Dry Weight)						Soil							
Duplicate (22H0481-DUP1)			Prepared: 08/12/22 13:08 Analyzed: 08/15/22 07:02						PRO				
<u>QC Source Sample: Non-SDG (A2H0213-02)</u>													
% Solids	97.8	1.00	1.00	%	1	---	97.8	---	---	0.02	10%		
Duplicate (22H0481-DUP2)			Prepared: 08/12/22 13:08 Analyzed: 08/15/22 07:02						PRO				
<u>QC Source Sample: Non-SDG (A2H0213-04)</u>													
% Solids	97.5	1.00	1.00	%	1	---	97.5	---	---	0.01	10%		
Duplicate (22H0481-DUP3)			Prepared: 08/12/22 13:08 Analyzed: 08/15/22 07:02						PRO				
<u>QC Source Sample: Non-SDG (A2H0213-06)</u>													
% Solids	97.6	1.00	1.00	%	1	---	97.7	---	---	0.05	10%		
Duplicate (22H0481-DUP4)			Prepared: 08/12/22 19:24 Analyzed: 08/15/22 07:02						PRO				
<u>QC Source Sample: Non-SDG (A2H0216-02)</u>													
% Solids	97.5	1.00	1.00	%	1	---	97.5	---	---	0.04	10%		
Duplicate (22H0481-DUP5)			Prepared: 08/12/22 19:24 Analyzed: 08/15/22 07:02						PRO				
<u>QC Source Sample: Non-SDG (A2H0216-04)</u>													
% Solids	97.6	1.00	1.00	%	1	---	97.6	---	---	0.001	10%		
Duplicate (22H0481-DUP6)			Prepared: 08/12/22 19:24 Analyzed: 08/15/22 07:02						PRO				
<u>QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-03)</u>													
<u>EPA 8000D</u>													
% Solids	7.08	1.00	1.00	%	1	---	6.71	---	---	5	10%		

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 22H0773 - Total Solids (Dry Weight)							Soil						
Duplicate (22H0773-DUP1)			Prepared: 08/22/22 15:12 Analyzed: 08/22/22 15:57						PRO				
QC Source Sample: DU1-20220810-ISM-COMP (A2H0382-02)													
EPA 8000D													
% Solids	94.1	1.00	1.00	%	1	---	93.7	---	---	0.4	10%		

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: [none]	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A2H0382 - 12 12 22 1538

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W2H1928 - EPA 3550/Sonication						Solid						
Blank (W2H1928-BLK1)			Prepared: 08/24/22 09:10 Analyzed: 09/01/22 08:41									
EPA 8151A												
2,4-D	ND	9.3	40	ug/kg	1	---	---	---	---	---	---	
2,4-DB	ND	16	80	ug/kg	1	---	---	---	---	---	---	
2,4,5-T	ND	4.2	20	ug/kg	1	---	---	---	---	---	---	
2,4,5-TP (Silvex)	ND	5.1	20	ug/kg	1	---	---	---	---	---	---	
Dalapon	ND	7.1	40	ug/kg	1	---	---	---	---	---	---	
Dicamba	ND	6.7	40	ug/kg	1	---	---	---	---	---	---	
Dichloroprop	ND	6.8	40	ug/kg	1	---	---	---	---	---	---	
Dinoseb	ND	2.3	20	ug/kg	1	---	---	---	---	---	---	
MCPA	ND	1500	4000	ug/kg	1	---	---	---	---	---	---	
MCPP	ND	750	4000	ug/kg	1	---	---	---	---	---	---	
Pentachlorophenol	ND	6.3	20	ug/kg	1	---	---	---	---	---	---	
Picloram	ND	6.2	20	ug/kg	1	---	---	---	---	---	---	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 97 %</i>		<i>Limits: 13-119 %</i>		<i>Dilution: 1x</i>						

LCS (W2H1928-BS1)			Prepared: 08/24/22 09:10 Analyzed: 09/01/22 09:13									
EPA 8151A												
2,4-D	91.6	9.3	40	ug/kg	1	100	---	92	53-130%	---	---	
2,4-DB	139	16	80	ug/kg	1	200	---	70	28-119%	---	---	
2,4,5-T	50.5	4.2	20	ug/kg	1	50.0	---	101	40-108%	---	---	
2,4,5-TP (Silvex)	45.5	5.1	20	ug/kg	1	50.0	---	91	38-108%	---	---	
Dalapon	67.7	7.1	40	ug/kg	1	100	---	68	17-122%	---	---	
Dicamba	91.2	6.7	40	ug/kg	1	100	---	91	48-107%	---	---	
Dichloroprop	91.4	6.8	40	ug/kg	1	100	---	91	45-117%	---	---	
Dinoseb	18.2	2.3	20	ug/kg	1	50.0	---	36	0.1-83%	---	---	J
MCPA	10400	1500	4000	ug/kg	1	10000	---	104	33-107%	---	---	
MCPP	8300	750	4000	ug/kg	1	10000	---	83	34-117%	---	---	
Pentachlorophenol	42.3	6.3	20	ug/kg	1	50.0	---	85	40-102%	---	---	
Picloram	44.9	6.2	20	ug/kg	1	50.0	---	90	22-139%	---	---	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 110 %</i>		<i>Limits: 13-119 %</i>		<i>Dilution: 1x</i>						

Matrix Spike (W2H1928-MS1)			Prepared: 08/24/22 09:10 Analyzed: 09/01/22 09:44									
-----------------------------------	--	--	---	--	--	--	--	--	--	--	--	--

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W2H1928 - EPA 3550/Sonication						Solid						
Matrix Spike (W2H1928-MS1)						Prepared: 08/24/22 09:10 Analyzed: 09/01/22 09:44						
QC Source Sample: A2H0382-02 (A2H0382-02)												
EPA 8151A												
2,4-D	ND	0.0	1500	ug/kg	10	365	ND		21-126%	---	---	M-02, M-04, MS-01
2,4-DB	32.1	0.0	2900	ug/kg	10	731	ND	4	13-133%	---	---	M-02, M-04, MS-01, J
2,4,5-T	ND	0.0	730	ug/kg	10	183	ND		17-123%	---	---	M-02, M-04, MS-01
2,4,5-TP (Silvex)	20.7	0.0	730	ug/kg	10	183	ND	11	15-126%	---	---	M-02, M-04, MS-01, J
Dalapon	ND	0.0	1500	ug/kg	10	365	ND		9.6-101%	---	---	M-02, M-04, MS-01
Dicamba	12.0	0.0	1500	ug/kg	10	365	ND	3	11-107%	---	---	M-02, M-04, MS-01, J
Dichloroprop	231	0.0	1500	ug/kg	10	365	ND	63	44-133%	---	---	M-02, M-04, J
Dinoseb	15.8	0.0	730	ug/kg	10	183	ND	9	0.1-72%	---	---	M-02, M-04, J
MCPA	8890	0.0	150000	ug/kg	10	36500	ND	24	23-123%	---	---	M-02, M-04, J
MCPP	ND	0.0	150000	ug/kg	10	36500	ND		24-120%	---	---	M-02, M-04, MS-01
Pentachlorophenol	7.57	0.0	730	ug/kg	10	183	ND	4	10-103%	---	---	M-02, M-04, MS-01, J
Picloram	ND	0.0	730	ug/kg	10	183	ND		17-155%	---	---	M-02, M-04, MS-01
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 8%</i>		<i>Limits: 13-119%</i>		<i>Dilution: 10x</i>		S-04				

Matrix Spike Dup (W2H1928-MSD1)						Prepared: 08/24/22 09:10 Analyzed: 09/01/22 10:15						
QC Source Sample: A2H0382-02 (A2H0382-02)												
EPA 8151A												
2,4-D	261	0.0	1500	ug/kg	10	364	ND	72	21-126%	200	25%	M-02, M-04, R-03, J
2,4-DB	296	0.0	2900	ug/kg	10	727	ND	41	13-133%	200	25%	M-02, M-04, R-03, J
2,4,5-T	106	0.0	730	ug/kg	10	182	ND	59	17-123%	200	25%	M-02, M-04, R-03, J

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W2H1928 - EPA 3550/Sonication						Solid						
Matrix Spike Dup (W2H1928-MSD1)						Prepared: 08/24/22 09:10 Analyzed: 09/01/22 10:15						
QC Source Sample: A2H0382-02 (A2H0382-02)												
2,4,5-TP (Silvex)	152	0.0	730	ug/kg	10	182	ND	84	15-126%	200	25%	M-02, M-04, R-03, J
Dalapon	206	0.0	1500	ug/kg	10	364	ND	57	9.6-101%	200	25%	M-02, M-04, R-03, J
Dicamba	163	0.0	1500	ug/kg	10	364	ND	45	11-107%	200	25%	M-02, M-04, R-03, J
Dichloroprop	429	250	1500	ug/kg	10	364	ND	118	44-133%	200	25%	M-02, M-04, R-03, J
Dinoseb	55.2	0.0	730	ug/kg	10	182	ND	30	0.1-72%	200	25%	M-02, M-04, R-03, J
MCPA	15900	0.0	150000	ug/kg	10	36400	ND	44	23-123%	200	25%	M-02, M-04, R-03, J
MCPP	32000	27000	150000	ug/kg	10	36400	ND	88	24-120%	200	25%	M-02, M-04, R-03, J
Pentachlorophenol	57.7	0.0	730	ug/kg	10	182	ND	32	10-103%	200	25%	M-02, M-04, R-03, J
Picloram	109	0.0	730	ug/kg	10	182	ND	60	17-155%	200	25%	M-02, M-04, R-03, J
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 67%</i>		<i>Limits: 13-119%</i>		<i>Dilution: 10x</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W2H1882 - _NONE (METALS)						Solid						
Duplicate (W2H1882-DUP1)				Prepared: 08/23/22 14:37 Analyzed: 08/24/22 16:39								
QC Source Sample: Non-SDG (2H23010-03)												
% Solids	28.1		0.100	% by Weight	1	---	27.4	---	---	3	20%	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3546 (Fuels)					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0779</u>							
A2H0382-02	Sediment	NWTPH-Dx	08/10/22 09:15	08/22/22 16:14	10.09g/10mL	10g/5mL	1.98

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5035A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0476</u>							
A2H0382-01	Sediment	NWTPH-Gx (MS)	08/10/22 09:15	08/10/22 09:15	165.15g/250mL	5g/5mL	1.51

Volatile Organic Compounds by EPA 8260D

Prep: EPA 5035A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0476</u>							
A2H0382-01	Sediment	5035A/8260D	08/10/22 09:15	08/10/22 09:15	165.15g/250mL	5g/5mL	1.51

Volatile Organic Compounds by EPA 8260D SIM

Prep: EPA 5035A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0946</u>							
A2H0382-01	Sediment	5035A/8260D SIM	08/10/22 09:15	08/10/22 09:15	165.15g/250mL	5g/5mL	1.51

Semivolatile Organic Compounds by EPA 8270E

Prep: EPA 3546					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0777</u>							
A2H0382-02	Sediment	EPA 8270E	08/10/22 09:15	08/22/22 16:07	15.09g/5mL	15g/2mL	2.49

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Prep: EPA 3546					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0778</u>							
A2H0382-02	Sediment	EPA 8270E OPPs	08/10/22 09:15	08/22/22 16:11	10.09g/10mL	10g/5mL	1.98

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

SAMPLE PREPARATION INFORMATION

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Prep: EPA 3546					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor

Organochlorine Pesticides by GC/MS/MS

Prep: EPA 3546					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 2210773</u>							
A2H0382-02	Sediment	EPA 8270E OCPs	08/10/22 09:15	09/23/22 11:03	10.06g/10mL	10g/1mL	9.94

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3051A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0793</u>							
A2H0382-02	Sediment	EPA 6020B	08/10/22 09:15	08/23/22 09:46	0.467g/50mL	0.5g/50mL	1.07

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Prep: EPA 3060A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0747</u>							
A2H0382-02	Sediment	EPA 7196A	08/10/22 09:15	08/22/22 08:37	2.5342g/100mL	2.5g/111mL	0.89

Percent Dry Weight

Prep: Total Solids (Dry Weight)					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 22H0481</u>							
A2H0382-01	Sediment	EPA 8000D	08/10/22 09:15	08/12/22 13:08			NA
A2H0382-03	Sediment	EPA 8000D	08/10/22 09:15	08/12/22 13:08			NA
<u>Batch: 22H0773</u>							
A2H0382-02	Sediment	EPA 8000D	08/10/22 09:15	08/22/22 15:12			NA

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

Weck Laboratories, Inc.

SAMPLE PREPARATION INFORMATION

Chlorinated Herbicides by GC/ECD

<u>Prep: EPA 3550/Sonication</u>						Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
<u>Batch: W2H1928</u>								
A2H0382-02	Sediment	EPA 8151A	08/10/22 09:15	08/24/22 09:10	8.34g/10ml	30g/10ml	3.60	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

<u>Prep: NONE (METALS)</u>						Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
<u>Batch: W2H1882</u>								
A2H0382-02	Sediment	EPA 160.3M	08/10/22 09:15	08/23/22 14:37	1g/1ml	1g/1ml	NA	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- A-01** Sample was received outside of recommended temperature.
- AMEND** The Result, Reporting Level, Recovery and/or RPD has changed. Note: Batch QC marked as AMENDED may or may not have been issued prior to the change. Case Narrative included if client data is affected.
- B** Analyte detected in an associated blank at a level above the MRL. (See Notes and Conventions below.)
- B-02** Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
- B-07** Analyte detected in the corresponding extraction blank at a level greater than the MRL, and detected in this sample at a level below that found in the blank. Reporting level for this analyte has been raised above the potential analyte contamination.
- Cr6-01** Matrix Spike fails due to probable reducing conditions present in the sample. Sample is ND. Data quality is not affected because any hexavalent chromium present in the sample is likely to have been reduced to chromium three.
- F-13** The chromatographic pattern does not resemble the fuel standard used for quantitation
- H-01** This sample was analyzed outside the recommended holding time.
- H-08** Sample hold time extended by freezing at -18 degrees C. Total time at 4 degrees C was less than the method hold time.
- Ja** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- PRO** Sample has undergone sample processing prior to extraction and analysis.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-03** Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-18** Matrix Spike results for this extraction batch are not reported due to the high dilution necessary for analysis of the source sample.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-30** Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
- Q-36** Daily CCV recovery for this analyte was below the +/-20% criteria listed in EPA 8270, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-41** Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-52** Due to known erratic recoveries, the result and reporting levels for this analyte are reported as Estimated Values. This analyte may not have passed all QC requirements for this method.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +16%. The results are reported as Estimated Values.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +19%. The results are reported as Estimated Values.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +2%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +6%. The results are reported as Estimated Values.
- Q-54d** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -13%. The results are reported as Estimated Values.
- Q-54e** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -4%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- Q-57** Compensation for background color and/or turbidity has been made by subtracting the absorbance of a second aliquot of sample to which all reagents except the color producing reagent have been added, in accordance with the method.
- R-02** The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample.
- R-04** Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
- S-01** Surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference.
- S-05** Surrogate recovery is estimated due to sample dilution required for high analyte concentration and/or matrix interference.

Weck Laboratories, Inc.

- J** Estimated conc. detected <MRL and >MDL.
- M-02** Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
- M-04** Due to the nature of matrix interferences, sample extract was diluted prior to analysis. The MDL and MRL were raised due to the dilution.
- MS-01** The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
- R-03** The RPD is not applicable for result below the reporting limit (either ND or J value).
- S-04** The surrogate recovery for this sample is outside of established control limits due to possible sample matrix effect.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	--

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.
 - " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A2H0382 - 12 12 22 1538).

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Handwritten signature of Philip Nerenberg



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A2H0382 - 12 12 22 1538).

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Table header with columns: Matrix, Analysis, TNI_ID, Analyte, TNI_ID, Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Handwritten signature of Philip Nerenberg

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	--	---

APEX LABS

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: Maul Foster Alongi
Address: 3140 NE Broadway St, Portland, OR 97232
Sampled by: *David Weatherby*
Sampler signature: *[Signature]*

Site Location: OR WA
Other: _____

Project Name: St. Helens Lagoon
Project #: M0830.03.006
Email: dweatherby@maulfoster.com, mbenzinger@maulfoster.com

Project Mgr: David Weatherby
Phone: (971) 544-2139

Project # of L
Lab # *A2H0382*

CHAIN OF CUSTODY

ANALYSIS REQUEST

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	RSM Prep*	NWTFH-GX	8260D VOCs	8260D-SIM	Tot Metals 6020B**	Cr-VI 719A	NWTFH-DX	SVOCS 8270E	OP Pest 8270E	Chlorinated Herb 8151A	LL OC Pest 1699	Dioxins/Furans 1613B	Chlorinated Herb 8151A	PCB Congeners 8151A	PFAS EPA-537 Mod 1689C
<i>DA2-2022-010-1</i>	<i>8/10/22</i>	<i>0615</i>	<i>Sed</i>	<i>4</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Normal Turn Around Time (TAT) = 5-10 Business Days

TAT Requested (circle):
 24 HR 48 HR 72 HR
 4 DAY STANDARD Other: _____

SPECIAL INSTRUCTIONS:
 *RSM prep on all sediment, associated sands, and gravel. Remove sticks and foreign material (plastic, trash, etc).
 Collect test sample from *7/8 inch* jar for dry weight using Jap2D RSM technique.
 **Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Se, Ag, Tl, Zn
 Detection limit report.

SAMPLES ARE HELD FOR 30 DAYS

RECEIVED BY:
Signature: *[Signature]* Date: *8/10/22*
Printed Name: *Kathryn Max ipse* Time: *18:25*
Company: *MFA*

RELINQUISHED BY:
Signature: *[Signature]* Date: *8/10/22*
Printed Name: *Kathryn Max ipse* Time: *18:25*
Company: *MFA*

Apex Laboratories

Philip Nerenberg

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: [none] Project Manager: David Weatherby	Report ID: A2H0382 - 12 12 22 1538
--	---	--

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster Alongi Element WO#: A2 H0382

Project/Project #: St. Helens Lagoon / M0830-03.006

Delivery Info:
Date/time received: ^{2AM 8110} 8/10/22 @ 18:25 By: 2AM
Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 8/10/22 @ 18:28 By: 2AM

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>3.1</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>N</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition:	<u>Good</u>						

Cooler out of temp? (Y/N) Possible reason why: (N)

Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No

Sample Inspection: Date/time inspected: 8/10/22 @ 15:56 By: 15

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____

Labeled by: <u>b</u>	Witness: <u>DSS</u>	Cooler Inspected by: <u>DJS</u>
----------------------	---------------------	---------------------------------

Philip Nerenberg



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Wednesday, April 19, 2023

David Weatherby
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A3A1010 - St. Helens Lagoon - M0830.03.006

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A3A1010, which was received by the laboratory on 1/31/2023 at 10:08:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: pnerenberg@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	3.1 degC	Cooler #2	1.4 degC
Cooler #3	2.8 degC	Cooler #4	0.9 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MFA-B1-20230130-21.9	A3A1010-01	Sediment	01/30/23 16:00	01/31/23 10:08
MFA-B3-20230131-31.0	A3A1010-02	Sediment	01/31/23 10:50	01/31/23 10:08
MFA-B2-20230131-23.0	A3A1010-03	Sediment	01/31/23 09:00	01/31/23 10:08
MFA-B4-20230202-SL-26.5	A3A1010-04	Sediment	02/02/23 09:10	01/31/23 10:08
MFA-B5-20230203-SL-27.0	A3A1010-05	Sediment	02/03/23 15:00	01/31/23 10:08
MFA-B1-B5-COMP-SL	A3A1010-06	Sediment	01/30/23 16:00	01/31/23 10:08
MFA-B1-B5-COMP-SL-PRO	A3A1010-07	Sediment	01/30/23 16:00	01/31/23 10:08

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A3A1010 - 04 19 23 1708).

ANALYTICAL CASE NARRATIVE

A3A1010 Apex Laboratories

Sample Processing: Air Dried Samples

All samples for Chlorinated Pesticides by EPA 8270E are air dried prior to extraction and analysis. A separate Dry Weight analysis is performed on the air dried samples in order to report data on a dry weight basis .

8270E Chlorinated Pesticides - Reporting levels raised due to Matrix.

Reporting levels for multiple analytes have been raised due to matrix interference for sample " MFA-SL-Composite After Processing" (Apex Labs ID A3A1010-07).

David Jack
Technical Manager
March 15, 2023

Sample B1-B5-COMP-SL (A3A1010-06) was composited by combining equal volumes of methanol from methanol-preserved VOAs for samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27.

Sample B1-B5-COMP-SL-PRO (A3A1010-07) was composited by combining equal weights of material from jars received for samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27.0. The composited sample was air-dried before analysis.

Philip Nerenberg
Lab Director
4/19/23

Handwritten signature of Philip Nerenberg



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0765		COMP, PRO
Diesel	26100	1030	2070	mg/kg dry	100	02/21/23 21:58	NWTPH-Dx	F-03, F-11
Oil	ND	2070	4130	mg/kg dry	100	02/21/23 21:58	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: %</i>	<i>Limits: 50-150 %</i>	<i>100</i>	<i>02/21/23 21:58</i>	<i>NWTPH-Dx</i>	<i>S-01</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL (A3A1010-06)				Matrix: Sediment		Batch: 23B0290		COMP
Gasoline Range Organics	ND	26.7	53.3	mg/kg dry	50	02/08/23 13:31	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>	<i>1</i>	<i>02/08/23 13:31</i>	<i>NWTPH-Gx (MS)</i>	
<i>1,4-Difluorobenzene (Sur)</i>		<i>106 %</i>		<i>50-150 %</i>	<i>1</i>	<i>02/08/23 13:31</i>	<i>NWTPH-Gx (MS)</i>	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL (A3A1010-06)				Matrix: Sediment		Batch: 23B0290		COMP
Acetone	ND	5330	10700	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Acrylonitrile	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Bromobenzene	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Bromochloromethane	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Bromodichloromethane	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Bromoform	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Bromomethane	ND	5330	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
2-Butanone (MEK)	ND	2670	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
n-Butylbenzene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
sec-Butylbenzene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
tert-Butylbenzene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Carbon disulfide	ND	2670	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Carbon tetrachloride	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Chlorobenzene	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Chloroethane	ND	5330	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Chloromethane	ND	1330	2670	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
2-Chlorotoluene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
4-Chlorotoluene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Dibromochloromethane	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Dibromomethane	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,2-Dichlorobenzene	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,3-Dichlorobenzene	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,4-Dichlorobenzene	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Dichlorodifluoromethane	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,3-Dichloropropane	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
2,2-Dichloropropane	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,1-Dichloropropene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Hexachlorobutadiene	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
2-Hexanone	ND	2670	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Isopropylbenzene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
4-Isopropyltoluene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Methylene chloride	ND	2670	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
4-Methyl-2-pentanone (MiBK)	ND	2670	5330	ug/kg dry	50	02/08/23 13:31	5035A/8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL (A3A1010-06)				Matrix: Sediment		Batch: 23B0290		COMP
Naphthalene	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
n-Propylbenzene	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Styrene	ND	267	533	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,1,1,2-Tetrachloroethane	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,2,3-Trichlorobenzene	ND	1330	2670	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,2,4-Trichlorobenzene	ND	1330	2670	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
1,1,1-Trichloroethane	ND	133	267	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
Trichlorofluoromethane	ND	533	1070	ug/kg dry	50	02/08/23 13:31	5035A/8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/08/23 13:31</i>	<i>5035A/8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/08/23 13:31</i>	<i>5035A/8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>79-120 %</i>		<i>1</i>	<i>02/08/23 13:31</i>	<i>5035A/8260D</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL (A3A1010-06)				Matrix: Sediment		Batch: 23B0452		COMP
Benzene	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
Toluene	29.7	26.7	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	J
Ethylbenzene	ND	26.7	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
m,p-Xylene	ND	53.3	107	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
o-Xylene	ND	26.7	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,2,4-Trimethylbenzene	ND	53.3	107	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,3,5-Trimethylbenzene	ND	53.3	107	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
Chloroform	ND	53.3	107	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,2-Dibromo-3-chloropropane	ND	26.7	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,2-Dibromoethane (EDB)	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,1-Dichloroethane	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,2-Dichloroethane (EDC)	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,1-Dichloroethene	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
cis-1,2-Dichloroethene	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
trans-1,2-Dichloroethene	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
1,2-Dichloropropane	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
cis-1,3-Dichloropropene	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
trans-1,3-Dichloropropene	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	21.3	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	
Tetrachloroethene (PCE)	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MFA-B1-B5-COMP-SL (A3A1010-06)				Matrix: Sediment		Batch: 23B0452		COMP	
1,1,2,2-Tetrachloroethane	ND	53.3	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM		
Trichloroethene (TCE)	ND	10.7	21.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM		
1,2,3-Trichloropropane	ND	26.7	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM		
Vinyl chloride	ND	53.3	107	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM		
1,1,2-Trichloroethane	ND	26.7	53.3	ug/kg dry	100	02/12/23 13:16	5035A/8260D SIM		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/12/23 13:16</i>	<i>5035A/8260D SIM</i>	
<i>Toluene-d8 (Surr)</i>				<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/12/23 13:16</i>	<i>5035A/8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>				<i>98 %</i>		<i>79-120 %</i>	<i>1</i>	<i>02/12/23 13:16</i>	<i>5035A/8260D SIM</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0782		COMP, H-02, PRO
Acenaphthene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Acenaphthylene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Anthracene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benz(a)anthracene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benzo(a)pyrene	ND	297	594	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benzo(b)fluoranthene	ND	297	594	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benzo(k)fluoranthene	ND	297	594	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benzo(g,h,i)perylene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Chrysene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Dibenz(a,h)anthracene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Fluoranthene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Fluorene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
1-Methylnaphthalene	ND	396	791	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2-Methylnaphthalene	ND	396	791	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Naphthalene	ND	396	791	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Phenanthrene	582	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Pyrene	304	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	J
Carbazole	ND	297	594	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Dibenzofuran	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2-Chlorophenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4-Chloro-3-methylphenol	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,4-Dichlorophenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,4-Dimethylphenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,4-Dinitrophenol	ND	4940	9900	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	4940	9900	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2-Methylphenol	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
3+4-Methylphenol(s)	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2-Nitrophenol	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4-Nitrophenol	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Pentachlorophenol (PCP)	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Phenol	ND	396	791	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0782		COMP, H-02, PRO
2,3,5,6-Tetrachlorophenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,4,5-Trichlorophenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,4,6-Trichlorophenol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Bis(2-ethylhexyl)phthalate	4080	2970	5940	ug/kg dry	40	02/21/23 23:47	EPA 8270E	J
Butyl benzyl phthalate	ND	1970	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Diethylphthalate	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Dimethylphthalate	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Di-n-butylphthalate	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Di-n-octyl phthalate	ND	1720	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
N-Nitrosodimethylamine	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
N-Nitrosodiphenylamine	ND	990	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Bis(2-Chloroethyl) ether	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Hexachlorobenzene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Hexachlorobutadiene	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Hexachlorocyclopentadiene	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Hexachloroethane	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2-Chloronaphthalene	ND	197	396	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
1,2,4-Trichlorobenzene	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4-Bromophenyl phenyl ether	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4-Chlorophenyl phenyl ether	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Aniline	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4-Chloroaniline	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2-Nitroaniline	ND	3960	7910	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
3-Nitroaniline	ND	3960	7910	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
4-Nitroaniline	ND	3960	7910	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Nitrobenzene	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,4-Dinitrotoluene	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
2,6-Dinitrotoluene	ND	1970	3960	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benzoic acid	ND	49400	49400	ug/kg dry	40	02/21/23 23:47	EPA 8270E	
Benzyl alcohol	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0782		COMP, H-02, PRO	
Isophorone	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
Azobenzene (1,2-DPH)	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
Bis(2-Ethylhexyl) adipate	ND	4940	9900	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
3,3'-Dichlorobenzidine	ND	3960	7910	ug/kg dry	40	02/21/23 23:47	EPA 8270E	Q-52	
1,2-Dinitrobenzene	ND	4940	9900	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
1,3-Dinitrobenzene	ND	4940	9900	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
1,4-Dinitrobenzene	ND	4940	9900	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
Pyridine	ND	990	1970	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
1,2-Dichlorobenzene	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
1,3-Dichlorobenzene	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
1,4-Dichlorobenzene	ND	494	990	ug/kg dry	40	02/21/23 23:47	EPA 8270E		
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 49 %</i>		<i>Limits: 37-122 %</i>		<i>40</i>	<i>02/21/23 23:47</i>	<i>EPA 8270E</i>	<i>S-05</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>63 %</i>		<i>44-120 %</i>		<i>40</i>	<i>02/21/23 23:47</i>	<i>EPA 8270E</i>	<i>S-05</i>
<i>Phenol-d6 (Surr)</i>		<i>17 %</i>		<i>33-122 %</i>		<i>40</i>	<i>02/21/23 23:47</i>	<i>EPA 8270E</i>	<i>S-05</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>77 %</i>		<i>54-127 %</i>		<i>40</i>	<i>02/21/23 23:47</i>	<i>EPA 8270E</i>	<i>S-05</i>
<i>2-Fluorophenol (Surr)</i>		<i>17 %</i>		<i>35-120 %</i>		<i>40</i>	<i>02/21/23 23:47</i>	<i>EPA 8270E</i>	<i>S-05</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>136 %</i>		<i>39-132 %</i>		<i>40</i>	<i>02/21/23 23:47</i>	<i>EPA 8270E</i>	<i>S-05</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0783		COMP, H-02, PRO	
Azinphos methyl (Guthion)	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Chlorpyrifos	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Coumaphos	ND	2940	2940	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs	R-02	
Demeton O	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Demeton S	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Diazinon	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Dichlorvos	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Dimethoate	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Disulfoton	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
EPN	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Ethoprop	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Fensulfothion	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Fenthion	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Malathion	ND	2010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Merphos	ND	30000	30000	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs	R-02	
Methyl parathion	ND	2010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Mevinphos (Phosdrin)	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Monocrotophos	ND	2010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Naled (Dibrom)	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Parathion, ethyl	ND	9500	9500	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs	R-02	
Phorate	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Ronnel (Fenclorpos)	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Sulfotep	ND	1010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Sulprofos (Bolstar)	ND	2010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
TEPP	ND	4030	8050	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Tetrachlorvinphos (Rabon)	ND	11000	11000	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs	R-02	
Tokuthion (Prothiofos)	ND	2010	2010	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs		
Trichloronate	ND	13200	13200	ug/kg dry	40	02/21/23 19:10	EPA 8270E OPPs	R-02	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 455 %</i>		<i>Limits: 10-136 %</i>		<i>40</i>	<i>02/21/23 19:10</i>	<i>EPA 8270E OPPs</i>	<i>S-05</i>
<i>Triphenyl phosphate (Surr)</i>		<i>221 %</i>		<i>34-121 %</i>		<i>40</i>	<i>02/21/23 19:10</i>	<i>EPA 8270E OPPs</i>	<i>S-05</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23C0074		COMP, PRO
Aldrin	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
alpha-BHC	ND	2.72	2.72	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	R-02
beta-BHC	ND	3.21	3.21	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	R-02
gamma-BHC (Lindane)	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
delta-BHC	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
cis-Chlordane	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
cis-Nonachlor	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
2,4'-DDD	ND	3.95	3.95	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	R-02
2,4'-DDE	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
2,4'-DDT	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
4,4'-DDD	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
4,4'-DDE	3.05	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
4,4'-DDT	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Endosulfan sulfate	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Endrin	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Endrin ketone	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Heptachlor	ND	4.20	4.20	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	R-02
Heptachlor epoxide	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Hexachlorobutadiene	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Methoxychlor	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Mirex	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
Oxychlordane	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
trans-Chlordane	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
trans-Nonachlor	ND	1.24	2.47	ug/kg dry	1	03/03/23 17:29	EPA 8270E OCPs	
<i>Surrogate: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 68 %</i>		<i>Limits: 50-150 %</i>	<i>1</i>	<i>03/03/23 17:29</i>	<i>EPA 8270E OCPs</i>	<i>S-05</i>
<i>4,4'-DDT-d8 (Surr)</i>		<i>80 %</i>		<i>50-150 %</i>	<i>1</i>	<i>03/03/23 17:29</i>	<i>EPA 8270E OCPs</i>	<i>S-05</i>

MFA-B1-B5-COMP-SL-PRO (A3A1010-07RE1)				Matrix: Sediment		Batch: 23C0074		COMP, PRO
Dieldrin	ND	242	242	ug/kg dry	10	03/07/23 22:29	EPA 8270E OCPs	R-02
Endosulfan I	ND	12.4	24.7	ug/kg dry	10	03/07/23 22:29	EPA 8270E OCPs	R-02
Endosulfan II	ND	12.4	24.7	ug/kg dry	10	03/07/23 22:29	EPA 8270E OCPs	R-02

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment				
Batch: 23B0914								
Antimony	0.944	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO, Q-42
Arsenic	3.48	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Barium	174	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Beryllium	0.316	0.0530	0.106	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Cadmium	3.24	0.0530	0.106	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Chromium	191	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Copper	142	0.530	1.06	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Lead	40.2	0.0530	0.106	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Manganese	763	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Mercury	0.881	0.0212	0.0424	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Nickel	46.8	0.530	1.06	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Selenium	0.813	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Silver	2.50	0.0530	0.106	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Thallium	ND	0.265	0.530	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO
Zinc	531	1.06	2.12	mg/kg dry	5	02/27/23 18:43	EPA 6020B	COMP, PRO

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
---	--	---

ANALYTICAL SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0959		COMP, PRO
Chromium (VI)	ND	11.4	20.1	mg/kg	50	02/28/23 12:45	EPA 7196A	Q-57, R-04

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight										
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes		
MFA-B1-20230130-21.9 (A3A1010-01)				Matrix: Sediment		Batch: 23B0043				
% Solids	14.0	1.00	1.00	%	1	02/02/23 05:57	EPA 8000D			
MFA-B3-20230131-31.0 (A3A1010-02)				Matrix: Sediment		Batch: 23B0116				
% Solids	14.0	1.00	1.00	%	1	02/03/23 04:15	EPA 8000D			
MFA-B2-20230131-23.0 (A3A1010-03)				Matrix: Sediment		Batch: 23B0116				
% Solids	16.4	1.00	1.00	%	1	02/03/23 04:15	EPA 8000D			
MFA-B4-20230202-SL-26.5 (A3A1010-04)				Matrix: Sediment		Batch: 23B0202				
% Solids	17.2	1.00	1.00	%	1	02/07/23 06:25	EPA 8000D			
MFA-B5-20230203-SL-27.0 (A3A1010-05)				Matrix: Sediment		Batch: 23B0202				
% Solids	34.3	1.00	1.00	%	1	02/07/23 06:25	EPA 8000D			
MFA-B1-B5-COMP-SL (A3A1010-06)				Matrix: Sediment		Batch: 23B0202				COMP
% Solids	19.2	1.00	1.00	%	1	02/07/23 00:00	EPA 8000D		A-01	
MFA-B1-B5-COMP-SL-PRO (A3A1010-07)				Matrix: Sediment		Batch: 23B0961				COMP, PRO
% Solids	95.7	1.00	1.00	%	1	02/28/23 06:46	EPA 8000D			

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0765 - EPA 3546 (Fuels)						Sediment						
Blank (23B0765-BLK1)						Prepared: 02/21/23 07:18 Analyzed: 02/21/23 21:17						
<u>NWTPH-Dx</u>												
Diesel	ND	10.0	20.0	mg/kg wet	1	---	---	---	---	---	---	
Oil	ND	20.0	40.0	mg/kg wet	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 88 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (23B0765-BS1)						Prepared: 02/21/23 07:18 Analyzed: 02/21/23 21:37						
<u>NWTPH-Dx</u>												
Diesel	115	10.0	20.0	mg/kg wet	1	125	---	92	38-132%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
Duplicate (23B0765-DUP1)						Prepared: 02/21/23 07:18 Analyzed: 02/21/23 22:18						
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)												
<u>NWTPH-Dx</u>												
Diesel	22700	1010	2020	mg/kg dry	100	---	26100	---	---	14	30%	F-03, F-11
Oil	ND	2020	4030	mg/kg dry	100	---	ND	---	---	---	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 100x</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
Blank (23B0290-BLK1)						Prepared: 02/08/23 08:00 Analyzed: 02/08/23 11:49						
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	2.50	5.00	mg/kg wet	50	---	---	---	---	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>103 %</i>		<i>50-150 %</i>		<i>"</i>						
LCS (23B0290-BS2)						Prepared: 02/08/23 08:00 Analyzed: 02/08/23 11:23						
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	20.4	2.50	5.00	mg/kg wet	50	25.0	---	82	80-120%	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>101 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0290-DUP1)						Prepared: 02/07/23 11:34 Analyzed: 02/08/23 14:22						
<u>QC Source Sample: Non-SDG (A3B0183-01)</u>												
Gasoline Range Organics	ND	111	221	mg/kg wet	500	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0290-DUP2)						Prepared: 02/03/23 08:52 Analyzed: 02/08/23 15:38						
<u>QC Source Sample: Non-SDG (A3B0176-21)</u>												
Gasoline Range Organics	ND	3.07	6.14	mg/kg dry	50	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 94 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>107 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
Blank (23B0290-BLK1)			Prepared: 02/08/23 08:00 Analyzed: 02/08/23 11:49									
<u>5035A/8260D</u>												
Acetone	ND	500	1000	ug/kg wet	50	---	---	---	---	---	---	---
Acrylonitrile	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	---
Benzene	ND	5.00	10.0	ug/kg wet	50	---	---	---	---	---	---	---
Bromobenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
Bromochloromethane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Bromodichloromethane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Bromoform	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	---
Bromomethane	ND	500	500	ug/kg wet	50	---	---	---	---	---	---	---
2-Butanone (MEK)	ND	250	500	ug/kg wet	50	---	---	---	---	---	---	---
n-Butylbenzene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
sec-Butylbenzene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
tert-Butylbenzene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Carbon disulfide	ND	250	500	ug/kg wet	50	---	---	---	---	---	---	---
Carbon tetrachloride	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Chlorobenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
Chloroethane	ND	500	500	ug/kg wet	50	---	---	---	---	---	---	---
Chloroform	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Chloromethane	ND	125	250	ug/kg wet	50	---	---	---	---	---	---	---
2-Chlorotoluene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
4-Chlorotoluene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Dibromochloromethane	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	125	250	ug/kg wet	50	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
Dibromomethane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	---

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
Blank (23B0290-BLK1)			Prepared: 02/08/23 08:00 Analyzed: 02/08/23 11:49									
1,2-Dichloropropane	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
1,3-Dichloropropane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
2,2-Dichloropropane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
1,1-Dichloropropene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
Ethylbenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
Hexachlorobutadiene	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	
2-Hexanone	ND	250	500	ug/kg wet	50	---	---	---	---	---	---	
Isopropylbenzene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
4-Isopropyltoluene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
Methylene chloride	ND	250	500	ug/kg wet	50	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	250	500	ug/kg wet	50	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
Naphthalene	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	
n-Propylbenzene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
Styrene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
Toluene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	125	250	ug/kg wet	50	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	125	250	ug/kg wet	50	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
Trichlorofluoromethane	ND	50.0	100	ug/kg wet	50	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
Vinyl chloride	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	
m,p-Xylene	ND	25.0	50.0	ug/kg wet	50	---	---	---	---	---	---	
o-Xylene	ND	12.5	25.0	ug/kg wet	50	---	---	---	---	---	---	

Surr: 1,4-Difluorobenzene (Surr) Recovery: 106 % Limits: 80-120 % Dilution: 1x

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
Blank (23B0290-BLK1)						Prepared: 02/08/23 08:00 Analyzed: 02/08/23 11:49						
<i>Surr: Toluene-d8 (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>95 %</i>		<i>79-120 %</i>		<i>"</i>						
LCS (23B0290-BS1)						Prepared: 02/08/23 08:00 Analyzed: 02/08/23 10:58						
5035A/8260D												
Acetone	2690	500	1000	ug/kg wet	50	2000	---	135	80-120%	---	---	Q-56
Acrylonitrile	1260	50.0	100	ug/kg wet	50	1000	---	126	80-120%	---	---	Q-56
Benzene	1090	5.00	10.0	ug/kg wet	50	1000	---	109	80-120%	---	---	
Bromobenzene	926	12.5	25.0	ug/kg wet	50	1000	---	93	80-120%	---	---	
Bromochloromethane	1250	25.0	50.0	ug/kg wet	50	1000	---	125	80-120%	---	---	Q-56
Bromodichloromethane	1110	25.0	50.0	ug/kg wet	50	1000	---	111	80-120%	---	---	
Bromoform	988	50.0	100	ug/kg wet	50	1000	---	99	80-120%	---	---	
Bromomethane	2090	500	500	ug/kg wet	50	1000	---	209	80-120%	---	---	Q-56
2-Butanone (MEK)	2460	250	500	ug/kg wet	50	2000	---	123	80-120%	---	---	Q-56
n-Butylbenzene	879	25.0	50.0	ug/kg wet	50	1000	---	88	80-120%	---	---	
sec-Butylbenzene	922	25.0	50.0	ug/kg wet	50	1000	---	92	80-120%	---	---	
tert-Butylbenzene	826	25.0	50.0	ug/kg wet	50	1000	---	83	80-120%	---	---	
Carbon disulfide	1020	250	500	ug/kg wet	50	1000	---	102	80-120%	---	---	
Carbon tetrachloride	1110	25.0	50.0	ug/kg wet	50	1000	---	111	80-120%	---	---	
Chlorobenzene	994	12.5	25.0	ug/kg wet	50	1000	---	99	80-120%	---	---	
Chloroethane	770	500	500	ug/kg wet	50	1000	---	77	80-120%	---	---	Q-55
Chloroform	1160	25.0	50.0	ug/kg wet	50	1000	---	116	80-120%	---	---	
Chloromethane	1010	125	250	ug/kg wet	50	1000	---	101	80-120%	---	---	
2-Chlorotoluene	884	25.0	50.0	ug/kg wet	50	1000	---	88	80-120%	---	---	
4-Chlorotoluene	898	25.0	50.0	ug/kg wet	50	1000	---	90	80-120%	---	---	
Dibromochloromethane	962	50.0	100	ug/kg wet	50	1000	---	96	80-120%	---	---	
1,2-Dibromo-3-chloropropane	884	125	250	ug/kg wet	50	1000	---	88	80-120%	---	---	
1,2-Dibromoethane (EDB)	1040	25.0	50.0	ug/kg wet	50	1000	---	104	80-120%	---	---	
Dibromomethane	1170	25.0	50.0	ug/kg wet	50	1000	---	117	80-120%	---	---	
1,2-Dichlorobenzene	955	12.5	25.0	ug/kg wet	50	1000	---	96	80-120%	---	---	
1,3-Dichlorobenzene	969	12.5	25.0	ug/kg wet	50	1000	---	97	80-120%	---	---	
1,4-Dichlorobenzene	964	12.5	25.0	ug/kg wet	50	1000	---	96	80-120%	---	---	
Dichlorodifluoromethane	964	50.0	100	ug/kg wet	50	1000	---	96	80-120%	---	---	
1,1-Dichloroethane	1180	12.5	25.0	ug/kg wet	50	1000	---	118	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
LCS (23B0290-BS1)			Prepared: 02/08/23 08:00 Analyzed: 02/08/23 10:58									
1,2-Dichloroethane (EDC)	1210	12.5	25.0	ug/kg wet	50	1000	---	121	80-120%	---	---	Q-56
1,1-Dichloroethene	1120	12.5	25.0	ug/kg wet	50	1000	---	112	80-120%	---	---	
cis-1,2-Dichloroethene	1110	12.5	25.0	ug/kg wet	50	1000	---	111	80-120%	---	---	
trans-1,2-Dichloroethene	1110	12.5	25.0	ug/kg wet	50	1000	---	111	80-120%	---	---	
1,2-Dichloropropane	1120	12.5	25.0	ug/kg wet	50	1000	---	112	80-120%	---	---	
1,3-Dichloropropane	1000	25.0	50.0	ug/kg wet	50	1000	---	100	80-120%	---	---	
2,2-Dichloropropane	1130	25.0	50.0	ug/kg wet	50	1000	---	113	80-120%	---	---	
1,1-Dichloropropene	1040	25.0	50.0	ug/kg wet	50	1000	---	104	80-120%	---	---	
cis-1,3-Dichloropropene	1050	25.0	50.0	ug/kg wet	50	1000	---	105	80-120%	---	---	
trans-1,3-Dichloropropene	1080	25.0	50.0	ug/kg wet	50	1000	---	108	80-120%	---	---	
Ethylbenzene	986	12.5	25.0	ug/kg wet	50	1000	---	99	80-120%	---	---	
Hexachlorobutadiene	961	50.0	100	ug/kg wet	50	1000	---	96	80-120%	---	---	
2-Hexanone	1810	250	500	ug/kg wet	50	2000	---	91	80-120%	---	---	
Isopropylbenzene	872	25.0	50.0	ug/kg wet	50	1000	---	87	80-120%	---	---	
4-Isopropyltoluene	874	25.0	50.0	ug/kg wet	50	1000	---	87	80-120%	---	---	
Methylene chloride	1080	250	500	ug/kg wet	50	1000	---	108	80-120%	---	---	
4-Methyl-2-pentanone (MiBK)	1980	250	500	ug/kg wet	50	2000	---	99	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	1020	25.0	50.0	ug/kg wet	50	1000	---	102	80-120%	---	---	
Naphthalene	808	50.0	100	ug/kg wet	50	1000	---	81	80-120%	---	---	
n-Propylbenzene	941	12.5	25.0	ug/kg wet	50	1000	---	94	80-120%	---	---	
Styrene	846	25.0	50.0	ug/kg wet	50	1000	---	85	80-120%	---	---	
1,1,1,2-Tetrachloroethane	1020	12.5	25.0	ug/kg wet	50	1000	---	102	80-120%	---	---	
1,1,2,2-Tetrachloroethane	1030	25.0	50.0	ug/kg wet	50	1000	---	103	80-120%	---	---	
Tetrachloroethene (PCE)	1060	12.5	25.0	ug/kg wet	50	1000	---	106	80-120%	---	---	
Toluene	1000	25.0	50.0	ug/kg wet	50	1000	---	100	80-120%	---	---	
1,2,3-Trichlorobenzene	946	125	250	ug/kg wet	50	1000	---	95	80-120%	---	---	
1,2,4-Trichlorobenzene	803	125	250	ug/kg wet	50	1000	---	80	80-120%	---	---	
1,1,1-Trichloroethane	1120	12.5	25.0	ug/kg wet	50	1000	---	112	80-120%	---	---	
1,1,2-Trichloroethane	1040	12.5	25.0	ug/kg wet	50	1000	---	104	80-120%	---	---	
Trichloroethene (TCE)	1100	12.5	25.0	ug/kg wet	50	1000	---	110	80-120%	---	---	
Trichlorofluoromethane	873	50.0	100	ug/kg wet	50	1000	---	87	80-120%	---	---	
1,2,3-Trichloropropane	1040	25.0	50.0	ug/kg wet	50	1000	---	104	80-120%	---	---	
1,2,4-Trimethylbenzene	932	25.0	50.0	ug/kg wet	50	1000	---	93	80-120%	---	---	
1,3,5-Trimethylbenzene	964	25.0	50.0	ug/kg wet	50	1000	---	96	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
LCS (23B0290-BS1)			Prepared: 02/08/23 08:00 Analyzed: 02/08/23 10:58									
Vinyl chloride	1950	12.5	25.0	ug/kg wet	50	1000	---	195	80-120%	---	---	Q-56
m,p-Xylene	1990	25.0	50.0	ug/kg wet	50	2000	---	99	80-120%	---	---	
o-Xylene	851	12.5	25.0	ug/kg wet	50	1000	---	85	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>92 %</i>		<i>79-120 %</i>		<i>"</i>						

Duplicate (23B0290-DUP1)						Prepared: 02/07/23 11:34 Analyzed: 02/08/23 14:22						V-15
QC Source Sample: Non-SDG (A3B0183-01)												
Acetone	ND	22100	44200	ug/kg wet	500	---	ND	---	---	---	30%	
Acrylonitrile	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%	
Benzene	ND	221	442	ug/kg wet	500	---	ND	---	---	---	30%	
Bromobenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%	
Bromochloromethane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Bromodichloromethane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Bromoform	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%	
Bromomethane	ND	22100	22100	ug/kg wet	500	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	11100	22100	ug/kg wet	500	---	ND	---	---	---	30%	
n-Butylbenzene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Carbon disulfide	ND	11100	22100	ug/kg wet	500	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Chlorobenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%	
Chloroethane	ND	22100	22100	ug/kg wet	500	---	ND	---	---	---	30%	
Chloroform	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Chloromethane	ND	5530	11100	ug/kg wet	500	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Dibromochloromethane	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	5530	11100	ug/kg wet	500	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
Dibromomethane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0290 - EPA 5035A						Soil							
Duplicate (23B0290-DUP1)			Prepared: 02/07/23 11:34 Analyzed: 02/08/23 14:22						V-15				
QC Source Sample: Non-SDG (A3B0183-01)													
1,3-Dichlorobenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,4-Dichlorobenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
Dichlorodifluoromethane	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%		
1,1-Dichloroethane	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,2-Dichloroethane (EDC)	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,1-Dichloroethene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
cis-1,2-Dichloroethene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
trans-1,2-Dichloroethene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,2-Dichloropropane	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,3-Dichloropropane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
2,2-Dichloropropane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
1,1-Dichloropropene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
cis-1,3-Dichloropropene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
trans-1,3-Dichloropropene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
Ethylbenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
Hexachlorobutadiene	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%		
2-Hexanone	ND	11100	22100	ug/kg wet	500	---	ND	---	---	---	30%		
Isopropylbenzene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
4-Isopropyltoluene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
Methylene chloride	ND	11100	22100	ug/kg wet	500	---	ND	---	---	---	30%		
4-Methyl-2-pentanone (MiBK)	ND	11100	22100	ug/kg wet	500	---	ND	---	---	---	30%		
Methyl tert-butyl ether (MTBE)	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
Naphthalene	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%		
n-Propylbenzene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
Styrene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
1,1,1,2-Tetrachloroethane	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,1,2,2-Tetrachloroethane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
Tetrachloroethene (PCE)	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
Toluene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
1,2,3-Trichlorobenzene	ND	5530	11100	ug/kg wet	500	---	ND	---	---	---	30%		
1,2,4-Trichlorobenzene	ND	5530	11100	ug/kg wet	500	---	ND	---	---	---	30%		
1,1,1-Trichloroethane	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
1,1,2-Trichloroethane	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0290 - EPA 5035A						Soil							
Duplicate (23B0290-DUP1)			Prepared: 02/07/23 11:34 Analyzed: 02/08/23 14:22						V-15				
QC Source Sample: Non-SDG (A3B0183-01)													
Trichloroethene (TCE)	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
Trichlorofluoromethane	ND	2210	4420	ug/kg wet	500	---	ND	---	---	---	30%		
1,2,3-Trichloropropane	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
1,2,4-Trimethylbenzene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
1,3,5-Trimethylbenzene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
Vinyl chloride	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
m,p-Xylene	ND	1110	2210	ug/kg wet	500	---	ND	---	---	---	30%		
o-Xylene	ND	553	1110	ug/kg wet	500	---	ND	---	---	---	30%		
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>							
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>							
<i>4-Bromofluorobenzene (Surr)</i>		<i>93 %</i>		<i>79-120 %</i>		<i>"</i>							

Duplicate (23B0290-DUP2)						Prepared: 02/03/23 08:52 Analyzed: 02/08/23 15:38						COMP
QC Source Sample: Non-SDG (A3B0176-21)												
Acetone	ND	614	1230	ug/kg dry	50	---	ND	---	---	---	30%	
Acrylonitrile	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%	
Benzene	ND	6.14	12.3	ug/kg dry	50	---	ND	---	---	---	30%	
Bromobenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%	
Bromochloromethane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
Bromodichloromethane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
Bromoform	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%	
Bromomethane	ND	614	614	ug/kg dry	50	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	307	614	ug/kg dry	50	---	ND	---	---	---	30%	
n-Butylbenzene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
Carbon disulfide	ND	307	614	ug/kg dry	50	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
Chlorobenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%	
Chloroethane	ND	614	614	ug/kg dry	50	---	ND	---	---	---	30%	
Chloroform	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	
Chloromethane	ND	154	307	ug/kg dry	50	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0290 - EPA 5035A						Soil							
Duplicate (23B0290-DUP2)			Prepared: 02/03/23 08:52 Analyzed: 02/08/23 15:38						COMP				
QC Source Sample: Non-SDG (A3B0176-21)													
4-Chlorotoluene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
Dibromochloromethane	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%		
1,2-Dibromo-3-chloropropane	ND	154	307	ug/kg dry	50	---	ND	---	---	---	30%		
1,2-Dibromoethane (EDB)	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
Dibromomethane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
1,2-Dichlorobenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,3-Dichlorobenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,4-Dichlorobenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
Dichlorodifluoromethane	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%		
1,1-Dichloroethane	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,2-Dichloroethane (EDC)	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,1-Dichloroethene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
cis-1,2-Dichloroethene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
trans-1,2-Dichloroethene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,2-Dichloropropane	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,3-Dichloropropane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
2,2-Dichloropropane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
1,1-Dichloropropene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
cis-1,3-Dichloropropene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
trans-1,3-Dichloropropene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
Ethylbenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
Hexachlorobutadiene	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%		
2-Hexanone	ND	307	614	ug/kg dry	50	---	ND	---	---	---	30%		
Isopropylbenzene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
4-Isopropyltoluene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
Methylene chloride	ND	307	614	ug/kg dry	50	---	ND	---	---	---	30%		
4-Methyl-2-pentanone (MiBK)	ND	307	614	ug/kg dry	50	---	ND	---	---	---	30%		
Methyl tert-butyl ether (MTBE)	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
Naphthalene	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%		
n-Propylbenzene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
Styrene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
1,1,1,2-Tetrachloroethane	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,1,2,2-Tetrachloroethane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0290 - EPA 5035A						Soil							
Duplicate (23B0290-DUP2)			Prepared: 02/03/23 08:52 Analyzed: 02/08/23 15:38						COMP				
QC Source Sample: Non-SDG (A3B0176-21)													
Tetrachloroethene (PCE)	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
Toluene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
1,2,3-Trichlorobenzene	ND	154	307	ug/kg dry	50	---	ND	---	---	---	30%		
1,2,4-Trichlorobenzene	ND	154	307	ug/kg dry	50	---	ND	---	---	---	30%		
1,1,1-Trichloroethane	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
1,1,2-Trichloroethane	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
Trichloroethene (TCE)	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
Trichlorofluoromethane	ND	61.4	123	ug/kg dry	50	---	ND	---	---	---	30%		
1,2,3-Trichloropropane	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
1,2,4-Trimethylbenzene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
1,3,5-Trimethylbenzene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
Vinyl chloride	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
m,p-Xylene	ND	30.7	61.4	ug/kg dry	50	---	ND	---	---	---	30%		
o-Xylene	ND	15.4	30.7	ug/kg dry	50	---	ND	---	---	---	30%		
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>							
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>"</i>							
<i>4-Bromofluorobenzene (Surr)</i>		<i>93 %</i>		<i>79-120 %</i>		<i>"</i>							

Matrix Spike (23B0290-MS1)			Prepared: 02/03/23 10:53 Analyzed: 02/08/23 19:53						COMP				
QC Source Sample: Non-SDG (A3B0176-30)													
5035A/8260D													
Acetone	3770	586	1170	ug/kg dry	50	2340	ND	161	36-164%	---	---	Q-54a	
Acrylonitrile	1590	58.6	117	ug/kg dry	50	1170	ND	136	65-134%	---	---	Q-54d	
Benzene	1400	5.86	11.7	ug/kg dry	50	1170	ND	120	77-121%	---	---		
Bromobenzene	1140	14.7	29.3	ug/kg dry	50	1170	ND	98	78-121%	---	---		
Bromochloromethane	1630	29.3	58.6	ug/kg dry	50	1170	ND	139	78-125%	---	---	Q-54c	
Bromodichloromethane	1420	29.3	58.6	ug/kg dry	50	1170	ND	121	75-127%	---	---		
Bromoform	1180	58.6	117	ug/kg dry	50	1170	ND	101	67-132%	---	---		
Bromomethane	2790	586	586	ug/kg dry	50	1170	ND	238	53-143%	---	---	Q-54f	
2-Butanone (MEK)	3230	293	586	ug/kg dry	50	2340	ND	138	51-148%	---	---	Q-54b	
n-Butylbenzene	1140	29.3	58.6	ug/kg dry	50	1170	ND	97	70-128%	---	---		
sec-Butylbenzene	1160	29.3	58.6	ug/kg dry	50	1170	ND	99	73-126%	---	---		
tert-Butylbenzene	1040	29.3	58.6	ug/kg dry	50	1170	ND	89	73-125%	---	---		

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0290 - EPA 5035A						Soil						
Matrix Spike (23B0290-MS1)						Prepared: 02/03/23 10:53 Analyzed: 02/08/23 19:53						COMP
QC Source Sample: Non-SDG (A3B0176-30)												
Carbon disulfide	1340	293	586	ug/kg dry	50	1170	ND	114	63-132%	---	---	
Carbon tetrachloride	1410	29.3	58.6	ug/kg dry	50	1170	ND	120	70-135%	---	---	
Chlorobenzene	1240	14.7	29.3	ug/kg dry	50	1170	ND	106	79-120%	---	---	
Chloroethane	1310	586	586	ug/kg dry	50	1170	ND	111	59-139%	---	---	Q-54g
Chloroform	1480	29.3	58.6	ug/kg dry	50	1170	ND	126	78-123%	---	---	
Chloromethane	1400	147	293	ug/kg dry	50	1170	ND	119	50-136%	---	---	
2-Chlorotoluene	1090	29.3	58.6	ug/kg dry	50	1170	ND	93	75-122%	---	---	
4-Chlorotoluene	1120	29.3	58.6	ug/kg dry	50	1170	ND	96	72-124%	---	---	
Dibromochloromethane	1180	58.6	117	ug/kg dry	50	1170	ND	101	74-126%	---	---	
1,2-Dibromo-3-chloropropane	1100	147	293	ug/kg dry	50	1170	ND	94	61-132%	---	---	
1,2-Dibromoethane (EDB)	1320	29.3	58.6	ug/kg dry	50	1170	ND	112	78-122%	---	---	
Dibromomethane	1480	29.3	58.6	ug/kg dry	50	1170	ND	126	78-125%	---	---	
1,2-Dichlorobenzene	1150	14.7	29.3	ug/kg dry	50	1170	ND	98	78-121%	---	---	
1,3-Dichlorobenzene	1190	14.7	29.3	ug/kg dry	50	1170	ND	102	77-121%	---	---	
1,4-Dichlorobenzene	1180	14.7	29.3	ug/kg dry	50	1170	ND	101	75-120%	---	---	
Dichlorodifluoromethane	1350	58.6	117	ug/kg dry	50	1170	ND	115	29-149%	---	---	
1,1-Dichloroethane	1520	14.7	29.3	ug/kg dry	50	1170	ND	130	76-125%	---	---	Q-01
1,2-Dichloroethane (EDC)	1540	14.7	29.3	ug/kg dry	50	1170	ND	131	73-128%	---	---	Q-54
1,1-Dichloroethene	1470	14.7	29.3	ug/kg dry	50	1170	ND	126	70-131%	---	---	
cis-1,2-Dichloroethene	1430	14.7	29.3	ug/kg dry	50	1170	ND	122	77-123%	---	---	
trans-1,2-Dichloroethene	1420	14.7	29.3	ug/kg dry	50	1170	ND	121	74-125%	---	---	
1,2-Dichloropropane	1480	14.7	29.3	ug/kg dry	50	1170	ND	126	76-123%	---	---	Q-01
1,3-Dichloropropane	1260	29.3	58.6	ug/kg dry	50	1170	ND	107	77-121%	---	---	
2,2-Dichloropropane	1370	29.3	58.6	ug/kg dry	50	1170	ND	117	67-133%	---	---	
1,1-Dichloropropene	1330	29.3	58.6	ug/kg dry	50	1170	ND	114	76-125%	---	---	
cis-1,3-Dichloropropene	1290	29.3	58.6	ug/kg dry	50	1170	ND	110	74-126%	---	---	
trans-1,3-Dichloropropene	1320	29.3	58.6	ug/kg dry	50	1170	ND	113	71-130%	---	---	
Ethylbenzene	1240	14.7	29.3	ug/kg dry	50	1170	ND	106	76-122%	---	---	
Hexachlorobutadiene	1140	58.6	117	ug/kg dry	50	1170	ND	97	61-135%	---	---	
2-Hexanone	2230	293	586	ug/kg dry	50	2340	ND	95	53-145%	---	---	
Isopropylbenzene	1080	29.3	58.6	ug/kg dry	50	1170	ND	92	68-134%	---	---	
4-Isopropyltoluene	1070	29.3	58.6	ug/kg dry	50	1170	ND	92	73-127%	---	---	
Methylene chloride	1420	293	586	ug/kg dry	50	1170	ND	121	70-128%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0290 - EPA 5035A							Soil						
Matrix Spike (23B0290-MS1)			Prepared: 02/03/23 10:53 Analyzed: 02/08/23 19:53						COMP				
QC Source Sample: Non-SDG (A3B0176-30)													
4-Methyl-2-pentanone (MiBK)	2550	293	586	ug/kg dry	50	2340	ND	109	65-135%	---	---		
Methyl tert-butyl ether (MTBE)	1260	29.3	58.6	ug/kg dry	50	1170	ND	108	73-125%	---	---		
Naphthalene	1030	58.6	117	ug/kg dry	50	1170	ND	88	62-129%	---	---		
n-Propylbenzene	1190	14.7	29.3	ug/kg dry	50	1170	ND	102	73-125%	---	---		
Styrene	1080	29.3	58.6	ug/kg dry	50	1170	ND	92	76-124%	---	---		
1,1,1,2-Tetrachloroethane	1280	14.7	29.3	ug/kg dry	50	1170	ND	109	78-125%	---	---		
1,1,2,2-Tetrachloroethane	1290	29.3	58.6	ug/kg dry	50	1170	ND	110	70-124%	---	---		
Tetrachloroethene (PCE)	1310	14.7	29.3	ug/kg dry	50	1170	ND	112	73-128%	---	---		
Toluene	1260	29.3	58.6	ug/kg dry	50	1170	ND	107	77-121%	---	---		
1,2,3-Trichlorobenzene	1130	147	293	ug/kg dry	50	1170	ND	97	66-130%	---	---		
1,2,4-Trichlorobenzene	1000	147	293	ug/kg dry	50	1170	ND	85	67-129%	---	---		
1,1,1-Trichloroethane	1440	14.7	29.3	ug/kg dry	50	1170	ND	123	73-130%	---	---		
1,1,2-Trichloroethane	1300	14.7	29.3	ug/kg dry	50	1170	ND	111	78-121%	---	---		
Trichloroethene (TCE)	1400	14.7	29.3	ug/kg dry	50	1170	ND	119	77-123%	---	---		
Trichlorofluoromethane	3230	58.6	117	ug/kg dry	50	1170	ND	275	62-140%	---	---	Q-01	
1,2,3-Trichloropropane	1270	29.3	58.6	ug/kg dry	50	1170	ND	108	73-125%	---	---		
1,2,4-Trimethylbenzene	1190	29.3	58.6	ug/kg dry	50	1170	ND	102	75-123%	---	---		
1,3,5-Trimethylbenzene	1200	29.3	58.6	ug/kg dry	50	1170	ND	103	73-124%	---	---		
Vinyl chloride	2710	14.7	29.3	ug/kg dry	50	1170	ND	231	56-135%	---	---	Q-54e	
m,p-Xylene	2510	29.3	58.6	ug/kg dry	50	2340	ND	107	77-124%	---	---		
o-Xylene	1070	14.7	29.3	ug/kg dry	50	1170	ND	92	77-123%	---	---		
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>							
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>							
<i>4-Bromofluorobenzene (Surr)</i>		<i>90 %</i>		<i>79-120 %</i>		<i>"</i>							

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0452 - EPA 5035A						Soil						
Blank (23B0452-BLK1)			Prepared: 02/12/23 10:17 Analyzed: 02/12/23 12:49									
<u>5035A/8260D SIM</u>												
Benzene	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
Toluene	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
Ethylbenzene	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
m,p-Xylene	ND	5.00	10.0	ug/kg wet	100	---	---	---	---	---	---	
o-Xylene	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	5.00	10.0	ug/kg wet	100	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	5.00	10.0	ug/kg wet	100	---	---	---	---	---	---	
Chloroform	ND	5.00	10.0	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
1,1-Dichloroethane	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
1,1-Dichloroethene	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
1,2-Dichloropropane	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	1.00	2.00	ug/kg wet	100	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
Vinyl chloride	ND	5.00	10.0	ug/kg wet	100	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	2.50	5.00	ug/kg wet	100	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>79-120 %</i>		<i>"</i>						

LCS (23B0452-BS1)			Prepared: 02/12/23 10:17 Analyzed: 02/12/23 11:56									
<u>5035A/8260D SIM</u>												
Benzene	20.9	1.00	2.00	ug/kg wet	100	20.0	---	105	80-120%	---	---	
Toluene	19.8	2.50	5.00	ug/kg wet	100	20.0	---	99	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0452 - EPA 5035A												
Soil												
LCS (23B0452-BS1)												
Prepared: 02/12/23 10:17						Analyzed: 02/12/23 11:56						
Ethylbenzene	19.8	2.50	5.00	ug/kg wet	100	20.0	---	99	80-120%	---	---	
m,p-Xylene	39.5	5.00	10.0	ug/kg wet	100	40.0	---	99	80-120%	---	---	
o-Xylene	20.0	2.50	5.00	ug/kg wet	100	20.0	---	100	80-120%	---	---	
1,2,4-Trimethylbenzene	19.7	5.00	10.0	ug/kg wet	100	20.0	---	98	80-120%	---	---	
1,3,5-Trimethylbenzene	19.4	5.00	10.0	ug/kg wet	100	20.0	---	97	80-120%	---	---	
Chloroform	19.5	5.00	10.0	ug/kg wet	100	20.0	---	98	80-120%	---	---	
1,2-Dibromo-3-chloropropane	21.6	2.50	5.00	ug/kg wet	100	20.0	---	108	80-120%	---	---	
1,2-Dibromoethane (EDB)	20.7	1.00	2.00	ug/kg wet	100	20.0	---	104	80-120%	---	---	
1,1-Dichloroethane	20.9	1.00	2.00	ug/kg wet	100	20.0	---	105	80-120%	---	---	
1,2-Dichloroethane (EDC)	20.8	1.00	2.00	ug/kg wet	100	20.0	---	104	80-120%	---	---	
1,1-Dichloroethene	21.2	1.00	2.00	ug/kg wet	100	20.0	---	106	80-120%	---	---	
cis-1,2-Dichloroethene	21.4	1.00	2.00	ug/kg wet	100	20.0	---	107	80-120%	---	---	
trans-1,2-Dichloroethene	20.0	1.00	2.00	ug/kg wet	100	20.0	---	100	80-120%	---	---	
1,2-Dichloropropane	21.5	1.00	2.00	ug/kg wet	100	20.0	---	108	80-120%	---	---	
cis-1,3-Dichloropropene	20.4	1.00	2.00	ug/kg wet	100	20.0	---	102	80-120%	---	---	
trans-1,3-Dichloropropene	21.6	1.00	2.00	ug/kg wet	100	20.0	---	108	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	20.9	1.00	2.00	ug/kg wet	100	20.0	---	104	80-120%	---	---	
Tetrachloroethene (PCE)	19.5	1.00	2.00	ug/kg wet	100	20.0	---	97	80-120%	---	---	
1,1,2,2-Tetrachloroethane	22.1	2.50	5.00	ug/kg wet	100	20.0	---	111	80-120%	---	---	
Trichloroethene (TCE)	20.1	1.00	2.00	ug/kg wet	100	20.0	---	101	80-120%	---	---	
1,2,3-Trichloropropane	20.7	2.50	5.00	ug/kg wet	100	20.0	---	103	80-120%	---	---	
Vinyl chloride	20.4	5.00	10.0	ug/kg wet	100	20.0	---	102	80-120%	---	---	
1,1,2-Trichloroethane	20.5	2.50	5.00	ug/kg wet	100	20.0	---	102	80-120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		Recovery: 100 %		Limits: 80-120 %		Dilution: 1x						
Toluene-d8 (Surr)		99 %		80-120 %		"						
4-Bromofluorobenzene (Surr)		97 %		79-120 %		"						

Duplicate (23B0452-DUP1) Prepared: 01/30/23 16:00 Analyzed: 02/12/23 13:43 **COMP**

QC Source Sample: MFA-B1-B5-COMP-SL (A3A1010-06)

5035A/8260D SIM

Benzene	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
Toluene	31.0	26.7	53.3	ug/kg dry	100	---	29.7	---	---	4	30%	J
Ethylbenzene	ND	26.7	53.3	ug/kg dry	100	---	ND	---	---	---	30%	
m,p-Xylene	ND	53.3	107	ug/kg dry	100	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0452 - EPA 5035A						Soil						
Duplicate (23B0452-DUP1)						Prepared: 01/30/23 16:00 Analyzed: 02/12/23 13:43						COMP
QC Source Sample: MFA-B1-B5-COMP-SL (A3A1010-06)												
o-Xylene	ND	26.7	53.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	53.3	107	ug/kg dry	100	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	53.3	107	ug/kg dry	100	---	ND	---	---	---	30%	
Chloroform	ND	53.3	107	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	26.7	53.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	53.3	53.3	ug/kg dry	100	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	10.7	21.3	ug/kg dry	100	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	26.7	53.3	ug/kg dry	100	---	ND	---	---	---	30%	
Vinyl chloride	ND	53.3	107	ug/kg dry	100	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	26.7	53.3	ug/kg dry	100	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>79-120 %</i>		<i>"</i>						

Matrix Spike (23B0452-MS1)						Prepared: 01/30/23 16:00 Analyzed: 02/12/23 14:10						COMP
QC Source Sample: MFA-B1-B5-COMP-SL (A3A1010-06)												
5035A/8260D SIM												
Benzene	214	10.7	21.3	ug/kg dry	100	213	ND	100	77-121%	---	---	
Toluene	212	26.7	53.3	ug/kg dry	100	213	29.7	85	77-121%	---	---	
Ethylbenzene	199	26.7	53.3	ug/kg dry	100	213	ND	93	76-122%	---	---	
m,p-Xylene	386	53.3	107	ug/kg dry	100	426	ND	91	77-124%	---	---	
o-Xylene	194	26.7	53.3	ug/kg dry	100	213	ND	91	77-123%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0452 - EPA 5035A						Soil							
Matrix Spike (23B0452-MS1)						Prepared: 01/30/23 16:00 Analyzed: 02/12/23 14:10						COMP	
QC Source Sample: MFA-B1-B5-COMP-SL (A3A1010-06)													
1,2,4-Trimethylbenzene	204	53.3	107	ug/kg dry	100	213	ND	96	75-123%	---	---		
1,3,5-Trimethylbenzene	203	53.3	107	ug/kg dry	100	213	ND	95	73-124%	---	---		
Chloroform	203	53.3	107	ug/kg dry	100	213	ND	95	78-123%	---	---		
1,2-Dibromo-3-chloropropane	160	26.7	53.3	ug/kg dry	100	213	ND	75	61-132%	---	---		
1,2-Dibromoethane (EDB)	187	10.7	21.3	ug/kg dry	100	213	ND	88	78-122%	---	---		
1,1-Dichloroethane	212	10.7	21.3	ug/kg dry	100	213	ND	99	76-125%	---	---		
1,2-Dichloroethane (EDC)	204	10.7	21.3	ug/kg dry	100	213	ND	95	73-128%	---	---		
1,1-Dichloroethene	238	10.7	21.3	ug/kg dry	100	213	ND	112	70-131%	---	---		
cis-1,2-Dichloroethene	217	10.7	21.3	ug/kg dry	100	213	ND	102	77-123%	---	---		
trans-1,2-Dichloroethene	215	10.7	21.3	ug/kg dry	100	213	ND	101	74-125%	---	---		
1,2-Dichloropropane	209	10.7	21.3	ug/kg dry	100	213	ND	98	76-123%	---	---		
cis-1,3-Dichloropropene	190	10.7	21.3	ug/kg dry	100	213	ND	89	74-126%	---	---		
trans-1,3-Dichloropropene	193	10.7	21.3	ug/kg dry	100	213	ND	91	71-130%	---	---		
Methyl tert-butyl ether (MTBE)	204	10.7	21.3	ug/kg dry	100	213	ND	91	73-125%	---	---		
Tetrachloroethene (PCE)	199	10.7	21.3	ug/kg dry	100	213	ND	93	73-128%	---	---		
1,1,2,2-Tetrachloroethane	222	26.7	53.3	ug/kg dry	100	213	ND	82	70-124%	---	---		
Trichloroethene (TCE)	206	10.7	21.3	ug/kg dry	100	213	ND	97	77-123%	---	---		
1,2,3-Trichloropropane	168	26.7	53.3	ug/kg dry	100	213	ND	79	73-125%	---	---		
Vinyl chloride	252	53.3	107	ug/kg dry	100	213	ND	118	56-135%	---	---		
1,1,2-Trichloroethane	183	26.7	53.3	ug/kg dry	100	213	ND	86	78-121%	---	---		
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>							
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>							
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>79-120 %</i>		<i>"</i>							

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546						Sediment						
Blank (23B0782-BLK1)			Prepared: 02/21/23 10:05 Analyzed: 02/21/23 22:07									
<u>EPA 8270E</u>												
Acenaphthene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Anthracene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	2.00	4.00	ug/kg wet	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	2.00	4.00	ug/kg wet	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	2.00	4.00	ug/kg wet	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Chrysene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Fluoranthene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Fluorene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	2.67	5.33	ug/kg wet	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	2.67	5.33	ug/kg wet	1	---	---	---	---	---	---	
Naphthalene	ND	2.67	5.33	ug/kg wet	1	---	---	---	---	---	---	
Phenanthrene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Pyrene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Carbazole	ND	2.00	4.00	ug/kg wet	1	---	---	---	---	---	---	
Dibenzofuran	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
2-Chlorophenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	33.3	66.7	ug/kg wet	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	33.3	66.7	ug/kg wet	1	---	---	---	---	---	---	
2-Methylphenol	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
2-Nitrophenol	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
4-Nitrophenol	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
Phenol	ND	2.67	5.33	ug/kg wet	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546						Sediment						
Blank (23B0782-BLK1)			Prepared: 02/21/23 10:05 Analyzed: 02/21/23 22:07									
2,3,5,6-Tetrachlorophenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	20.0	40.0	ug/kg wet	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	9.50	13.3	ug/kg wet	1	---	---	---	---	---	---	
Diethylphthalate	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
Dimethylphthalate	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	11.6	13.3	ug/kg wet	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
Hexachloroethane	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	1.33	2.67	ug/kg wet	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
4-Bromophenyl phenyl ether	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
Aniline	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
4-Chloroaniline	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
2-Nitroaniline	ND	26.7	53.3	ug/kg wet	1	---	---	---	---	---	---	
3-Nitroaniline	ND	26.7	53.3	ug/kg wet	1	---	---	---	---	---	---	
4-Nitroaniline	ND	26.7	53.3	ug/kg wet	1	---	---	---	---	---	---	
Nitrobenzene	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	13.3	26.7	ug/kg wet	1	---	---	---	---	---	---	
Benzoic acid	ND	167	333	ug/kg wet	1	---	---	---	---	---	---	
Benzyl alcohol	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
Isophorone	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3A1010 - 04 19 23 1708

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546												
Sediment												
Blank (23B0782-BLK1)												
						Prepared: 02/21/23 10:05		Analyzed: 02/21/23 22:07				
Azobenzene (1,2-DPH)	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	33.3	66.7	ug/kg wet	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	26.7	53.3	ug/kg wet	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	33.3	66.7	ug/kg wet	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	33.3	66.7	ug/kg wet	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	33.3	66.7	ug/kg wet	1	---	---	---	---	---	---	
Pyridine	ND	6.67	13.3	ug/kg wet	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	3.33	6.67	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 1x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>84 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>90 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>101 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>91 %</i>		<i>35-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>78 %</i>		<i>39-132 %</i>		<i>"</i>						

LCS (23B0782-BS1)												
						Prepared: 02/21/23 10:05		Analyzed: 02/21/23 22:40				
EPA 8270E												
Acenaphthene	449	5.32	10.7	ug/kg wet	4	533	---	84	40-123%	---	---	
Acenaphthylene	486	5.32	10.7	ug/kg wet	4	533	---	91	32-132%	---	---	
Anthracene	490	5.32	10.7	ug/kg wet	4	533	---	92	47-123%	---	---	
Benz(a)anthracene	487	5.32	10.7	ug/kg wet	4	533	---	91	49-126%	---	---	
Benzo(a)pyrene	511	8.00	16.0	ug/kg wet	4	533	---	96	45-129%	---	---	
Benzo(b)fluoranthene	524	8.00	16.0	ug/kg wet	4	533	---	98	45-132%	---	---	
Benzo(k)fluoranthene	517	8.00	16.0	ug/kg wet	4	533	---	97	47-132%	---	---	
Benzo(g,h,i)perylene	472	5.32	10.7	ug/kg wet	4	533	---	88	43-134%	---	---	
Chrysene	469	5.32	10.7	ug/kg wet	4	533	---	88	50-124%	---	---	
Dibenz(a,h)anthracene	480	5.32	10.7	ug/kg wet	4	533	---	90	45-134%	---	---	
Fluoranthene	489	5.32	10.7	ug/kg wet	4	533	---	92	50-127%	---	---	
Fluorene	472	5.32	10.7	ug/kg wet	4	533	---	89	43-125%	---	---	
Indeno(1,2,3-cd)pyrene	495	5.32	10.7	ug/kg wet	4	533	---	93	45-133%	---	---	
1-Methylnaphthalene	444	10.7	21.3	ug/kg wet	4	533	---	83	40-120%	---	---	
2-Methylnaphthalene	459	10.7	21.3	ug/kg wet	4	533	---	86	38-122%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546						Sediment						
LCS (23B0782-BS1)			Prepared: 02/21/23 10:05 Analyzed: 02/21/23 22:40									
Naphthalene	444	10.7	21.3	ug/kg wet	4	533	---	83	35-123%	---	---	
Phenanthrene	453	5.32	10.7	ug/kg wet	4	533	---	85	50-121%	---	---	
Pyrene	488	5.32	10.7	ug/kg wet	4	533	---	91	47-127%	---	---	
Carbazole	490	8.00	16.0	ug/kg wet	4	533	---	92	50-123%	---	---	
Dibenzofuran	457	5.32	10.7	ug/kg wet	4	533	---	86	44-120%	---	---	
2-Chlorophenol	475	26.7	53.2	ug/kg wet	4	533	---	89	34-121%	---	---	
4-Chloro-3-methylphenol	500	53.2	107	ug/kg wet	4	533	---	94	45-122%	---	---	
2,4-Dichlorophenol	500	26.7	53.2	ug/kg wet	4	533	---	94	40-122%	---	---	
2,4-Dimethylphenol	501	26.7	53.2	ug/kg wet	4	533	---	94	30-127%	---	---	
2,4-Dinitrophenol	407	133	267	ug/kg wet	4	533	---	76	10-137%	---	---	
4,6-Dinitro-2-methylphenol	450	133	267	ug/kg wet	4	533	---	84	29-132%	---	---	
2-Methylphenol	450	13.3	26.7	ug/kg wet	4	533	---	84	32-122%	---	---	
3+4-Methylphenol(s)	457	13.3	26.7	ug/kg wet	4	533	---	86	34-120%	---	---	
2-Nitrophenol	547	53.2	107	ug/kg wet	4	533	---	103	36-123%	---	---	
4-Nitrophenol	461	53.2	107	ug/kg wet	4	533	---	86	30-132%	---	---	
Pentachlorophenol (PCP)	361	53.2	107	ug/kg wet	4	533	---	68	25-133%	---	---	
Phenol	515	10.7	21.3	ug/kg wet	4	533	---	97	34-121%	---	---	
2,3,4,6-Tetrachlorophenol	441	26.7	53.2	ug/kg wet	4	533	---	83	44-125%	---	---	
2,3,5,6-Tetrachlorophenol	438	26.7	53.2	ug/kg wet	4	533	---	82	40-120%	---	---	
2,4,5-Trichlorophenol	490	26.7	53.2	ug/kg wet	4	533	---	92	41-124%	---	---	
2,4,6-Trichlorophenol	485	26.7	53.2	ug/kg wet	4	533	---	91	39-126%	---	---	
Bis(2-ethylhexyl)phthalate	526	80.0	160	ug/kg wet	4	533	---	99	51-133%	---	---	
Butyl benzyl phthalate	553	38.0	53.2	ug/kg wet	4	533	---	104	48-132%	---	---	
Diethylphthalate	484	26.7	53.2	ug/kg wet	4	533	---	91	50-124%	---	---	
Dimethylphthalate	468	26.7	53.2	ug/kg wet	4	533	---	88	48-124%	---	---	
Di-n-butylphthalate	540	26.7	53.2	ug/kg wet	4	533	---	101	51-128%	---	---	
Di-n-octyl phthalate	667	46.4	53.2	ug/kg wet	4	533	---	125	45-140%	---	---	
N-Nitrosodimethylamine	447	13.3	26.7	ug/kg wet	4	533	---	84	23-120%	---	---	
N-Nitroso-di-n-propylamine	472	13.3	26.7	ug/kg wet	4	533	---	88	36-120%	---	---	
N-Nitrosodiphenylamine	469	13.3	26.7	ug/kg wet	4	533	---	88	38-127%	---	---	
Bis(2-Chloroethoxy) methane	455	13.3	26.7	ug/kg wet	4	533	---	85	36-121%	---	---	
Bis(2-Chloroethyl) ether	450	13.3	26.7	ug/kg wet	4	533	---	84	31-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	437	13.3	26.7	ug/kg wet	4	533	---	82	39-120%	---	---	
Hexachlorobenzene	456	5.32	10.7	ug/kg wet	4	533	---	85	45-122%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546						Sediment						
LCS (23B0782-BS1)			Prepared: 02/21/23 10:05 Analyzed: 02/21/23 22:40									
Hexachlorobutadiene	410	13.3	26.7	ug/kg wet	4	533	---	77	32-123%	---	---	
Hexachlorocyclopentadiene	463	26.7	53.2	ug/kg wet	4	533	---	87	10-140%	---	---	
Hexachloroethane	438	13.3	26.7	ug/kg wet	4	533	---	82	28-120%	---	---	
2-Chloronaphthalene	458	5.32	10.7	ug/kg wet	4	533	---	86	41-120%	---	---	
1,2,4-Trichlorobenzene	442	13.3	26.7	ug/kg wet	4	533	---	83	34-120%	---	---	
4-Bromophenyl phenyl ether	459	13.3	26.7	ug/kg wet	4	533	---	86	46-124%	---	---	
4-Chlorophenyl phenyl ether	455	13.3	26.7	ug/kg wet	4	533	---	85	45-121%	---	---	
Aniline	302	26.7	53.2	ug/kg wet	4	533	---	57	10-120%	---	---	
4-Chloroaniline	269	13.3	26.7	ug/kg wet	4	533	---	50	17-120%	---	---	Q-31
2-Nitroaniline	476	107	213	ug/kg wet	4	533	---	89	44-127%	---	---	
3-Nitroaniline	381	107	213	ug/kg wet	4	533	---	71	33-120%	---	---	
4-Nitroaniline	460	107	213	ug/kg wet	4	533	---	86	51-125%	---	---	
Nitrobenzene	464	53.2	107	ug/kg wet	4	533	---	87	34-122%	---	---	
2,4-Dinitrotoluene	467	53.2	107	ug/kg wet	4	533	---	87	48-126%	---	---	
2,6-Dinitrotoluene	457	53.2	107	ug/kg wet	4	533	---	86	46-124%	---	---	
Benzoic acid	1090	668	668	ug/kg wet	4	1070	---	102	10-140%	---	---	Q-31
Benzyl alcohol	423	26.7	53.2	ug/kg wet	4	533	---	79	29-122%	---	---	
Isophorone	467	13.3	26.7	ug/kg wet	4	533	---	88	30-122%	---	---	
Azobenzene (1,2-DPH)	481	13.3	26.7	ug/kg wet	4	533	---	90	39-125%	---	---	
Bis(2-Ethylhexyl) adipate	569	133	267	ug/kg wet	4	533	---	107	61-121%	---	---	
3,3'-Dichlorobenzidine	2010	107	213	ug/kg wet	4	1070	---	189	22-121%	---	---	Q-29, Q-52
1,2-Dinitrobenzene	464	133	267	ug/kg wet	4	533	---	87	44-120%	---	---	
1,3-Dinitrobenzene	459	133	267	ug/kg wet	4	533	---	86	43-127%	---	---	
1,4-Dinitrobenzene	487	133	267	ug/kg wet	4	533	---	91	37-132%	---	---	
Pyridine	379	26.7	53.2	ug/kg wet	4	533	---	71	10-120%	---	---	
1,2-Dichlorobenzene	429	13.3	26.7	ug/kg wet	4	533	---	81	33-120%	---	---	
1,3-Dichlorobenzene	428	13.3	26.7	ug/kg wet	4	533	---	80	30-120%	---	---	
1,4-Dichlorobenzene	424	13.3	26.7	ug/kg wet	4	533	---	80	31-120%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>89 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>89 %</i>		<i>33-122 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>103 %</i>		<i>54-127 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>93 %</i>		<i>35-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>90 %</i>		<i>39-132 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546												
Sediment												
LCS Dup (23B0782-BSD1)												
						Prepared: 02/21/23 10:08 Analyzed: 02/21/23 23:14						
EPA 8270E												
Acenaphthene	454	5.32	10.7	ug/kg wet	4	533	---	85	40-123%	1	30%	
Acenaphthylene	483	5.32	10.7	ug/kg wet	4	533	---	91	32-132%	0.7	30%	
Anthracene	478	5.32	10.7	ug/kg wet	4	533	---	90	47-123%	2	30%	
Benz(a)anthracene	486	5.32	10.7	ug/kg wet	4	533	---	91	49-126%	0.3	30%	
Benzo(a)pyrene	505	8.00	16.0	ug/kg wet	4	533	---	95	45-129%	1	30%	
Benzo(b)fluoranthene	512	8.00	16.0	ug/kg wet	4	533	---	96	45-132%	2	30%	
Benzo(k)fluoranthene	501	8.00	16.0	ug/kg wet	4	533	---	94	47-132%	3	30%	
Benzo(g,h,i)perylene	471	5.32	10.7	ug/kg wet	4	533	---	88	43-134%	0.3	30%	
Chrysene	474	5.32	10.7	ug/kg wet	4	533	---	89	50-124%	1	30%	
Dibenz(a,h)anthracene	464	5.32	10.7	ug/kg wet	4	533	---	87	45-134%	4	30%	
Fluoranthene	479	5.32	10.7	ug/kg wet	4	533	---	90	50-127%	2	30%	
Fluorene	474	5.32	10.7	ug/kg wet	4	533	---	89	43-125%	0.3	30%	
Indeno(1,2,3-cd)pyrene	488	5.32	10.7	ug/kg wet	4	533	---	91	45-133%	1	30%	
1-Methylnaphthalene	441	10.7	21.3	ug/kg wet	4	533	---	83	40-120%	0.7	30%	
2-Methylnaphthalene	451	10.7	21.3	ug/kg wet	4	533	---	85	38-122%	2	30%	
Naphthalene	447	10.7	21.3	ug/kg wet	4	533	---	84	35-123%	0.6	30%	
Phenanthrene	451	5.32	10.7	ug/kg wet	4	533	---	84	50-121%	0.6	30%	
Pyrene	483	5.32	10.7	ug/kg wet	4	533	---	91	47-127%	1	30%	
Carbazole	463	8.00	16.0	ug/kg wet	4	533	---	87	50-123%	6	30%	
Dibenzofuran	458	5.32	10.7	ug/kg wet	4	533	---	86	44-120%	0.2	30%	
2-Chlorophenol	474	26.7	53.2	ug/kg wet	4	533	---	89	34-121%	0.09	30%	
4-Chloro-3-methylphenol	481	53.2	107	ug/kg wet	4	533	---	90	45-122%	4	30%	
2,4-Dichlorophenol	493	26.7	53.2	ug/kg wet	4	533	---	92	40-122%	2	30%	
2,4-Dimethylphenol	499	26.7	53.2	ug/kg wet	4	533	---	94	30-127%	0.4	30%	
2,4-Dinitrophenol	401	133	267	ug/kg wet	4	533	---	75	10-137%	2	30%	
4,6-Dinitro-2-methylphenol	456	133	267	ug/kg wet	4	533	---	85	29-132%	1	30%	
2-Methylphenol	453	13.3	26.7	ug/kg wet	4	533	---	85	32-122%	0.6	30%	
3+4-Methylphenol(s)	446	13.3	26.7	ug/kg wet	4	533	---	84	34-120%	2	30%	
2-Nitrophenol	548	53.2	107	ug/kg wet	4	533	---	103	36-123%	0.1	30%	
4-Nitrophenol	450	53.2	107	ug/kg wet	4	533	---	84	30-132%	3	30%	
Pentachlorophenol (PCP)	357	53.2	107	ug/kg wet	4	533	---	67	25-133%	1	30%	
Phenol	509	10.7	21.3	ug/kg wet	4	533	---	95	34-121%	1	30%	
2,3,4,6-Tetrachlorophenol	438	26.7	53.2	ug/kg wet	4	533	---	82	44-125%	0.8	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546						Sediment						
LCS Dup (23B0782-BSD1)						Prepared: 02/21/23 10:08 Analyzed: 02/21/23 23:14						Q-19
2,3,5,6-Tetrachlorophenol	438	26.7	53.2	ug/kg wet	4	533	---	82	40-120%	0.07	30%	
2,4,5-Trichlorophenol	491	26.7	53.2	ug/kg wet	4	533	---	92	41-124%	0.2	30%	
2,4,6-Trichlorophenol	469	26.7	53.2	ug/kg wet	4	533	---	88	39-126%	3	30%	
Bis(2-ethylhexyl)phthalate	523	80.0	160	ug/kg wet	4	533	---	98	51-133%	0.6	30%	
Butyl benzyl phthalate	546	38.0	53.2	ug/kg wet	4	533	---	102	48-132%	1	30%	
Diethylphthalate	488	26.7	53.2	ug/kg wet	4	533	---	91	50-124%	0.7	30%	
Dimethylphthalate	472	26.7	53.2	ug/kg wet	4	533	---	88	48-124%	0.7	30%	
Di-n-butylphthalate	546	26.7	53.2	ug/kg wet	4	533	---	102	51-128%	1	30%	
Di-n-octyl phthalate	644	46.4	53.2	ug/kg wet	4	533	---	121	45-140%	3	30%	
N-Nitrosodimethylamine	451	13.3	26.7	ug/kg wet	4	533	---	85	23-120%	1	30%	
N-Nitroso-di-n-propylamine	457	13.3	26.7	ug/kg wet	4	533	---	86	36-120%	3	30%	
N-Nitrosodiphenylamine	461	13.3	26.7	ug/kg wet	4	533	---	86	38-127%	2	30%	
Bis(2-Chloroethoxy) methane	457	13.3	26.7	ug/kg wet	4	533	---	86	36-121%	0.4	30%	
Bis(2-Chloroethyl) ether	444	13.3	26.7	ug/kg wet	4	533	---	83	31-120%	1	30%	
2,2'-Oxybis(1-Chloropropane)	433	13.3	26.7	ug/kg wet	4	533	---	81	39-120%	0.9	30%	
Hexachlorobenzene	452	5.32	10.7	ug/kg wet	4	533	---	85	45-122%	0.7	30%	
Hexachlorobutadiene	420	13.3	26.7	ug/kg wet	4	533	---	79	32-123%	2	30%	
Hexachlorocyclopentadiene	475	26.7	53.2	ug/kg wet	4	533	---	89	10-140%	3	30%	
Hexachloroethane	440	13.3	26.7	ug/kg wet	4	533	---	82	28-120%	0.5	30%	
2-Chloronaphthalene	461	5.32	10.7	ug/kg wet	4	533	---	86	41-120%	0.7	30%	
1,2,4-Trichlorobenzene	450	13.3	26.7	ug/kg wet	4	533	---	84	34-120%	2	30%	
4-Bromophenyl phenyl ether	455	13.3	26.7	ug/kg wet	4	533	---	85	46-124%	0.8	30%	
4-Chlorophenyl phenyl ether	461	13.3	26.7	ug/kg wet	4	533	---	87	45-121%	1	30%	
Aniline	314	26.7	53.2	ug/kg wet	4	533	---	59	10-120%	4	30%	
4-Chloroaniline	277	13.3	26.7	ug/kg wet	4	533	---	52	17-120%	3	30%	Q-31
2-Nitroaniline	469	107	213	ug/kg wet	4	533	---	88	44-127%	1	30%	
3-Nitroaniline	380	107	213	ug/kg wet	4	533	---	71	33-120%	0.2	30%	
4-Nitroaniline	454	107	213	ug/kg wet	4	533	---	85	51-125%	1	30%	
Nitrobenzene	459	53.2	107	ug/kg wet	4	533	---	86	34-122%	1	30%	
2,4-Dinitrotoluene	477	53.2	107	ug/kg wet	4	533	---	89	48-126%	2	30%	
2,6-Dinitrotoluene	459	53.2	107	ug/kg wet	4	533	---	86	46-124%	0.4	30%	
Benzoic acid	948	668	668	ug/kg wet	4	1070	---	89	10-140%	14	30%	Q-31
Benzyl alcohol	409	26.7	53.2	ug/kg wet	4	533	---	77	29-122%	3	30%	
Isophorone	453	13.3	26.7	ug/kg wet	4	533	---	85	30-122%	3	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546												
Sediment												
LCS Dup (23B0782-BSD1)												
						Prepared: 02/21/23 10:08			Analyzed: 02/21/23 23:14			Q-19
Azobenzene (1,2-DPH)	480	13.3	26.7	ug/kg wet	4	533	---	90	39-125%	0.2	30%	
Bis(2-Ethylhexyl) adipate	564	133	267	ug/kg wet	4	533	---	106	61-121%	0.8	30%	
3,3'-Dichlorobenzidine	1970	107	213	ug/kg wet	4	1070	---	184	22-121%	2	30%	Q-29, Q-52
1,2-Dinitrobenzene	471	133	267	ug/kg wet	4	533	---	88	44-120%	2	30%	
1,3-Dinitrobenzene	456	133	267	ug/kg wet	4	533	---	86	43-127%	0.7	30%	
1,4-Dinitrobenzene	484	133	267	ug/kg wet	4	533	---	91	37-132%	0.6	30%	
Pyridine	389	26.7	53.2	ug/kg wet	4	533	---	73	10-120%	3	30%	
1,2-Dichlorobenzene	437	13.3	26.7	ug/kg wet	4	533	---	82	33-120%	2	30%	
1,3-Dichlorobenzene	433	13.3	26.7	ug/kg wet	4	533	---	81	30-120%	1	30%	
1,4-Dichlorobenzene	432	13.3	26.7	ug/kg wet	4	533	---	81	31-120%	2	30%	
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 87% Limits: 37-122% Dilution: 4x</i>												
<i>2-Fluorobiphenyl (Surr) 86% 44-120% "</i>												
<i>Phenol-d6 (Surr) 85% 33-122% "</i>												
<i>p-Terphenyl-d14 (Surr) 97% 54-127% "</i>												
<i>2-Fluorophenol (Surr) 92% 35-120% "</i>												
<i>2,4,6-Tribromophenol (Surr) 86% 39-132% "</i>												

Matrix Spike (23B0782-MS1)												
						Prepared: 02/21/23 10:05			Analyzed: 02/22/23 12:55			COMP, H-02, PRO
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)												
EPA 8270E												
Acenaphthene	314	198	397	ug/kg dry	40	794	ND	40	40-123%	---	---	J, Q-11
Acenaphthylene	257	198	397	ug/kg dry	40	794	ND	32	32-132%	---	---	J, Q-11
Anthracene	323	198	397	ug/kg dry	40	794	ND	41	47-123%	---	---	Q-11, J
Benz(a)anthracene	333	198	397	ug/kg dry	40	794	ND	42	49-126%	---	---	Q-11, J
Benzo(a)pyrene	386	298	595	ug/kg dry	40	794	ND	49	45-129%	---	---	Q-11, J
Benzo(b)fluoranthene	389	298	595	ug/kg dry	40	794	ND	49	45-132%	---	---	Q-11, J
Benzo(k)fluoranthene	361	298	595	ug/kg dry	40	794	ND	45	47-132%	---	---	Q-11, J
Benzo(g,h,i)perylene	ND	198	397	ug/kg dry	40	794	ND		43-134%	---	---	Q-11
Chrysene	268	198	397	ug/kg dry	40	794	ND	34	50-124%	---	---	Q-11, J
Dibenz(a,h)anthracene	ND	198	397	ug/kg dry	40	794	ND		45-134%	---	---	Q-11
Fluoranthene	423	198	397	ug/kg dry	40	794	ND	53	50-127%	---	---	Q-11
Fluorene	356	198	397	ug/kg dry	40	794	ND	45	43-125%	---	---	Q-11, J
Indeno(1,2,3-cd)pyrene	ND	198	397	ug/kg dry	40	794	ND		45-133%	---	---	Q-11
1-Methylnaphthalene	ND	397	793	ug/kg dry	40	794	ND		40-120%	---	---	Q-11

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0782 - EPA 3546						Sediment							
Matrix Spike (23B0782-MS1)						Prepared: 02/21/23 10:05 Analyzed: 02/22/23 12:55				COMP, H-02, PRO			
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)													
2-Methylnaphthalene	ND	397	793	ug/kg dry	40	794	ND		38-122%	---	---	Q-11	
Naphthalene	ND	397	793	ug/kg dry	40	794	ND		35-123%	---	---	Q-11	
Phenanthrene	565	198	397	ug/kg dry	40	794	582	-2	50-121%	---	---	Q-11	
Pyrene	427	198	397	ug/kg dry	40	794	304	15	47-127%	---	---	Q-11	
Carbazole	445	298	595	ug/kg dry	40	794	ND	56	50-123%	---	---	Q-11, J	
Dibenzofuran	301	198	397	ug/kg dry	40	794	ND	38	44-120%	---	---	Q-11, J	
2-Chlorophenol	ND	993	1980	ug/kg dry	40	794	ND		34-121%	---	---	Q-11	
4-Chloro-3-methylphenol	ND	1980	3970	ug/kg dry	40	794	ND		45-122%	---	---	Q-11, Q-41	
2,4-Dichlorophenol	ND	993	1980	ug/kg dry	40	794	ND		40-122%	---	---	Q-11	
2,4-Dimethylphenol	ND	993	1980	ug/kg dry	40	794	ND		30-127%	---	---	Q-11	
2,4-Dinitrophenol	ND	4960	9930	ug/kg dry	40	794	ND		10-137%	---	---	Q-11, Q-41	
4,6-Dinitro-2-methylphenol	ND	4960	9930	ug/kg dry	40	794	ND		29-132%	---	---	Q-11, Q-41	
2-Methylphenol	ND	496	993	ug/kg dry	40	794	ND		32-122%	---	---	Q-11	
3+4-Methylphenol(s)	ND	496	993	ug/kg dry	40	794	ND		34-120%	---	---	Q-11	
2-Nitrophenol	ND	1980	3970	ug/kg dry	40	794	ND		36-123%	---	---	Q-11	
4-Nitrophenol	ND	1980	3970	ug/kg dry	40	794	ND		30-132%	---	---	Q-11, Q-41	
Pentachlorophenol (PCP)	ND	1980	3970	ug/kg dry	40	794	ND		25-133%	---	---	Q-11	
Phenol	ND	397	793	ug/kg dry	40	794	ND		34-121%	---	---	Q-11, Q-41	
2,3,4,6-Tetrachlorophenol	ND	993	1980	ug/kg dry	40	794	ND		44-125%	---	---	Q-11	
2,3,5,6-Tetrachlorophenol	ND	993	1980	ug/kg dry	40	794	ND		40-120%	---	---	Q-11	
2,4,5-Trichlorophenol	ND	993	1980	ug/kg dry	40	794	ND		41-124%	---	---	Q-11	
2,4,6-Trichlorophenol	ND	993	1980	ug/kg dry	40	794	ND		39-126%	---	---	Q-11	
Bis(2-ethylhexyl)phthalate	ND	2980	5950	ug/kg dry	40	794	4080	-514	51-133%	---	---	Q-11	
Butyl benzyl phthalate	1840	1410	1980	ug/kg dry	40	794	ND	11	48-132%	---	---	Q-11, J	
Diethylphthalate	ND	993	1980	ug/kg dry	40	794	ND		50-124%	---	---	Q-11	
Dimethylphthalate	ND	993	1980	ug/kg dry	40	794	ND		48-124%	---	---	Q-11	
Di-n-butylphthalate	ND	993	1980	ug/kg dry	40	794	ND		51-128%	---	---	Q-11	
Di-n-octyl phthalate	2050	1730	1980	ug/kg dry	40	794	ND	259	45-140%	---	---	Q-11	
N-Nitrosodimethylamine	ND	496	993	ug/kg dry	40	794	ND		23-120%	---	---	Q-11	
N-Nitroso-di-n-propylamine	ND	496	993	ug/kg dry	40	794	ND		36-120%	---	---	Q-11	
N-Nitrosodiphenylamine	687	496	993	ug/kg dry	40	794	ND	-13	38-127%	---	---	Q-11, J	
Bis(2-Chloroethoxy) methane	ND	496	993	ug/kg dry	40	794	ND		36-121%	---	---	Q-11	
Bis(2-Chloroethyl) ether	ND	496	993	ug/kg dry	40	794	ND		31-120%	---	---	Q-11, Q-41	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3A1010 - 04 19 23 1708

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0782 - EPA 3546						Sediment							
Matrix Spike (23B0782-MS1)						Prepared: 02/21/23 10:05 Analyzed: 02/22/23 12:55						COMP, H-02, PRO	
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)													
2,2'-Oxybis(1-Chloropropane)	ND	496	993	ug/kg dry	40	794	ND		39-120%	---	---	Q-11	
Hexachlorobenzene	267	198	397	ug/kg dry	40	794	ND	34	45-122%	---	---	Q-11, J	
Hexachlorobutadiene	ND	496	993	ug/kg dry	40	794	ND		32-123%	---	---	Q-11	
Hexachlorocyclopentadiene	ND	993	1980	ug/kg dry	40	794	ND		10-140%	---	---	Q-11, Q-41	
Hexachloroethane	ND	496	993	ug/kg dry	40	794	ND		28-120%	---	---	Q-11	
2-Chloronaphthalene	280	198	397	ug/kg dry	40	794	ND	35	41-120%	---	---	Q-11, J	
1,2,4-Trichlorobenzene	ND	496	993	ug/kg dry	40	794	ND		34-120%	---	---	Q-11	
4-Bromophenyl phenyl ether	ND	496	993	ug/kg dry	40	794	ND		46-124%	---	---	Q-11	
4-Chlorophenyl phenyl ether	ND	496	993	ug/kg dry	40	794	ND		45-121%	---	---	Q-11	
Aniline	ND	993	1980	ug/kg dry	40	794	ND		10-120%	---	---	Q-11	
4-Chloroaniline	ND	496	993	ug/kg dry	40	794	ND		17-120%	---	---	Q-11	
2-Nitroaniline	ND	3970	7930	ug/kg dry	40	794	ND		44-127%	---	---	Q-11	
3-Nitroaniline	ND	3970	7930	ug/kg dry	40	794	ND		33-120%	---	---	Q-11	
4-Nitroaniline	ND	3970	7930	ug/kg dry	40	794	ND		51-125%	---	---	Q-11	
Nitrobenzene	ND	1980	3970	ug/kg dry	40	794	ND		34-122%	---	---	Q-11	
2,4-Dinitrotoluene	ND	1980	3970	ug/kg dry	40	794	ND		48-126%	---	---	Q-11	
2,6-Dinitrotoluene	ND	1980	3970	ug/kg dry	40	794	ND		46-124%	---	---	Q-11	
Benzoic acid	ND	24900	49600	ug/kg dry	40	1590	ND		10-140%	---	---	Q-11	
Benzyl alcohol	ND	993	1980	ug/kg dry	40	794	ND		29-122%	---	---	Q-11	
Isophorone	ND	496	993	ug/kg dry	40	794	ND		30-122%	---	---	Q-11	
Azobenzene (1,2-DPH)	ND	496	993	ug/kg dry	40	794	ND		39-125%	---	---	Q-11	
Bis(2-Ethylhexyl) adipate	ND	4960	9930	ug/kg dry	40	794	ND		61-121%	---	---	Q-11	
3,3'-Dichlorobenzidine	ND	3970	7930	ug/kg dry	40	1590	ND		22-121%	---	---	Q-11, Q-52	
1,2-Dinitrobenzene	ND	4960	9930	ug/kg dry	40	794	ND		44-120%	---	---	Q-11	
1,3-Dinitrobenzene	ND	4960	9930	ug/kg dry	40	794	ND		43-127%	---	---	Q-11	
1,4-Dinitrobenzene	ND	4960	9930	ug/kg dry	40	794	ND		37-132%	---	---	Q-11, Q-41	
Pyridine	ND	993	1980	ug/kg dry	40	794	ND		10-120%	---	---	Q-11	
1,2-Dichlorobenzene	ND	496	993	ug/kg dry	40	794	ND		33-120%	---	---	Q-11	
1,3-Dichlorobenzene	ND	496	993	ug/kg dry	40	794	ND		30-120%	---	---	Q-11	
1,4-Dichlorobenzene	ND	496	993	ug/kg dry	40	794	ND		31-120%	---	---	Q-11	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 23 %</i>		<i>Limits: 37-122 %</i>		<i>Dilution: 40x</i>				S-05			
<i>2-Fluorobiphenyl (Surr)</i>		<i>34 %</i>		<i>44-120 %</i>		<i>"</i>				S-05			
<i>Phenol-d6 (Surr)</i>		<i>12 %</i>		<i>33-122 %</i>		<i>"</i>				S-05			

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0782 - EPA 3546						Sediment						
Matrix Spike (23B0782-MS1)						Prepared: 02/21/23 10:05 Analyzed: 02/22/23 12:55					COMP, H-02, PRO	
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)												
Surr: <i>p</i> -Terphenyl-d14 (Surr)		Recovery: 46 %		Limits: 54-127 %		Dilution: 40x				S-05		
2-Fluorophenol (Surr)		13 %		35-120 %		"				S-05		
2,4,6-Tribromophenol (Surr)		130 %		39-132 %		"						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0783 - EPA 3546						Sediment						
Blank (23B0783-BLK1)			Prepared: 02/21/23 10:10 Analyzed: 02/21/23 17:23									
<u>EPA 8270E OPPs</u>												
Azinphos methyl (Guthion)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Chlorpyrifos	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Coumaphos	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Demeton O	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Demeton S	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Diazinon	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Dichlorvos	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Dimethoate	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Disulfoton	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
EPN	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Ethoprop	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Fensulfothion	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Fenthion	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Malathion	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Merphos	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Methyl parathion	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Mevinphos (Phosdrin)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Monocrotophos	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Naled (Dibrom)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Parathion, ethyl	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Phorate	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Ronnel (Fenchlorphos)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Sulfotep	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Sulprofos (Bolstar)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
TEPP	ND	100	200	ug/kg wet	1	---	---	---	---	---	---	
Tetrachlorvinphos (Rabon)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Tokuthion (Prothiofos)	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
Trichloronate	ND	25.0	50.0	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 72 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 1x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>85 %</i>		<i>34-121 %</i>		<i>"</i>						

LCS (23B0783-BS1) Prepared: 02/21/23 10:10 Analyzed: 02/21/23 17:58

EPA 8270E OPPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0783 - EPA 3546						Sediment						
LCS (23B0783-BS1)			Prepared: 02/21/23 10:10			Analyzed: 02/21/23 17:58						
Azinphos methyl (Guthion)	424	25.0	50.0	ug/kg wet	1	400	---	106	38-156%	---	---	
Chlorpyrifos	371	25.0	50.0	ug/kg wet	1	400	---	93	47-140%	---	---	
Coumaphos	432	25.0	50.0	ug/kg wet	1	400	---	108	37-160%	---	---	
Demeton O	188	25.0	50.0	ug/kg wet	1	184	---	102	66-127%	---	---	
Demeton S	182	25.0	50.0	ug/kg wet	1	194	---	94	70-121%	---	---	
Diazinon	417	25.0	50.0	ug/kg wet	1	400	---	104	42-134%	---	---	
Dichlorvos	411	25.0	50.0	ug/kg wet	1	400	---	103	39-142%	---	---	
Dimethoate	387	25.0	50.0	ug/kg wet	1	400	---	97	16-139%	---	---	
Disulfoton	427	25.0	50.0	ug/kg wet	1	400	---	107	28-145%	---	---	
EPN	447	25.0	50.0	ug/kg wet	1	400	---	112	44-137%	---	---	
Ethoprop	402	25.0	50.0	ug/kg wet	1	400	---	100	47-128%	---	---	
Fensulfothion	414	25.0	50.0	ug/kg wet	1	400	---	103	27-147%	---	---	
Fenthion	389	25.0	50.0	ug/kg wet	1	400	---	97	44-134%	---	---	
Malathion	348	25.0	50.0	ug/kg wet	1	400	---	87	46-137%	---	---	
Merphos	446	25.0	50.0	ug/kg wet	1	400	---	112	66-131%	---	---	
Methyl parathion	438	25.0	50.0	ug/kg wet	1	400	---	109	49-138%	---	---	
Mevinphos (Phosdrin)	405	25.0	50.0	ug/kg wet	1	400	---	101	12-176%	---	---	
Monocrotophos	346	25.0	50.0	ug/kg wet	1	400	---	86	10-153%	---	---	
Naled (Dibrom)	414	25.0	50.0	ug/kg wet	1	400	---	103	10-174%	---	---	
Parathion, ethyl	409	25.0	50.0	ug/kg wet	1	400	---	102	50-139%	---	---	
Phorate	441	25.0	50.0	ug/kg wet	1	400	---	110	23-142%	---	---	
Ronnel (Fenclorphos)	379	25.0	50.0	ug/kg wet	1	400	---	95	45-138%	---	---	
Sulfotep	370	25.0	50.0	ug/kg wet	1	400	---	93	52-126%	---	---	
Sulprofos (Bolstar)	398	25.0	50.0	ug/kg wet	1	400	---	100	48-139%	---	---	
TEPP	333	100	200	ug/kg wet	1	400	---	83	16-126%	---	---	
Tetrachlorvinphos (Rabon)	444	25.0	50.0	ug/kg wet	1	400	---	111	54-129%	---	---	
Tokuthion (Prothiofos)	423	25.0	50.0	ug/kg wet	1	400	---	106	45-136%	---	---	
Trichloronate	395	25.0	50.0	ug/kg wet	1	400	---	99	37-140%	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 1x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>101 %</i>		<i>34-121 %</i>		<i>"</i>						

LCS Dup (23B0783-BSD1)						Prepared: 02/21/23 10:11 Analyzed: 02/21/23 18:34						Q-19
EPA 8270E OPPs												
Azinphos methyl (Guthion)	409	25.0	50.0	ug/kg wet	1	400	---	102	38-156%	3	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0783 - EPA 3546													
Sediment													
LCS Dup (23B0783-BSD1)													
						Prepared: 02/21/23 10:11 Analyzed: 02/21/23 18:34							Q-19
Chlorpyrifos	362	25.0	50.0	ug/kg wet	1	400	---	91	47-140%	2	30%		
Coumaphos	409	25.0	50.0	ug/kg wet	1	400	---	102	37-160%	5	30%		
Demeton O	186	25.0	50.0	ug/kg wet	1	184	---	101	66-127%	1	30%		
Demeton S	177	25.0	50.0	ug/kg wet	1	194	---	91	70-121%	3	30%		
Diazinon	410	25.0	50.0	ug/kg wet	1	400	---	102	42-134%	2	30%		
Dichlorvos	414	25.0	50.0	ug/kg wet	1	400	---	103	39-142%	0.6	30%		
Dimethoate	382	25.0	50.0	ug/kg wet	1	400	---	95	16-139%	1	30%		
Disulfoton	413	25.0	50.0	ug/kg wet	1	400	---	103	28-145%	3	30%		
EPN	429	25.0	50.0	ug/kg wet	1	400	---	107	44-137%	4	30%		
Ethoprop	391	25.0	50.0	ug/kg wet	1	400	---	98	47-128%	3	30%		
Fensulfothion	402	25.0	50.0	ug/kg wet	1	400	---	100	27-147%	3	30%		
Fenthion	381	25.0	50.0	ug/kg wet	1	400	---	95	44-134%	2	30%		
Malathion	338	25.0	50.0	ug/kg wet	1	400	---	85	46-137%	3	30%		
Merphos	429	25.0	50.0	ug/kg wet	1	400	---	107	66-131%	4	30%		
Methyl parathion	432	25.0	50.0	ug/kg wet	1	400	---	108	49-138%	1	30%		
Mevinphos (Phosdrin)	407	25.0	50.0	ug/kg wet	1	400	---	102	12-176%	0.4	30%		
Monocrotophos	361	25.0	50.0	ug/kg wet	1	400	---	90	10-153%	4	30%		
Naled (Dibrom)	409	25.0	50.0	ug/kg wet	1	400	---	102	10-174%	1	30%		
Parathion, ethyl	403	25.0	50.0	ug/kg wet	1	400	---	101	50-139%	1	30%		
Phorate	430	25.0	50.0	ug/kg wet	1	400	---	108	23-142%	2	30%		
Ronnel (Fenchlorphos)	376	25.0	50.0	ug/kg wet	1	400	---	94	45-138%	1	30%		
Sulfotep	361	25.0	50.0	ug/kg wet	1	400	---	90	52-126%	2	30%		
Sulprofos (Bolstar)	383	25.0	50.0	ug/kg wet	1	400	---	96	48-139%	4	30%		
TEPP	356	100	200	ug/kg wet	1	400	---	89	16-126%	7	30%		
Tetrachlorvinphos (Rabon)	437	25.0	50.0	ug/kg wet	1	400	---	109	54-129%	2	30%		
Tokuthion (Prothiofos)	418	25.0	50.0	ug/kg wet	1	400	---	104	45-136%	1	30%		
Trichloronate	384	25.0	50.0	ug/kg wet	1	400	---	96	37-140%	3	30%		
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 1x</i>							
<i>Triphenyl phosphate (Surr)</i>		<i>94 %</i>		<i>34-121 %</i>		<i>"</i>							

Matrix Spike (23B0783-MS1) Prepared: 02/21/23 10:10 Analyzed: 02/22/23 14:24 **COMP, H-02, PRO**

QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)

EPA 8270E OPPs

Azinphos methyl (Guthion)	ND	972	1940	ug/kg dry	40	389	ND	38-156%	---	---	Q-11
---------------------------	----	-----	------	-----------	----	-----	----	----------------	-----	-----	-------------

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0783 - EPA 3546						Sediment							
Matrix Spike (23B0783-MS1)			Prepared: 02/21/23 10:10 Analyzed: 02/22/23 14:24						COMP, H-02, PRO				
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)													
Chlorpyrifos	ND	972	1940	ug/kg dry	40	389	ND		47-140%	---	---	Q-11	
Coumaphos	4750	2840	2840	ug/kg dry	40	389	ND	469	37-160%	---	---	Q-11	
Demeton O	ND	972	1940	ug/kg dry	40	179	ND		66-127%	---	---	Q-11	
Demeton S	ND	972	1940	ug/kg dry	40	189	ND		70-121%	---	---	Q-11	
Diazinon	ND	972	1940	ug/kg dry	40	389	ND		42-134%	---	---	Q-11	
Dichlorvos	ND	972	1940	ug/kg dry	40	389	ND		39-142%	---	---	Q-11	
Dimethoate	ND	972	1940	ug/kg dry	40	389	ND		16-139%	---	---	Q-11	
Disulfoton	ND	972	1940	ug/kg dry	40	389	ND		28-145%	---	---	Q-11	
EPN	ND	972	1940	ug/kg dry	40	389	ND		44-137%	---	---	Q-11	
Ethoprop	ND	972	1940	ug/kg dry	40	389	ND		47-128%	---	---	Q-11	
Fensulfothion	ND	972	1940	ug/kg dry	40	389	ND		27-147%	---	---	Q-11	
Fenthion	ND	972	1940	ug/kg dry	40	389	ND		44-134%	---	---	Q-11	
Malathion	ND	1940	1940	ug/kg dry	40	389	ND		46-137%	---	---	Q-11	
Merphos	ND	28900	28900	ug/kg dry	40	389	ND	-7680	66-131%	---	---	Q-11	
Methyl parathion	ND	1940	1940	ug/kg dry	40	389	ND		49-138%	---	---	Q-11	
Mevinphos (Phosdrin)	ND	972	1940	ug/kg dry	40	389	ND		12-176%	---	---	Q-11	
Monocrotophos	ND	1940	1940	ug/kg dry	40	389	ND		10-153%	---	---	Q-11	
Naled (Dibrom)	ND	972	1940	ug/kg dry	40	389	ND		10-174%	---	---	Q-11	
Parathion, ethyl	ND	9170	9170	ug/kg dry	40	389	ND	-2440	50-139%	---	---	Q-11	
Phorate	ND	972	1940	ug/kg dry	40	389	ND		23-142%	---	---	Q-11, Q-41	
Ronnel (Fenchlorphos)	ND	972	1940	ug/kg dry	40	389	ND		45-138%	---	---	Q-11	
Sulfotep	ND	972	1940	ug/kg dry	40	389	ND		52-126%	---	---	Q-11	
Sulprofos (Bolstar)	ND	1940	1940	ug/kg dry	40	389	ND		48-139%	---	---	Q-11	
TEPP	ND	3890	7770	ug/kg dry	40	389	ND		16-126%	---	---	Q-11	
Tetrachlorvinphos (Rabon)	10700	10600	10600	ug/kg dry	40	389	ND	-50	54-129%	---	---	Q-11	
Tokuthion (Prothiofos)	ND	1940	1940	ug/kg dry	40	389	ND		45-136%	---	---	Q-11	
Trichloronate	ND	12800	12800	ug/kg dry	40	389	ND	-3380	37-140%	---	---	Q-11	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 455 %</i>		<i>Limits: 10-136 %</i>		<i>Dilution: 40x</i>							S-05
<i>Triphenyl phosphate (Surr)</i>		<i>181 %</i>		<i>34-121 %</i>		<i>"</i>							S-05

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0074 - EPA 3546						Soil						
Blank (23C0074-BLK1)			Prepared: 03/02/23 09:12 Analyzed: 03/03/23 15:06									
<u>EPA 8270E OCPs</u>												
Aldrin	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
alpha-BHC	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
beta-BHC	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
gamma-BHC (Lindane)	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
delta-BHC	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
cis-Chlordane	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
cis-Nonachlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
2,4'-DDD	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
2,4'-DDE	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
2,4'-DDT	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
4,4'-DDD	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
4,4'-DDE	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
4,4'-DDT	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Dieldrin	ND	0.0300	0.0300	ug/kg wet	1	---	---	---	---	---	---	
Endosulfan I	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endosulfan II	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endosulfan sulfate	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endrin	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Endrin ketone	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Heptachlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Heptachlor epoxide	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Methoxychlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Mirex	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
Oxychlordane	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
trans-Chlordane	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
trans-Nonachlor	ND	0.0500	0.100	ug/kg wet	1	---	---	---	---	---	---	
<i>Surr: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>4,4'-DDT-d8 (Surr)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						

Blank (23C0074-BLK2)			Prepared: 03/02/23 09:12 Analyzed: 03/07/23 20:06									Q-16
<u>EPA 8270E OCPs</u>												
Endrin Aldehyde	ND	0.100	0.100	ug/kg wet	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0074 - EPA 3546						Soil						

LCS (23C0074-BS1) Prepared: 03/02/23 09:12 Analyzed: 03/03/23 15:34 Q-21

<u>EPA 8270E OCPs</u>												
Aldrin	2.59	0.0500	0.100	ug/kg wet	1	2.50	---	104	54-135%	---	---	
alpha-BHC	2.63	0.0500	0.100	ug/kg wet	1	2.50	---	105	58-132%	---	---	
beta-BHC	2.68	0.0500	0.100	ug/kg wet	1	2.50	---	107	63-140%	---	---	
gamma-BHC (Lindane)	2.57	0.0500	0.100	ug/kg wet	1	2.50	---	103	62-132%	---	---	
delta-BHC	2.66	0.0500	0.100	ug/kg wet	1	2.50	---	106	65-140%	---	---	
cis-Chlordane	2.71	0.0500	0.100	ug/kg wet	1	2.50	---	108	57-151%	---	---	
cis-Nonachlor	2.67	0.0500	0.100	ug/kg wet	1	2.50	---	107	68-151%	---	---	
2,4'-DDD	2.40	0.0500	0.100	ug/kg wet	1	2.50	---	96	71-125%	---	---	
2,4'-DDE	2.42	0.0500	0.100	ug/kg wet	1	2.50	---	97	61-131%	---	---	
2,4'-DDT	2.56	0.0500	0.100	ug/kg wet	1	2.50	---	102	78-133%	---	---	
4,4'-DDD	2.40	0.0500	0.100	ug/kg wet	1	2.50	---	96	71-126%	---	---	
4,4'-DDE	2.36	0.0500	0.100	ug/kg wet	1	2.50	---	94	67-124%	---	---	
4,4'-DDT	2.52	0.0500	0.100	ug/kg wet	1	2.50	---	101	75-130%	---	---	
Dieldrin	2.49	0.0300	0.0300	ug/kg wet	1	2.50	---	99	70-135%	---	---	
Endosulfan I	2.77	0.0500	0.100	ug/kg wet	1	2.50	---	111	62-148%	---	---	
Endosulfan II	2.26	0.0500	0.100	ug/kg wet	1	2.50	---	90	57-141%	---	---	
Endosulfan sulfate	2.39	0.0500	0.100	ug/kg wet	1	2.50	---	96	55-152%	---	---	
Endrin	2.69	0.0500	0.100	ug/kg wet	1	2.50	---	107	73-138%	---	---	
Endrin ketone	2.47	0.0500	0.100	ug/kg wet	1	2.50	---	99	62-146%	---	---	
Heptachlor	2.82	0.0500	0.100	ug/kg wet	1	2.50	---	113	60-154%	---	---	
Heptachlor epoxide	2.68	0.0500	0.100	ug/kg wet	1	2.50	---	107	65-140%	---	---	
Hexachlorobutadiene	1.62	0.0500	0.100	ug/kg wet	1	2.50	---	65	20-120%	---	---	
Methoxychlor	2.59	0.0500	0.100	ug/kg wet	1	2.50	---	104	73-135%	---	---	
Mirex	2.42	0.0500	0.100	ug/kg wet	1	2.50	---	97	61-149%	---	---	
Oxychlordane	2.60	0.0500	0.100	ug/kg wet	1	2.50	---	104	65-133%	---	---	
trans-Chlordane	2.81	0.0500	0.100	ug/kg wet	1	2.50	---	112	62-145%	---	---	
trans-Nonachlor	2.73	0.0500	0.100	ug/kg wet	1	2.50	---	109	59-153%	---	---	
<i>Surr: gamma-BHC-d6 (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>4,4'-DDT-d8 (Surr)</i>		<i>103 %</i>		<i>50-150 %</i>		<i>"</i>						

LCS (23C0074-BS2) Prepared: 03/02/23 09:12 Analyzed: 03/07/23 20:35 Q-16, Q-21

EPA 8270E OCPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23C0074 - EPA 3546						Soil							
LCS (23C0074-BS2)						Prepared: 03/02/23 09:12 Analyzed: 03/07/23 20:35						Q-16, Q-21	
Endrin Aldehyde	1.52	0.100	0.100	ug/kg wet	1	2.50	---	61	10-146%	---	---		
LCS Dup (23C0074-BSD1)						Prepared: 03/02/23 09:12 Analyzed: 03/03/23 16:03							
EPA 8270E OCPs													
Aldrin	2.46	0.0500	0.100	ug/kg wet	1	2.50	---	99	54-135%	5	30%		
alpha-BHC	2.54	0.0500	0.100	ug/kg wet	1	2.50	---	102	58-132%	3	30%		
beta-BHC	2.56	0.0500	0.100	ug/kg wet	1	2.50	---	102	63-140%	5	30%		
gamma-BHC (Lindane)	2.48	0.0500	0.100	ug/kg wet	1	2.50	---	99	62-132%	4	30%		
delta-BHC	2.55	0.0500	0.100	ug/kg wet	1	2.50	---	102	65-140%	4	30%		
cis-Chlordane	2.72	0.0500	0.100	ug/kg wet	1	2.50	---	109	57-151%	0.2	30%		
cis-Nonachlor	2.54	0.0500	0.100	ug/kg wet	1	2.50	---	102	68-151%	5	30%		
2,4'-DDD	2.48	0.0500	0.100	ug/kg wet	1	2.50	---	99	71-125%	3	30%		
2,4'-DDE	2.43	0.0500	0.100	ug/kg wet	1	2.50	---	97	61-131%	0.6	30%		
2,4'-DDT	2.62	0.0500	0.100	ug/kg wet	1	2.50	---	105	78-133%	3	30%		
4,4'-DDD	2.46	0.0500	0.100	ug/kg wet	1	2.50	---	98	71-126%	3	30%		
4,4'-DDE	2.39	0.0500	0.100	ug/kg wet	1	2.50	---	96	67-124%	1	30%		
4,4'-DDT	2.60	0.0500	0.100	ug/kg wet	1	2.50	---	104	75-130%	3	30%		
Dieldrin	2.41	0.0300	0.0300	ug/kg wet	1	2.50	---	96	70-135%	3	30%		
Endosulfan I	2.69	0.0500	0.100	ug/kg wet	1	2.50	---	108	62-148%	3	30%		
Endosulfan II	2.33	0.0500	0.100	ug/kg wet	1	2.50	---	93	57-141%	3	30%		
Endosulfan sulfate	2.49	0.0500	0.100	ug/kg wet	1	2.50	---	100	55-152%	4	30%		
Endrin	2.53	0.0500	0.100	ug/kg wet	1	2.50	---	101	73-138%	6	30%		
Endrin ketone	2.58	0.0500	0.100	ug/kg wet	1	2.50	---	103	62-146%	4	30%		
Heptachlor	2.69	0.0500	0.100	ug/kg wet	1	2.50	---	108	60-154%	5	30%		
Heptachlor epoxide	2.56	0.0500	0.100	ug/kg wet	1	2.50	---	102	65-140%	4	30%		
Hexachlorobutadiene	1.84	0.0500	0.100	ug/kg wet	1	2.50	---	74	20-120%	13	30%		
Methoxychlor	2.73	0.0500	0.100	ug/kg wet	1	2.50	---	109	73-135%	5	30%		
Mirex	2.49	0.0500	0.100	ug/kg wet	1	2.50	---	100	61-149%	3	30%		
Oxychlordane	2.51	0.0500	0.100	ug/kg wet	1	2.50	---	100	65-133%	4	30%		
trans-Chlordane	2.59	0.0500	0.100	ug/kg wet	1	2.50	---	104	62-145%	8	30%		
trans-Nonachlor	2.58	0.0500	0.100	ug/kg wet	1	2.50	---	103	59-153%	6	30%		
Surr: gamma-BHC-d6 (Surr)		Recovery: 95 %		Limits: 50-150 %		Dilution: 1x							
4,4'-DDT-d8 (Surr)		105 %		50-150 %		"							

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by GC/MS/MS

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23C0074 - EPA 3546						Soil							
LCS Dup (23C0074-BSD2)			Prepared: 03/02/23 09:12 Analyzed: 03/07/23 21:03						Q-16				
<u>EPA 8270E OCPs</u>													
Endrin Aldehyde	1.51	0.100	0.100	ug/kg wet	1	2.50	---	60	10-146%	0.9	30%		

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0914 - EPA 3051A												
Sediment												
Blank (23B0914-BLK1)												
Prepared: 02/27/23 06:58 Analyzed: 02/27/23 18:16												
EPA 6020B												
Antimony	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Barium	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Beryllium	ND	0.0500	0.100	mg/kg wet	5	---	---	---	---	---	---	
Cadmium	ND	0.0500	0.100	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Copper	ND	0.500	1.00	mg/kg wet	5	---	---	---	---	---	---	
Lead	ND	0.0500	0.100	mg/kg wet	5	---	---	---	---	---	---	
Manganese	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Mercury	ND	0.0200	0.0400	mg/kg wet	5	---	---	---	---	---	---	
Nickel	ND	0.500	1.00	mg/kg wet	5	---	---	---	---	---	---	
Selenium	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Silver	ND	0.0500	0.100	mg/kg wet	5	---	---	---	---	---	---	
Thallium	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Zinc	ND	1.00	2.00	mg/kg wet	5	---	---	---	---	---	---	

LCS (23B0914-BS1)												
Prepared: 02/27/23 06:58 Analyzed: 02/27/23 18:27												
EPA 6020B												
Antimony	12.2	0.250	0.500	mg/kg wet	5	12.5	---	97	80-120%	---	---	
Arsenic	23.2	0.250	0.500	mg/kg wet	5	25.0	---	93	80-120%	---	---	
Barium	24.4	0.250	0.500	mg/kg wet	5	25.0	---	97	80-120%	---	---	
Beryllium	12.0	0.0500	0.100	mg/kg wet	5	12.5	---	96	80-120%	---	---	
Cadmium	23.2	0.0500	0.100	mg/kg wet	5	25.0	---	93	80-120%	---	---	
Chromium	22.1	0.250	0.500	mg/kg wet	5	25.0	---	89	80-120%	---	---	
Copper	22.4	0.500	1.00	mg/kg wet	5	25.0	---	90	80-120%	---	---	
Lead	24.5	0.0500	0.100	mg/kg wet	5	25.0	---	98	80-120%	---	---	
Manganese	23.1	0.250	0.500	mg/kg wet	5	25.0	---	92	80-120%	---	---	
Mercury	0.455	0.0200	0.0400	mg/kg wet	5	0.500	---	91	80-120%	---	---	
Nickel	23.1	0.500	1.00	mg/kg wet	5	25.0	---	92	80-120%	---	---	
Selenium	11.5	0.250	0.500	mg/kg wet	5	12.5	---	92	80-120%	---	---	
Silver	12.1	0.0500	0.100	mg/kg wet	5	12.5	---	97	80-120%	---	---	
Thallium	11.9	0.250	0.500	mg/kg wet	5	12.5	---	95	80-120%	---	---	
Zinc	23.6	1.00	2.00	mg/kg wet	5	25.0	---	95	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3A1010 - 04 19 23 1708

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0914 - EPA 3051A												
Sediment												
Duplicate (23B0914-DUP1)												
						Prepared: 02/27/23 06:58 Analyzed: 02/27/23 18:48						
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)												
EPA 6020B												
Antimony	0.902	0.277	0.555	mg/kg dry	5	---	0.944	---	---	5	20%	COMP, PRO
Arsenic	3.49	0.277	0.555	mg/kg dry	5	---	3.48	---	---	0.2	20%	COMP, PRO
Barium	169	0.277	0.555	mg/kg dry	5	---	174	---	---	3	20%	COMP, PRO
Beryllium	0.336	0.0555	0.111	mg/kg dry	5	---	0.316	---	---	6	20%	COMP, PRO
Cadmium	3.04	0.0555	0.111	mg/kg dry	5	---	3.24	---	---	6	20%	COMP, PRO
Chromium	183	0.277	0.555	mg/kg dry	5	---	191	---	---	5	20%	COMP, PRO
Copper	128	0.555	1.11	mg/kg dry	5	---	142	---	---	10	20%	COMP, PRO
Lead	39.5	0.0555	0.111	mg/kg dry	5	---	40.2	---	---	2	20%	COMP, PRO
Manganese	699	0.277	0.555	mg/kg dry	5	---	763	---	---	9	20%	COMP, PRO
Mercury	0.833	0.0222	0.0444	mg/kg dry	5	---	0.881	---	---	6	20%	COMP, PRO
Nickel	44.6	0.555	1.11	mg/kg dry	5	---	46.8	---	---	5	20%	COMP, PRO
Selenium	0.767	0.277	0.555	mg/kg dry	5	---	0.813	---	---	6	20%	COMP, PRO
Silver	2.49	0.0555	0.111	mg/kg dry	5	---	2.50	---	---	0.3	20%	COMP, PRO
Thallium	ND	0.277	0.555	mg/kg dry	5	---	ND	---	---	---	20%	COMP, PRO
Zinc	482	1.11	2.22	mg/kg dry	5	---	531	---	---	10	20%	COMP, PRO

Matrix Spike (23B0914-MS1)												
						Prepared: 02/27/23 06:58 Analyzed: 02/27/23 18:53						
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)												
EPA 6020B												
Antimony	10.4	0.268	0.536	mg/kg dry	5	13.4	0.944	71	75-125%	---	---	COMP, PRO, Q-01
Arsenic	27.6	0.268	0.536	mg/kg dry	5	26.8	3.48	90	75-125%	---	---	COMP, PRO
Barium	199	0.268	0.536	mg/kg dry	5	26.8	174	91	75-125%	---	---	COMP, PRO
Beryllium	13.4	0.0536	0.107	mg/kg dry	5	13.4	0.316	97	75-125%	---	---	COMP, PRO
Cadmium	29.0	0.0536	0.107	mg/kg dry	5	26.8	3.24	96	75-125%	---	---	COMP, PRO
Chromium	203	0.268	0.536	mg/kg dry	5	26.8	191	44	75-125%	---	---	COMP, PRO, Q-65
Copper	158	0.536	1.07	mg/kg dry	5	26.8	142	59	75-125%	---	---	COMP, PRO, Q-65
Lead	66.3	0.0536	0.107	mg/kg dry	5	26.8	40.2	97	75-125%	---	---	COMP, PRO
Manganese	739	0.268	0.536	mg/kg dry	5	26.8	763	-91	75-125%	---	---	COMP, PRO, Q-65
Mercury	1.41	0.0215	0.0429	mg/kg dry	5	0.536	0.881	99	75-125%	---	---	COMP, PRO

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0914 - EPA 3051A						Sediment						
Matrix Spike (23B0914-MS1)						Prepared: 02/27/23 06:58 Analyzed: 02/27/23 18:53						
QC Source Sample: MFA-B1-B5-COMP-SL-PRO (A3A1010-07)												
Nickel	68.9	0.536	1.07	mg/kg dry	5	26.8	46.8	82	75-125%	---	---	COMP, PRO
Selenium	14.1	0.268	0.536	mg/kg dry	5	13.4	0.813	99	75-125%	---	---	COMP, PRO
Silver	15.3	0.0536	0.107	mg/kg dry	5	13.4	2.50	95	75-125%	---	---	COMP, PRO
Thallium	13.0	0.268	0.536	mg/kg dry	5	13.4	ND	97	75-125%	---	---	COMP, PRO
Zinc	529	1.07	2.15	mg/kg dry	5	26.8	531	-6	75-125%	---	---	COMP, PRO, Q-65

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0959 - EPA 3060A						Solid						
Blank (23B0959-BLK1)			Prepared: 02/27/23 14:57 Analyzed: 02/28/23 12:44									
<u>EPA 7196A</u>												
Chromium (VI)	ND	0.225	0.450	mg/kg	1	---	---	---	---	---	---	
LCS (23B0959-BS1)			Prepared: 02/27/23 14:57 Analyzed: 02/28/23 12:44									
<u>EPA 7196A</u>												
Chromium (VI)	17.0	0.225	0.450	mg/kg	1	20.0	---	85	80-120%	---	---	
LCS Dup (23B0959-BSD1)			Prepared: 02/27/23 14:57 Analyzed: 02/28/23 12:45									
<u>EPA 7196A</u>												
Chromium (VI)	19.4	0.225	0.450	mg/kg	1	20.0	---	97	80-120%	13	20%	
Matrix Spike (23B0959-MS1)			Prepared: 02/27/23 14:57 Analyzed: 02/28/23 12:46									
<u>EPA 7196A</u>												
Chromium (VI)	ND	10.0	20.0	mg/kg	50	19.7			75-125%	---	---	Cr6-01, Q-57, R-04
Post Spike (23B0959-PS1)			Prepared: 02/27/23 14:57 Analyzed: 02/28/23 12:50									
<u>EPA 7196A</u>												
Chromium (VI)	ND			ug/L	50	19900			85-115%	---	---	Cr6-01, Q-57, R-04

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0043 - Total Solids (Dry Weight)						Soil							
Duplicate (23B0043-DUP1)			Prepared: 02/01/23 13:29 Analyzed: 02/02/23 05:57						PRO				
<u>QC Source Sample: Non-SDG (A3A0911-02)</u>													
% Solids	97.2	1.00	1.00	%	1	---	97.2	---	---	0.01	10%		
Duplicate (23B0043-DUP2)			Prepared: 02/01/23 13:29 Analyzed: 02/02/23 05:57						PRO				
<u>QC Source Sample: Non-SDG (A3A0911-04)</u>													
% Solids	97.5	1.00	1.00	%	1	---	97.4	---	---	0.08	10%		
Duplicate (23B0043-DUP3)			Prepared: 02/01/23 18:38 Analyzed: 02/02/23 05:57						PRO				
<u>QC Source Sample: Non-SDG (A3B0033-01)</u>													
% Solids	76.1	1.00	1.00	%	1	---	75.9	---	---	0.3	10%		
Duplicate (23B0043-DUP4)			Prepared: 02/01/23 18:38 Analyzed: 02/02/23 05:57						PRO				
<u>QC Source Sample: Non-SDG (A3B0033-02)</u>													
% Solids	77.3	1.00	1.00	%	1	---	77.6	---	---	0.4	10%		

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0116 - Total Solids (Dry Weight)							Soil					
Duplicate (23B0116-DUP1)			Prepared: 02/02/23 19:28 Analyzed: 02/03/23 04:15									
<u>QC Source Sample: Non-SDG (A3B0049-01)</u>												
% Solids	64.5	1.00	1.00	%	1	---	60.6	---	---	6	10%	
Duplicate (23B0116-DUP2)			Prepared: 02/02/23 19:28 Analyzed: 02/03/23 04:15									
<u>QC Source Sample: Non-SDG (A3B0049-02)</u>												
% Solids	56.0	1.00	1.00	%	1	---	55.9	---	---	0.1	10%	
Duplicate (23B0116-DUP3)			Prepared: 02/02/23 19:28 Analyzed: 02/03/23 04:15									
<u>QC Source Sample: Non-SDG (A3B0049-03)</u>												
% Solids	64.5	1.00	1.00	%	1	---	65.1	---	---	0.8	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0202 - Total Solids (Dry Weight)						Soil							
Duplicate (23B0202-DUP1)			Prepared: 02/06/23 13:38 Analyzed: 02/07/23 06:25						PRO				
<u>QC Source Sample: Non-SDG (A3A0960-02)</u>													
% Solids	97.3	1.00	1.00	%	1	---	97.4	---	---	0.1	10%		
Duplicate (23B0202-DUP2)			Prepared: 02/06/23 13:38 Analyzed: 02/07/23 06:25						PRO				
<u>QC Source Sample: Non-SDG (A3A0960-04)</u>													
% Solids	97.1	1.00	1.00	%	1	---	97.1	---	---	0.04	10%		
Duplicate (23B0202-DUP3)			Prepared: 02/06/23 13:38 Analyzed: 02/07/23 06:25						PRO				
<u>QC Source Sample: Non-SDG (A3A0960-06)</u>													
% Solids	96.9	1.00	1.00	%	1	---	97.0	---	---	0.09	10%		
Duplicate (23B0202-DUP4)			Prepared: 02/06/23 13:38 Analyzed: 02/07/23 06:25						PRO				
<u>QC Source Sample: Non-SDG (A3A0960-08)</u>													
% Solids	96.9	1.00	1.00	%	1	---	96.9	---	---	0.03	10%		
Duplicate (23B0202-DUP5)			Prepared: 02/06/23 13:38 Analyzed: 02/07/23 06:25						PRO				
<u>QC Source Sample: Non-SDG (A3B0140-01)</u>													
% Solids	75.1	1.00	1.00	%	1	---	73.2	---	---	3	10%		
Duplicate (23B0202-DUP6)			Prepared: 02/06/23 13:38 Analyzed: 02/07/23 06:25						PRO				
<u>QC Source Sample: Non-SDG (A3B0140-02)</u>													
% Solids	90.2	1.00	1.00	%	1	---	90.2	---	---	0.02	10%		

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0961 - Total Solids (Dry Weight)						Soil						
Duplicate (23B0961-DUP1)			Prepared: 02/27/23 15:30 Analyzed: 02/28/23 06:46									
<u>QC Source Sample: Non-SDG (A3B0820-01)</u>												
% Solids	76.8	1.00	1.00	%	1	---	76.1	---	---	0.9	10%	
Duplicate (23B0961-DUP2)			Prepared: 02/27/23 15:30 Analyzed: 02/28/23 06:46									
<u>QC Source Sample: Non-SDG (A3B0820-02)</u>												
% Solids	77.7	1.00	1.00	%	1	---	78.5	---	---	1	10%	
Duplicate (23B0961-DUP3)			Prepared: 02/27/23 19:00 Analyzed: 02/28/23 06:46									
<u>QC Source Sample: Non-SDG (A3B0849-03)</u>												
% Solids	91.6	1.00	1.00	%	1	---	91.6	---	---	0.06	10%	
Duplicate (23B0961-DUP4)			Prepared: 02/27/23 19:00 Analyzed: 02/28/23 06:46									
<u>QC Source Sample: Non-SDG (A3B0849-04)</u>												
% Solids	91.5	1.00	1.00	%	1	---	92.0	---	---	0.5	10%	
Duplicate (23B0961-DUP5)			Prepared: 02/27/23 19:00 Analyzed: 02/28/23 06:46									
<u>QC Source Sample: Non-SDG (A3B0849-05)</u>												
% Solids	91.9	1.00	1.00	%	1	---	92.2	---	---	0.3	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3546 (Fuels)					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0765</u>							
A3A1010-07	Sediment	NWTPH-Dx	01/30/23 16:00	02/21/23 07:18	10.11g/5mL	10g/5mL	0.99

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5035A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0290</u>							
A3A1010-06	Sediment	NWTPH-Gx (MS)	01/30/23 16:00	01/30/23 16:00	20.2g/25mL	5g/5mL	1.24

Volatile Organic Compounds by EPA 8260D

Prep: EPA 5035A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0290</u>							
A3A1010-06	Sediment	5035A/8260D	01/30/23 16:00	01/30/23 16:00	20.2g/25mL	5g/5mL	1.24

Volatile Organic Compounds by EPA 8260D SIM

Prep: EPA 5035A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0452</u>							
A3A1010-06	Sediment	5035A/8260D SIM	01/30/23 16:00	01/30/23 16:00	20.2g/25mL	5g/5mL	1.24

Semivolatile Organic Compounds by EPA 8270E

Prep: EPA 3546					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0782</u>							
A3A1010-07	Sediment	EPA 8270E	01/30/23 16:00	02/21/23 10:05	10.56g/5mL	15g/2mL	3.55

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Prep: EPA 3546					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0783</u>							
A3A1010-07	Sediment	EPA 8270E OPPs	01/30/23 16:00	02/21/23 10:10	10.38g/5mL	10g/5mL	0.96

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

SAMPLE PREPARATION INFORMATION

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

<u>Prep: EPA 3546</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor

Organochlorine Pesticides by GC/MS/MS

<u>Prep: EPA 3546</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23C0074</u>							
A3A1010-07	Sediment	EPA 8270E OCPs	01/30/23 16:00	03/02/23 09:12	10.57g/25mL	10g/1mL	23.70
A3A1010-07RE1	Sediment	EPA 8270E OCPs	01/30/23 16:00	03/02/23 09:12	10.57g/25mL	10g/1mL	23.70

Total Metals by EPA 6020B (ICPMS)

<u>Prep: EPA 3051A</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0914</u>							
A3A1010-07	Sediment	EPA 6020B	01/30/23 16:00	02/27/23 06:58	0.493g/50mL	0.5g/50mL	1.01

Total Hexavalent Chromium by Colorimetric Spectrophotometry

<u>Prep: EPA 3060A</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0959</u>							
A3A1010-07	Sediment	EPA 7196A	01/30/23 16:00	02/27/23 14:57	2.5194g/100mL	2.5g/111mL	0.89

Percent Dry Weight

<u>Prep: Total Solids (Dry Weight)</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0043</u>							
A3A1010-01	Sediment	EPA 8000D	01/30/23 16:00	02/01/23 13:29			NA
<u>Batch: 23B0116</u>							
A3A1010-02	Sediment	EPA 8000D	01/31/23 10:50	02/02/23 19:28			NA
A3A1010-03	Sediment	EPA 8000D	01/31/23 09:00	02/02/23 19:28			NA
<u>Batch: 23B0202</u>							
A3A1010-04	Sediment	EPA 8000D	02/02/23 09:10	02/06/23 13:38			NA
A3A1010-05	Sediment	EPA 8000D	02/03/23 15:00	02/06/23 13:38			NA
A3A1010-06	Sediment	EPA 8000D	01/30/23 16:00	02/06/23 00:00			NA

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

SAMPLE PREPARATION INFORMATION

Percent Dry Weight

<u>Prep: Total Solids (Dry Weight)</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 23B0961</u>							
A3A1010-07	Sediment	EPA 8000D	01/30/23 16:00	02/27/23 19:00			NA

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3A1010 - 04 19 23 1708

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- A-01** The Average of Dry Weight Results from the discrete samples was used for DW for Composite sample for Volatiles.
- COMP** Analyzed sample is a composite of discrete samples that was performed in the laboratory.
- Cr6-01** Matrix Spike fails due to probable reducing conditions present in the sample. Sample is ND. Data quality is not affected because any hexavalent chromium present in the sample is likely to have been reduced to chromium three.
- F-03** The result for this hydrocarbon range is elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported.
- F-11** The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
- H-02** This sample was extracted outside of the recommended holding time.
- J** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- PRO** Sample has undergone sample processing prior to extraction and analysis.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-11** Spike recovery is estimated due to sample dilution required for high analyte concentration and/or matrix interference.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-19** Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
- Q-21** Matrix Spike results for this extraction batch are not reported due to the interfering organic compounds in the source sample. Batch is accepted based on results of the Blank Spikes.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-31** Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- Q-41** Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-42** Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-52** Due to known erratic recoveries, the result and reporting levels for this analyte are reported as Estimated Values. This analyte may not have passed all QC requirements for this method.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +1%. The results are reported as Estimated Values.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +15%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +3%. The results are reported as Estimated Values.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +5%. The results are reported as Estimated Values.
- Q-54d** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +6%. The results are reported as Estimated Values.
- Q-54e** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +75%. The results are reported as Estimated Values.
- Q-54f** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +89%. The results are reported as Estimated Values.
- Q-54g** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -3%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- Q-57** Compensation for background color and/or turbidity has been made by subtracting the absorbance of a second aliquot of sample to which all reagents except the color producing reagent have been added, in accordance with the method.
- Q-65** Spike recovery is estimated due to the high analyte concentration of the source sample.
- R-02** The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample.
- R-04** Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.
- S-01** Surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference.
- S-05** Surrogate recovery is estimated due to sample dilution required for high analyte concentration and/or matrix interference.
- V-15** Sample aliquot was subsampled from the sample container. The subsampled aliquot was preserved in the laboratory within 48 hours of sampling.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.
- " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
- " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
- " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A3A1010 - 04 19 23 1708).

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Handwritten signature of Philip Nerenberg



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A3A1010 - 04 19 23 1708).

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Table header with columns: Matrix, Analysis, TNI_ID, Analyte, TNI_ID, Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Handwritten signature of Philip Nerenberg

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC.
 3140 NE Broadway Street
 Portland, OR 97232

Project: **St. Helens Lagoon**
 Project Number: **M0830.03.006**
 Project Manager: **David Weatherby**

Report ID:
A3A1010 - 04 19 23 1708

APEX LABS
 12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: Maul Foster Alongi
 Address: 3140 NE Broadway St, Portland, OR 97232
 Sampled by: *Cathy Schuster*
 Sampler signature: *[Signature]*

Site Location: OR WA
 Other: _____

SAMPLE ID: **MFA-BI-2023013-Z1A**

CHAIN OF CUSTODY

Project Name: St. Helens Lagoon
 Project #: M0830.03.006
 Email: dweatherby@mfaulfo.com; mbenzinger@mfaulfo.com

Project Mgr: David Weatherby
 Phone: (971) 544-2139

Lab # **A3A1010** of **1**
 Lab # ~~A3A1010~~ of ~~1~~
 Date: **1/31/23**

ANALYSIS REQUEST

LAB ID #	DATE	TIME	# OF CONTAINERS	Frozen Storage*	Composite**	NWTPH-GX	8260D VOCs	LI VOCs 8260D-SIM	ToI Metals 6020B**	CR-VI 7196A/218.6	NWTPH-DX	SVOCs 8270E	OP Pest 8270E	Chlorinated Herb 8151A	LI OC Pest 8270E/169	Dioxins/Furans 1618B	PCB Congeners 1668C	PFAS EPA-537 Mod/537.1	
MFA-BI-2023013-Z1A	01/30/23	1600	4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

SPECIAL INSTRUCTIONS:
 *Please store a portion of each sediment sample at -18 °C until all 5 components have been received, then composite and analyze for NWTPH-DX, SVOC, OP Pest, LI-OC Pest, and Chl Herb.
 **Composite sediment samples after all 5 components have been received, except for PFAS, which will be composited by Bureau Veritas.
 ***Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Sr, Ag, Tl, Zn

TAT Requested:
 STANDARD

SAMPLES ARE HELD FOR 30 DA Received via:

RELINQUISHED BY: Signature: <i>[Signature]</i> Printed Name: Cathy Schuster Company: MFA	RECEIVED BY: Signature: <i>[Signature]</i> Printed Name: ERIC ERICKSON Company: MFA
Date: 01/31/23 Time: 0845	Date: 01/31/2023 Time: 1000

Philip Nerenberg



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. Project: **St. Helens Lagoon**
3140 NE Broadway Street Project Number: **M0830.03.006**
Portland, OR 97232 Project Manager: **David Weatherby** Report ID:
A3A1010 - 04 19 23 1708

CHAIN OF CUSTODY

APEX LABS 12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: Maul Foster Alongi Project Name: St. Helens Lagoon Project #: M0830.03.006
Address: 3140 NE Broadway St, Portland, OR 97232 Project Mgr: David Weatherby
Sampled by: *Cathy Schwab* Phone: (971) 544-2139 Email: dweatherby@maulfoster.com, mbenzinger@maulfoster.com
Sampler signature: *[Signature]*

Lab # **A3A1010** * Received **2/1/23** **APX** **2/1/23**
COC of **1** **APX**

Site Location: OR WA
Other: _____

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	Frozen Storage*	Composite**	NWTPH-Gx	8260D VOCs	8260D SIM	Tot Metals 6020B***	Cr-VI 7196A/218.6	NWTPH-Dx	SVOCs 8270E	OP Pest 8270E	Chlorinated Herb	8151A	IL OC Pest	8270E/1699	Dioxins/Furans	1613B	PCB Congeners	1668C	PFAS EPA-537 Mod/537.1	
MFA-B3-20230131-310	01/31/23	1050	Sludge	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MFA-B3-20230131-320	01/31/23	0800	Sludge	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Normal Turn Around Time (TAT) = 5-10 Business Days

SPECIAL INSTRUCTIONS:
*Please store a portion of each sediment sample at +18 °C until all 5 components have been received, then composite and analyze for NWTPH-Dx, SVOC, OP Pest, LL-OC Pest, and CH Herb.
Store portion of each sediment sample at standard temperature (0-6 °C), until all 5 components have been received, then composite and analyze for NWTPH-Gx, VOCs, LL-VOCs, Metals, Hg, Cr-VI, Dioxins/Furans, and PCB Congeners.
Store sediment PFAS containers at 0-6 °C until all 5 components have been received, then subcontract to Bureau Veritas for composting and analysis.
**Composite sediment samples after all 5 components have been received, except for PFAS, which will be composited by Bureau Veritas.
***Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Se, Ag, Tl, Zn

TAT Requested: STANDARD

RECEIVED BY: Signature: *[Signature]* Date: 02/01/23
Printed Name: ERIC EDICKSON Time: 0925
Company: MFA

RECEIVED BY: Signature: *[Signature]* Date: 02-01-2023
Printed Name: ERIC EDICKSON Time: 1200
Company: MFA

RECEIVED BY: Signature: *[Signature]* Date: 2/1/23
Printed Name: Shawn Thompson Time: 1200
Company: Apex Labs

PLEASE USE ENCLOSED TEMP. BULK TO SEND TO BUREAU VERITAS

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

Project: St. Helens Lagoon
Project Number: M0830.03.006
Project Manager: David Weatherby

Report ID: A3A1010-04 19 23 1708

CHAIN OF CUSTODY
APEX LABS
12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333
Project Name: St. Helens Lagoon
Project # M0830.03.006
Email: dweatherby@maulfoster.com, mbeznings@maulfoster.com
Sampled by: Leah Schumber
Sampler signature: Leah Schumber
Date: 02/09/23
Time: 0910
LAB ID #: MFA-04-2023-02-SL-265
Site Location: WA
Sample matrix: # OF CONTAINERS, MATRIX, TIME, DATE, LAB ID #
Analysis Request: PFAS EPA-57, PCB Congeners 168C, Dioxins/Furans 1613B, OP Pest 8270E, SVOCs 8270E, NWTPH-DX, C-VI 7196A/218.6, Tot Metals 6020B, LL VOCs 8260D-SIM, 8260D VOCs, NWTPH-Gx, Composite, Frozen Storage
Special Instructions: Store a portion of each sediment sample at standard temperature (0-6 °C) until all 5 components have been received...
TAT Requested: STANDARD
Relinquished by: Eric Erickson
Received by: Shawn Thompson

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. Project: **St. Helens Lagoon**
3140 NE Broadway Street Project Number: **M0830.03.006**
Portland, OR 97232 Project Manager: **David Weatherby** **Report ID:**
A3A1010 - 04 19 23 1708

114
COC 1 of 1
*received 2/6/23
Lab # **A3A1010**

CHAIN OF CUSTODY

APEX LABS 12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333 Company: Maul Foster Alongi Address: 3140 NE Broadway St, Portland, OR 97232 Sampled by: <i>Cathy Schwaner</i> Sampler signature: <i>[Signature]</i>		Project Name: St. Helens Lagoon Email: dweatherby@maulfoster.com, mbeazinger@maulfoster.com Project #: M0830.03.006 Phone: (971) 544-2139	
Site Location: <input type="checkbox"/> OR <input checked="" type="checkbox"/> WA Other: _____	# OF CONTAINERS MATRIX TIME DATE LAB ID #	Frozen Storage* Composite** NWTPH-GX 8260D VOCs 8260D VOCs-SIM TL VOCs 8260D-SIM Tot Metals 6020B** C-VI 7196A/218.6 NWTPH-DX SVOCs 8270E OP Pest 8270E Chlorinated Herb 8151A LC Pest 8270E/1699 Dioxins/Furans 1613B PCB Congeners 1668C Mod/5371 PFAS EPA-537	ANALYSIS REQUEST
SAMPLE ID WFA-85-023-003-SL-27.0	DATE 02/06/23	TIME 1500	# OF CONTAINERS 4
SPECIAL INSTRUCTIONS: *Store a portion of each sediment sample at standard temperature (0-6 °C) until all 5 components have been received, then composite and analyze for Metals and Hg. Composite MeOH-preserved VOAs and analyze for NWTPH-GX, VOCs, and LL-VOCs. Store 250 mL PFAS sediment containers at 0-6 °C until all 5 components have been received, then subcontract to Bureau Veritas for composting and analysis. Store remainder of each sediment sample at -18 °C until all 5 components have been received, then composite and analyze for all remaining tests. ***Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Se, Ag, Tl, Zn Detection limit report.			
TAT Requested: <input checked="" type="checkbox"/> STANDARD		Please use enclosed temperature blank to send to Bureau Veritas	
RELINQUISHED BY: Signature: <i>[Signature]</i> Printed Name: Cathy Schwaner Date: 02/06/23 Time: 0847 Company: MFA	RECEIVED BY: Signature: <i>[Signature]</i> Printed Name: ERIC ERICKSON Date: 02.06.23 Time: 0847 Company: MFA	RELINQUISHED BY: Signature: <i>[Signature]</i> Printed Name: ERIC ERICKSON Date: 02.06.23 Time: 1205 Company: MFA	RECEIVED BY: Signature: <i>[Signature]</i> Printed Name: Andy Manjara Date: 2/6/23 Time: 1205 Company: Apex

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	--

APEX LABS COOLER RECEIPT FORM

1/31/23
APEX 2/8/23

Client: Maul Foster Alongi Element WO#: A3A1010

Project/Project #: St. Helens Lagoon M0830.03.006

Delivery Info:
Date/time received: 1/31/23 @ 1008 By: EST

Delivered by: Apex Client ESS FedEx UPS Radio Morgan SDS Evergreen Other

Cooler Inspection Date/time inspected: 1/31/23 @ 1113 By: EST

Chain of Custody included? Yes No

Signed/dated by client? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>3.1</u>						
Custody seals? (Y/N)	<u>N</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>Y</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition (In/Out):	<u>In</u>						

Cooler out of temp? (Y/N) Possible reason why: (N)

Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No

Sample Inspection: Date/time inspected: 1/31/23 @ 12:07 By: ZAM

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____
Sub sampler: ZAM
Witness: DSS

Labeled by: ZAM Witness: DSS Cooler Inspected by: ZAM

Form Y-003 R-00



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	--

APEX LABS COOLER RECEIPT FORM

2/1/23
AKC
2/6/23

Client: MAUL FOSTER ALONGI Element WO#: A3A1010

Project/Project #: ST. HELENS LAGOON # M0830.03.006

Delivery Info: *Additional Volume*

Date/time received: 2/1/23 @ 1200 By: SAT

Delivered by: Apex Client ESS FedEx UPS Radio Morgan SDS Evergreen Other

Cooler Inspection Date/time inspected: 2/1/23 @ 1655 By: SAT

Chain of Custody included? Yes No

Signed/dated by client? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>1.4</u>						
Custody seals? (Y/N)	<u>N</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>Y</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition (In/Out):	<u>IN</u>						

Cooler out of temp? (Y/N) Possible reason why: _____

Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No

Sample Inspection: Date/time inspected: 2/1/23 @ 17:24 By: RAM

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____

Subsampler: RAM
Witness: AKC

Labeled by: RAM Witness: AKC Cooler Inspected by: RAM

Form Y-003 R-00

Philip Nerenberg



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232
Project: St. Helens Lagoon
Project Number: M0830.03.006
Project Manager: David Weatherby
Report ID: A3A1010 - 04 19 23 1708

APEX LABS COOLER RECEIPT FORM
Client: MFA - PORTLAND Element WO#: A3 A1010
Project/Project #: ST. HELENS LAGOON # M0830-03-006
Delivery Info: Date/time received: 2/3/23 @ 11:20 By: SAT
Cooler Inspection: Date/time inspected: 2/3/23 @ 13:25 By: SAT
Chain of Custody included? Yes X No
Signed/dated by client? Yes X No
Cooler #1-7 table with temperature, custody seals, etc.
Sample Inspection: Date/time inspected: 2/3/23 @ 4:01 By: RAM
All samples intact? Yes X No
Bottle labels/COCs agree? Yes X No
COC/container discrepancies form initiated? Yes No X
Containers/volumes received appropriate for analysis? Yes X No
Do VOA vials have visible headspace? Yes No NA X
Water samples: pH checked: Yes No NA X pH appropriate? Yes No NA X
Additional information: Sub sampler: RAM, Witness: DSS
Labeled by: RAM, Witness: DSS, Cooler Inspected by: RAM

Philip Nerenberg



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3A1010 - 04 19 23 1708
--	---	---

414

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster Alongi Element WO#: A3A1010

Project/Project #: St. Helens Lagoon # M0830.03.006

Delivery Info: h26 #Additional volume*

Date/time received: 2/6/23 @ 12:05 By: JAM

Delivered by: Apex Client ESS FedEx UPS Radio Morgan SDS Evergreen Other

Cooler Inspection Date/time inspected: 2/6/23 @ 15:21 By: Kus

Chain of Custody included? Yes No

Signed/dated by client? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>0.9</u>						
Custody seals? (Y/N)	<u>N</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>Y</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition (In/Out):	<u>In</u>						

Cooler out of temp? (Y/N) Possible reason why: Green dots applied to out of temperature samples? Yes/No

Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No

Sample Inspection: Date/time inspected: 2/6/23 @ 16:07 By: JAM

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: Subsampler: JAM

Witness: DWP

Labeled by: JAM Witness: DWP Cooler Inspected by: JAM Form Y-003 R-00



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Friday, April 21, 2023

David Weatherby
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A3B0217 - St. Helens Lagoon - M0830.03.006

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A3B0217, which was received by the laboratory on 2/7/2023 at 2:29:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: pnerenberg@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Default Cooler 4.4 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MFA-B3A-20230207-GW-36.0	A3B0217-01	Water	02/07/23 08:30	02/07/23 14:29
Field Blank	A3B0217-02	Water	02/07/23 08:20	02/07/23 14:29
Trip Blank	A3B0217-03	Water	02/07/23 00:00	02/07/23 14:29

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01)				Matrix: Water		Batch: 23B0657		
Diesel	ND	0.112	0.225	mg/L	1	02/18/23 02:55	NWTPH-Dx	
Oil	ND	0.225	0.449	mg/L	1	02/18/23 02:55	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/18/23 02:55</i>	<i>NWTPH-Dx</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with client information (Maul Foster & Alongi, INC.), project details (St. Helens Lagoon), project number (M0830.03.006), project manager (David Weatherby), and report ID (A3B0217 - 04 21 23 1023).

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Table with columns: Analyte, Sample Result, Detection Limit, Reporting Limit, Units, Dilution, Date Analyzed, Method Ref., Notes. Includes data for Gasoline Range Organics (ND) and surrogate compounds (4-Bromofluorobenzene, 1,4-Difluorobenzene).

Apex Laboratories

Philip Nerenberg (signature)

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE1)				Matrix: Water		Batch: 23B0509		V-04
Acetone	ND	20.0	20.0	ug/L	1	02/14/23 11:15	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/14/23 11:15	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/14/23 11:15	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/14/23 11:15	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/14/23 11:15	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/14/23 11:15	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/14/23 11:15	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/14/23 11:15	EPA 8260D	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/14/23 11:15	EPA 8260D	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/14/23 11:15	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/14/23 11:15	EPA 8260D	
2-Hexanone	ND	5.00	10.0	ug/L	1	02/14/23 11:15	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/14/23 11:15	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/14/23 11:15	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE1)				Matrix: Water		Batch: 23B0509		V-04	
Naphthalene	ND	1.00	2.00	ug/L	1	02/14/23 11:15	EPA 8260D		
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/14/23 11:15	EPA 8260D		
Styrene	ND	0.500	1.00	ug/L	1	02/14/23 11:15	EPA 8260D		
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/14/23 11:15	EPA 8260D		
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/14/23 11:15	EPA 8260D		
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/14/23 11:15	EPA 8260D		
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/14/23 11:15	EPA 8260D		
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/14/23 11:15	EPA 8260D		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/14/23 11:15</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>				<i>105 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/14/23 11:15</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>				<i>97 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/14/23 11:15</i>	<i>EPA 8260D</i>
Trip Blank (A3B0217-03)				Matrix: Water		Batch: 23B0344			
Acetone	ND	10.0	20.0	ug/L	1	02/09/23 12:40	EPA 8260D		
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Bromobenzene	ND	0.250	0.500	ug/L	1	02/09/23 12:40	EPA 8260D		
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Bromoform	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Bromomethane	ND	5.00	5.00	ug/L	1	02/09/23 12:40	EPA 8260D		
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/09/23 12:40	EPA 8260D		
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/09/23 12:40	EPA 8260D		
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/09/23 12:40	EPA 8260D		
Chloroethane	ND	5.00	5.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Chloromethane	ND	2.50	5.00	ug/L	1	02/09/23 12:40	EPA 8260D		
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
Dibromomethane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D		
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/09/23 12:40	EPA 8260D		

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0217-03)			Matrix: Water			Batch: 23B0344		
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/09/23 12:40	EPA 8260D	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/09/23 12:40	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/09/23 12:40	EPA 8260D	
2-Hexanone	ND	5.00	10.0	ug/L	1	02/09/23 12:40	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/09/23 12:40	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/09/23 12:40	EPA 8260D	
Naphthalene	ND	1.00	2.00	ug/L	1	02/09/23 12:40	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/09/23 12:40	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/09/23 12:40	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/09/23 12:40	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/09/23 12:40	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/09/23 12:40	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/09/23 12:40	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/09/23 12:40	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/09/23 12:40</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/09/23 12:40</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/09/23 12:40</i>	<i>EPA 8260D</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01)			Matrix: Water		Batch: 23B0743			
Benzene	0.0754	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	Ja
Toluene	0.0904	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	Ja
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,2,4-Trimethylbenzene	0.0578	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	Ja
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
Chloroform	0.122	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0200	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:00	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>02/20/23 18:00</i>	<i>EPA 8260D SIM</i>	
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/20/23 18:00</i>	<i>EPA 8260D SIM</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/20/23 18:00</i>	<i>EPA 8260D SIM</i>	

Trip Blank (A3B0217-03)			Matrix: Water		Batch: 23B0743			
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0217-03)			Matrix: Water			Batch: 23B0743		
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Chloroform	0.0693	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	Ja
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:12	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/20/23 16:12</i>	<i>EPA 8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 16:12</i>	<i>EPA 8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 16:12</i>	<i>EPA 8260D SIM</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
---	--	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE3)			Matrix: Water			Batch: 23B0481		
Acenaphthene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
Acenaphthylene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Anthracene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Benz(a)anthracene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Benzo(a)pyrene	ND	0.0192	0.0385	ug/L	1	02/13/23 19:59	EPA 8270E	
Benzo(b)fluoranthene	ND	0.0192	0.0385	ug/L	1	02/13/23 19:59	EPA 8270E	
Benzo(k)fluoranthene	ND	0.0192	0.0385	ug/L	1	02/13/23 19:59	EPA 8270E	
Benzo(g,h,i)perylene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Chrysene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Dibenz(a,h)anthracene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Fluoranthene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Fluorene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
1-Methylnaphthalene	ND	0.0256	0.0513	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
2-Methylnaphthalene	ND	0.0256	0.0513	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
Naphthalene	ND	0.0256	0.0513	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
Phenanthrene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Pyrene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Carbazole	ND	0.0192	0.0385	ug/L	1	02/13/23 19:59	EPA 8270E	
Dibenzofuran	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
2-Chlorophenol	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.128	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
2,4-Dichlorophenol	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
2,4-Dimethylphenol	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
2,4-Dinitrophenol	ND	0.321	0.641	ug/L	1	02/13/23 19:59	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.321	0.641	ug/L	1	02/13/23 19:59	EPA 8270E	
2-Methylphenol	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
2-Nitrophenol	ND	0.128	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
4-Nitrophenol	ND	0.256	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.128	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
Phenol	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE3)			Matrix: Water		Batch: 23B0481			
2,3,5,6-Tetrachlorophenol	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
2,4,6-Trichlorophenol	0.0665	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	Ja
Bis(2-ethylhexyl)phthalate	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
Butyl benzyl phthalate	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
Diethylphthalate	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
Dimethylphthalate	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
Di-n-butylphthalate	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
Di-n-octyl phthalate	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0641	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
Bis(2-Chloroethyl) ether	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
Hexachlorobenzene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	
Hexachlorobutadiene	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
Hexachlorocyclopentadiene	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
Hexachloroethane	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
2-Chloronaphthalene	ND	0.0128	0.0256	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
1,2,4-Trichlorobenzene	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
4-Bromophenyl phenyl ether	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
4-Chlorophenyl phenyl ether	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30
Aniline	ND	0.0641	0.128	ug/L	1	02/13/23 19:59	EPA 8270E	
4-Chloroaniline	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	
2-Nitroaniline	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
3-Nitroaniline	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
4-Nitroaniline	ND	0.256	0.513	ug/L	1	02/13/23 19:59	EPA 8270E	
Nitrobenzene	ND	0.128	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
2,4-Dinitrotoluene	ND	0.128	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
2,6-Dinitrotoluene	ND	0.256	0.256	ug/L	1	02/13/23 19:59	EPA 8270E	
Isophorone	0.0541	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Ja
Azobenzene (1,2-DPH)	ND	0.0641	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE3)			Matrix: Water			Batch: 23B0481			
Bis(2-Ethylhexyl) adipate	ND	0.321	0.641	ug/L	1	02/13/23 19:59	EPA 8270E		
3,3'-Dichlorobenzidine	ND	0.641	1.28	ug/L	1	02/13/23 19:59	EPA 8270E	Q-52	
1,2-Dinitrobenzene	ND	0.321	0.641	ug/L	1	02/13/23 19:59	EPA 8270E		
1,3-Dinitrobenzene	ND	0.321	0.641	ug/L	1	02/13/23 19:59	EPA 8270E		
1,4-Dinitrobenzene	ND	0.321	0.641	ug/L	1	02/13/23 19:59	EPA 8270E		
Pyridine	ND	0.128	0.256	ug/L	1	02/13/23 19:59	EPA 8270E		
1,2-Dichlorobenzene	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30	
1,3-Dichlorobenzene	0.0432	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Ja, Q-30	
1,4-Dichlorobenzene	ND	0.0321	0.0641	ug/L	1	02/13/23 19:59	EPA 8270E	Q-30	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 47 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>02/13/23 19:59</i>	<i>EPA 8270E</i>	
<i>2-Fluorobiphenyl (Surr)</i>		<i>40 %</i>		<i>44-120 %</i>		<i>1</i>	<i>02/13/23 19:59</i>	<i>EPA 8270E</i>	<i>S-06</i>
<i>Phenol-d6 (Surr)</i>		<i>21 %</i>		<i>10-133 %</i>		<i>1</i>	<i>02/13/23 19:59</i>	<i>EPA 8270E</i>	
<i>p-Terphenyl-d14 (Surr)</i>		<i>69 %</i>		<i>50-134 %</i>		<i>1</i>	<i>02/13/23 19:59</i>	<i>EPA 8270E</i>	
<i>2-Fluorophenol (Surr)</i>		<i>31 %</i>		<i>19-120 %</i>		<i>1</i>	<i>02/13/23 19:59</i>	<i>EPA 8270E</i>	
<i>2,4,6-Tribromophenol (Surr)</i>		<i>75 %</i>		<i>43-140 %</i>		<i>1</i>	<i>02/13/23 19:59</i>	<i>EPA 8270E</i>	
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE4)			Matrix: Water			Batch: 23B0481			
Benzoic acid	1.83	1.60	3.21	ug/L	1	02/14/23 14:06	EPA 8270E	Ja	
Benzyl alcohol	0.212	0.128	0.256	ug/L	1	02/14/23 14:06	EPA 8270E	Ja	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE1)			Matrix: Water			Batch: 23B0312		
Azinphos methyl (Guthion)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Chlorpyrifos	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Coumaphos	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Demeton O	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Demeton S	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Diazinon	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Dichlorvos	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Dimethoate	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Disulfoton	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
EPN	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Ethoprop	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Fensulfothion	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Fenthion	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Malathion	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Merphos	ND	0.658	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Methyl parathion	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Monocrotophos	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Parathion, ethyl	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Phorate	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Ronnel (Fenclorophos)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Sulfotep	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
TEPP	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
Trichloronate	ND	0.329	0.658	ug/L	1	02/08/23 19:48	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>			<i>Recovery: 85 %</i>	<i>Limits: 56-124 %</i>	<i>1</i>	<i>02/08/23 19:48</i>	<i>EPA 8270E OPPs</i>	
<i>Triphenyl phosphate (Surr)</i>			<i>82 %</i>	<i>58-121 %</i>	<i>1</i>	<i>02/08/23 19:48</i>	<i>EPA 8270E OPPs</i>	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01)				Matrix: Water				
Batch: 23B0281								
Antimony	0.697	0.500	1.00	ug/L	1	02/09/23 19:39	EPA 6020B	Ja
Arsenic	29.1	0.500	1.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Barium	1080	1.00	2.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Beryllium	6.44	0.100	0.200	ug/L	1	02/09/23 19:39	EPA 6020B	
Cadmium	1.50	0.100	0.200	ug/L	1	02/09/23 19:39	EPA 6020B	
Chromium	339	1.00	2.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Copper	210	1.00	2.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Lead	66.8	0.110	0.200	ug/L	1	02/09/23 19:39	EPA 6020B	
Manganese	2350	0.500	1.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Nickel	285	1.00	2.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Selenium	4.48	0.500	1.00	ug/L	1	02/09/23 19:39	EPA 6020B	
Silver	0.776	0.100	0.200	ug/L	1	02/09/23 19:39	EPA 6020B	
Thallium	0.711	0.100	0.200	ug/L	1	02/09/23 19:39	EPA 6020B	
Zinc	802	2.00	4.00	ug/L	1	02/09/23 19:39	EPA 6020B	
MFA-B3A-20230207-GW-36.0 (A3B0217-01RE2)				Matrix: Water				
Batch: 23B0281								
Mercury	0.328	0.0800	0.160	ug/L	2	02/13/23 10:12	EPA 6020B	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
---	--	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01)			Matrix: Water			Batch: W3B1025		
<i>Batch: W3B1025</i>								
2,4-D	ND	0.34	0.50	ug/l	1	02/25/23 08:34	EPA 8151A	
2,4-DB	ND	0.99	2.5	ug/l	1	02/25/23 08:34	EPA 8151A	
2,4,5-T	ND	0.14	0.25	ug/l	1	02/25/23 08:34	EPA 8151A	
2,4,5-TP (Silvex)	ND	0.14	0.25	ug/l	1	02/25/23 08:34	EPA 8151A	
3,5-Dichlorobenzoic acid	ND	0.28	1.2	ug/l	1	02/25/23 08:34	EPA 8151A	
4-Nitrophenol	ND	0.50	1.2	ug/l	1	02/25/23 08:34	EPA 8151A	
Acifluorfen	ND	0.24	0.50	ug/l	1	02/25/23 08:34	EPA 8151A	
Bentazon	ND	0.55	2.5	ug/l	1	02/25/23 08:34	EPA 8151A	
Dalapon	ND	0.16	0.50	ug/l	1	02/25/23 08:34	EPA 8151A	
Dicamba	ND	0.19	0.75	ug/l	1	02/25/23 08:34	EPA 8151A	
Dichloroprop	ND	0.24	1.0	ug/l	1	02/25/23 08:34	EPA 8151A	
Dinoseb	ND	0.090	0.50	ug/l	1	02/25/23 08:34	EPA 8151A	
DCPA	ND	0.20	0.25	ug/l	1	02/25/23 08:34	EPA 8151A	
MCPA	ND	40	100	ug/l	1	02/25/23 08:34	EPA 8151A	
MCPP	ND	27	100	ug/l	1	02/25/23 08:34	EPA 8151A	
Pentachlorophenol	ND	0.18	0.25	ug/l	1	02/25/23 08:34	EPA 8151A	
Picloram	ND	0.13	0.75	ug/l	1	02/25/23 08:34	EPA 8151A	
<i>Batch: W3B1025</i>								
<i>Surrogate: 2,4-DCAA</i>		<i>Recovery: 91 %</i>		<i>Limits: 56-156 %</i>		<i>1</i>	<i>02/25/23 08:34</i>	<i>EPA 8151A</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Hexavalent Chromium by IC

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MFA-B3A-20230207-GW-36.0 (A3B0217-01)				Matrix: Water		Batch: W3B1145		
Batch: W3B1145								
Chromium 6+	0.057	0.0079	0.020	ug/l	1	02/14/23 16:44	EPA 218.6	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0657 - EPA 3510C (Fuels/Acid Ext.)						Water						
Blank (23B0657-BLK1)			Prepared: 02/17/23 07:46 Analyzed: 02/18/23 01:45									
<u>NWTPH-Dx</u>												
Diesel	ND	0.100	0.200	mg/L	1	---	---	---	---	---	---	
Oil	ND	0.200	0.400	mg/L	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 131 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (23B0657-BS1)			Prepared: 02/17/23 07:46 Analyzed: 02/18/23 02:08									
<u>NWTPH-Dx</u>												
Diesel	0.860	0.100	0.200	mg/L	1	1.25	---	69	36-132%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS Dup (23B0657-BSD1)			Prepared: 02/17/23 07:46 Analyzed: 02/18/23 02:32 Q-19									
<u>NWTPH-Dx</u>												
Diesel	0.782	0.100	0.200	mg/L	1	1.25	---	63	36-132%	9	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Blank (23B0344-BLK1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 12:18									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	---	---	---	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 92 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>105 %</i>		<i>50-150 %</i>		<i>"</i>						
LCS (23B0344-BS2)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 11:44									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.543	0.0500	0.100	mg/L	1	0.500	---	109	80-120%	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 101 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0344-DUP1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 13:47									
<u>QC Source Sample: Non-SDG (A3B0269-13)</u>												
Gasoline Range Organics	0.485	0.0500	0.100	mg/L	1	---	0.419	---	---	15	30%	F-12
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>110 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0344-DUP2)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 14:54									
<u>QC Source Sample: Non-SDG (A3B0270-01)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 99 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>110 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
Blank (23B0509-BLK1)			Prepared: 02/14/23 08:30 Analyzed: 02/14/23 10:53									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	---	---	---	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>107 %</i>		<i>50-150 %</i>		<i>"</i>						
LCS (23B0509-BS2)			Prepared: 02/14/23 08:30 Analyzed: 02/14/23 10:31									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.515	0.0500	0.100	mg/L	1	0.500	---	103	80-120%	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 101 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>106 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0509-DUP1)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 12:00									
<u>QC Source Sample: Non-SDG (A3B0393-04)</u>												
Gasoline Range Organics	0.169	0.0500	0.100	mg/L	1	---	0.162	---	---	5	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 101 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>109 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0509-DUP2)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 13:29									
<u>QC Source Sample: Non-SDG (A3B0406-03)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>108 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	--

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Blank (23B0344-BLK1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 12:18									
EPA 8260D												
Acetone	ND	10.0	20.0	ug/L	1	---	---	---	---	---	---	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Benzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	5.00	5.00	ug/L	1	---	---	---	---	---	---	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	5.00	5.00	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Blank (23B0344-BLK1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 12:18									
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	

Surr: 1,4-Difluorobenzene (Surr)

Recovery: 94 % Limits: 80-120 %

Dilution: 1x

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Blank (23B0344-BLK1)						Prepared: 02/09/23 08:37 Analyzed: 02/09/23 12:18						
Surr: Toluene-d8 (Surr)		Recovery: 107 %		Limits: 80-120 %		Dilution: 1x						
4-Bromofluorobenzene (Surr)		100 %		80-120 %		"						
LCS (23B0344-BS1)						Prepared: 02/09/23 08:37 Analyzed: 02/09/23 10:43						
EPA 8260D												
Acetone	42.3	10.0	20.0	ug/L	1	40.0	---	106	80-120%	---	---	ICV-01
Acrylonitrile	17.6	1.00	2.00	ug/L	1	20.0	---	88	80-120%	---	---	
Benzene	19.2	0.100	0.200	ug/L	1	20.0	---	96	80-120%	---	---	
Bromobenzene	18.6	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
Bromochloromethane	21.7	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
Bromodichloromethane	21.0	0.500	1.00	ug/L	1	20.0	---	105	80-120%	---	---	
Bromoform	21.7	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
Bromomethane	20.3	5.00	5.00	ug/L	1	20.0	---	101	80-120%	---	---	
2-Butanone (MEK)	37.0	5.00	10.0	ug/L	1	40.0	---	92	80-120%	---	---	ICV-01
n-Butylbenzene	22.4	0.500	1.00	ug/L	1	20.0	---	112	80-120%	---	---	
sec-Butylbenzene	21.8	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
tert-Butylbenzene	20.0	0.500	1.00	ug/L	1	20.0	---	100	80-120%	---	---	
Carbon disulfide	21.1	5.00	10.0	ug/L	1	20.0	---	105	80-120%	---	---	
Carbon tetrachloride	24.0	0.500	1.00	ug/L	1	20.0	---	120	80-120%	---	---	
Chlorobenzene	20.5	0.250	0.500	ug/L	1	20.0	---	102	80-120%	---	---	
Chloroethane	27.8	5.00	5.00	ug/L	1	20.0	---	139	80-120%	---	---	Q-56
Chloroform	21.2	0.500	1.00	ug/L	1	20.0	---	106	80-120%	---	---	
Chloromethane	17.3	2.50	5.00	ug/L	1	20.0	---	87	80-120%	---	---	
2-Chlorotoluene	19.5	0.500	1.00	ug/L	1	20.0	---	97	80-120%	---	---	
4-Chlorotoluene	19.6	0.500	1.00	ug/L	1	20.0	---	98	80-120%	---	---	
Dibromochloromethane	21.8	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
1,2-Dibromo-3-chloropropane	16.7	2.50	5.00	ug/L	1	20.0	---	83	80-120%	---	---	
1,2-Dibromoethane (EDB)	20.0	0.250	0.500	ug/L	1	20.0	---	100	80-120%	---	---	
Dibromomethane	20.1	0.500	1.00	ug/L	1	20.0	---	100	80-120%	---	---	
1,2-Dichlorobenzene	19.7	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
1,3-Dichlorobenzene	19.5	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
1,4-Dichlorobenzene	18.9	0.250	0.500	ug/L	1	20.0	---	95	80-120%	---	---	
Dichlorodifluoromethane	23.6	0.500	1.00	ug/L	1	20.0	---	118	80-120%	---	---	
1,1-Dichloroethane	20.1	0.200	0.400	ug/L	1	20.0	---	100	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
LCS (23B0344-BS1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 10:43									
1,2-Dichloroethane (EDC)	22.1	0.200	0.400	ug/L	1	20.0	---	110	80-120%	---	---	
1,1-Dichloroethene	23.0	0.200	0.400	ug/L	1	20.0	---	115	80-120%	---	---	
cis-1,2-Dichloroethene	19.2	0.200	0.400	ug/L	1	20.0	---	96	80-120%	---	---	
trans-1,2-Dichloroethene	20.1	0.200	0.400	ug/L	1	20.0	---	100	80-120%	---	---	
1,2-Dichloropropane	18.3	0.250	0.500	ug/L	1	20.0	---	92	80-120%	---	---	
1,3-Dichloropropane	20.7	0.500	1.00	ug/L	1	20.0	---	104	80-120%	---	---	
2,2-Dichloropropane	22.1	0.500	1.00	ug/L	1	20.0	---	110	80-120%	---	---	
1,1-Dichloropropene	19.8	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
cis-1,3-Dichloropropene	21.0	0.500	1.00	ug/L	1	20.0	---	105	80-120%	---	---	
trans-1,3-Dichloropropene	22.9	0.500	1.00	ug/L	1	20.0	---	114	80-120%	---	---	
Ethylbenzene	21.6	0.250	0.500	ug/L	1	20.0	---	108	80-120%	---	---	
Hexachlorobutadiene	19.9	2.50	5.00	ug/L	1	20.0	---	99	80-120%	---	---	
2-Hexanone	38.2	5.00	10.0	ug/L	1	40.0	---	95	80-120%	---	---	
Isopropylbenzene	21.8	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
4-Isopropyltoluene	21.1	0.500	1.00	ug/L	1	20.0	---	106	80-120%	---	---	
Methylene chloride	19.4	5.00	10.0	ug/L	1	20.0	---	97	80-120%	---	---	
4-Methyl-2-pentanone (MiBK)	40.5	5.00	10.0	ug/L	1	40.0	---	101	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	17.9	0.500	1.00	ug/L	1	20.0	---	89	80-120%	---	---	
Naphthalene	17.5	1.00	2.00	ug/L	1	20.0	---	87	80-120%	---	---	
n-Propylbenzene	21.2	0.250	0.500	ug/L	1	20.0	---	106	80-120%	---	---	
Styrene	20.6	0.500	1.00	ug/L	1	20.0	---	103	80-120%	---	---	
1,1,1,2-Tetrachloroethane	20.0	0.200	0.400	ug/L	1	20.0	---	100	80-120%	---	---	
1,1,2,2-Tetrachloroethane	20.7	0.250	0.500	ug/L	1	20.0	---	104	80-120%	---	---	
Tetrachloroethene (PCE)	19.8	0.200	0.400	ug/L	1	20.0	---	99	80-120%	---	---	
Toluene	20.4	0.500	1.00	ug/L	1	20.0	---	102	80-120%	---	---	
1,2,3-Trichlorobenzene	19.1	1.00	2.00	ug/L	1	20.0	---	96	80-120%	---	---	
1,2,4-Trichlorobenzene	17.1	1.00	2.00	ug/L	1	20.0	---	85	80-120%	---	---	
1,1,1-Trichloroethane	22.1	0.200	0.400	ug/L	1	20.0	---	111	80-120%	---	---	
1,1,2-Trichloroethane	20.2	0.250	0.500	ug/L	1	20.0	---	101	80-120%	---	---	
Trichloroethene (TCE)	16.6	0.200	0.400	ug/L	1	20.0	---	83	80-120%	---	---	
Trichlorofluoromethane	26.7	1.00	2.00	ug/L	1	20.0	---	133	80-120%	---	---	Q-56
1,2,3-Trichloropropane	20.9	0.500	1.00	ug/L	1	20.0	---	104	80-120%	---	---	
1,2,4-Trimethylbenzene	21.6	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
1,3,5-Trimethylbenzene	20.9	0.500	1.00	ug/L	1	20.0	---	104	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
LCS (23B0344-BS1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 10:43									
Vinyl chloride	19.8	0.200	0.400	ug/L	1	20.0	---	99	80-120%	---	---	
m,p-Xylene	43.3	0.500	1.00	ug/L	1	40.0	---	108	80-120%	---	---	
o-Xylene	20.8	0.250	0.500	ug/L	1	20.0	---	104	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 90%</i>		<i>Limits: 80-120%</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>103%</i>		<i>80-120%</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>90%</i>		<i>80-120%</i>		<i>"</i>						

Duplicate (23B0344-DUP1)												
Prepared: 02/09/23 08:37 Analyzed: 02/09/23 13:47												
QC Source Sample: Non-SDG (A3B0269-13)												
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Acetone	ND	20.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	0.820	0.500	1.00	ug/L	1	---	0.630	---	---	26	30%	Ja
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C												
Water												
Duplicate (23B0344-DUP1)												
Prepared: 02/09/23 08:37 Analyzed: 02/09/23 13:47												
QC Source Sample: Non-SDG (A3B0269-13)												
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	13.7	0.200	0.400	ug/L	1	---	13.2	---	---	4	30%	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Hexanone	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Styrene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	170	0.200	0.400	ug/L	1	---	145	---	---	16	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Duplicate (23B0344-DUP1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 13:47									
QC Source Sample: Non-SDG (A3B0269-13)												
Trichloroethene (TCE)	18.9	0.200	0.400	ug/L	1	---	16.8	---	---	12	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97%</i>		<i>Limits: 80-120%</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>106%</i>		<i>80-120%</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>97%</i>		<i>80-120%</i>		<i>"</i>						

Duplicate (23B0344-DUP2)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 14:54									
QC Source Sample: Non-SDG (A3B0270-01)												
Acetone	ND	20.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Duplicate (23B0344-DUP2)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 14:54									
QC Source Sample: Non-SDG (A3B0270-01)												
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Hexanone	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Styrene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Duplicate (23B0344-DUP2)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 14:54									
QC Source Sample: Non-SDG (A3B0270-01)												
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97%</i>		<i>Limits: 80-120%</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>106%</i>		<i>80-120%</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>97%</i>		<i>80-120%</i>		<i>"</i>						

Matrix Spike (23B0344-MS1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 21:58									
QC Source Sample: Non-SDG (A3B0266-01)												
EPA 8260D												
Acetone	39.4	10.0	20.0	ug/L	1	40.0	ND	98	39-160%	---	---	ICV-01
Acrylonitrile	15.8	1.00	2.00	ug/L	1	20.0	ND	79	63-135%	---	---	
Benzene	19.7	0.100	0.200	ug/L	1	20.0	2.66	85	79-120%	---	---	
Bromobenzene	15.1	0.250	0.500	ug/L	1	20.0	ND	76	80-120%	---	---	Q-01
Bromochloromethane	19.0	0.500	1.00	ug/L	1	20.0	ND	95	78-123%	---	---	
Bromodichloromethane	19.0	0.500	1.00	ug/L	1	20.0	ND	95	79-125%	---	---	
Bromoform	18.9	0.500	1.00	ug/L	1	20.0	ND	94	66-130%	---	---	
Bromomethane	21.6	5.00	5.00	ug/L	1	20.0	ND	108	53-141%	---	---	
2-Butanone (MEK)	31.7	5.00	10.0	ug/L	1	40.0	ND	79	56-143%	---	---	ICV-01
n-Butylbenzene	18.3	0.500	1.00	ug/L	1	20.0	ND	92	75-128%	---	---	
sec-Butylbenzene	18.4	0.500	1.00	ug/L	1	20.0	ND	92	77-126%	---	---	
tert-Butylbenzene	16.9	0.500	1.00	ug/L	1	20.0	ND	85	78-124%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Matrix Spike (23B0344-MS1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 21:58									
QC Source Sample: Non-SDG (A3B0266-01)												
Carbon disulfide	19.0	5.00	10.0	ug/L	1	20.0	ND	95	64-133%	---	---	
Carbon tetrachloride	21.2	0.500	1.00	ug/L	1	20.0	ND	106	72-136%	---	---	
Chlorobenzene	17.3	0.250	0.500	ug/L	1	20.0	ND	87	80-120%	---	---	
Chloroethane	28.8	5.00	5.00	ug/L	1	20.0	ND	144	60-138%	---	---	Q-54c
Chloroform	18.9	0.500	1.00	ug/L	1	20.0	ND	94	79-124%	---	---	
Chloromethane	16.6	2.50	5.00	ug/L	1	20.0	ND	83	50-139%	---	---	
2-Chlorotoluene	15.9	0.500	1.00	ug/L	1	20.0	ND	80	79-122%	---	---	
4-Chlorotoluene	15.7	0.500	1.00	ug/L	1	20.0	ND	78	78-122%	---	---	
Dibromochloromethane	18.5	0.500	1.00	ug/L	1	20.0	ND	93	74-126%	---	---	
1,2-Dibromo-3-chloropropane	13.3	2.50	5.00	ug/L	1	20.0	ND	66	62-128%	---	---	
1,2-Dibromoethane (EDB)	16.9	0.250	0.500	ug/L	1	20.0	ND	84	77-121%	---	---	
Dibromomethane	17.3	0.500	1.00	ug/L	1	20.0	ND	87	79-123%	---	---	
1,2-Dichlorobenzene	16.5	0.250	0.500	ug/L	1	20.0	ND	83	80-120%	---	---	
1,3-Dichlorobenzene	16.5	0.250	0.500	ug/L	1	20.0	ND	82	80-120%	---	---	
1,4-Dichlorobenzene	16.2	0.250	0.500	ug/L	1	20.0	ND	81	79-120%	---	---	
Dichlorodifluoromethane	22.0	0.500	1.00	ug/L	1	20.0	ND	110	32-152%	---	---	
1,1-Dichloroethane	18.5	0.200	0.400	ug/L	1	20.0	ND	93	77-125%	---	---	
1,2-Dichloroethane (EDC)	20.0	0.200	0.400	ug/L	1	20.0	ND	100	73-128%	---	---	
1,1-Dichloroethene	20.6	0.200	0.400	ug/L	1	20.0	ND	103	71-131%	---	---	
cis-1,2-Dichloroethene	16.6	0.200	0.400	ug/L	1	20.0	ND	83	78-123%	---	---	
trans-1,2-Dichloroethene	18.1	0.200	0.400	ug/L	1	20.0	ND	90	75-124%	---	---	
1,2-Dichloropropane	16.8	0.250	0.500	ug/L	1	20.0	ND	84	78-122%	---	---	
1,3-Dichloropropane	17.3	0.500	1.00	ug/L	1	20.0	ND	86	80-120%	---	---	
2,2-Dichloropropane	17.2	0.500	1.00	ug/L	1	20.0	ND	86	60-139%	---	---	
1,1-Dichloropropene	17.8	0.500	1.00	ug/L	1	20.0	ND	89	79-125%	---	---	
cis-1,3-Dichloropropene	15.6	0.500	1.00	ug/L	1	20.0	ND	78	75-124%	---	---	
trans-1,3-Dichloropropene	18.8	0.500	1.00	ug/L	1	20.0	ND	94	73-127%	---	---	
Ethylbenzene	18.2	0.250	0.500	ug/L	1	20.0	ND	91	79-121%	---	---	
Hexachlorobutadiene	15.6	2.50	5.00	ug/L	1	20.0	ND	78	66-134%	---	---	
2-Hexanone	30.6	5.00	10.0	ug/L	1	40.0	ND	76	57-139%	---	---	
Isopropylbenzene	18.6	0.500	1.00	ug/L	1	20.0	ND	93	72-131%	---	---	
4-Isopropyltoluene	17.7	0.500	1.00	ug/L	1	20.0	ND	89	77-127%	---	---	
Methylene chloride	17.2	5.00	10.0	ug/L	1	20.0	ND	86	74-124%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0344 - EPA 5030C						Water						
Matrix Spike (23B0344-MS1)			Prepared: 02/09/23 08:37 Analyzed: 02/09/23 21:58									
QC Source Sample: Non-SDG (A3B0266-01)												
4-Methyl-2-pentanone (MiBK)	32.7	5.00	10.0	ug/L	1	40.0	ND	82	67-130%	---	---	
Methyl tert-butyl ether (MTBE)	15.5	0.500	1.00	ug/L	1	20.0	ND	78	71-124%	---	---	
Naphthalene	14.2	1.00	2.00	ug/L	1	20.0	ND	71	61-128%	---	---	
n-Propylbenzene	17.5	0.250	0.500	ug/L	1	20.0	ND	88	76-126%	---	---	
Styrene	17.0	0.500	1.00	ug/L	1	20.0	ND	85	78-123%	---	---	
1,1,1,2-Tetrachloroethane	17.0	0.200	0.400	ug/L	1	20.0	ND	85	78-124%	---	---	
1,1,1,2,2-Tetrachloroethane	16.6	0.250	0.500	ug/L	1	20.0	ND	83	71-121%	---	---	
Tetrachloroethene (PCE)	17.0	0.200	0.400	ug/L	1	20.0	ND	85	74-129%	---	---	
Toluene	17.5	0.500	1.00	ug/L	1	20.0	ND	87	80-121%	---	---	
1,2,3-Trichlorobenzene	16.0	1.00	2.00	ug/L	1	20.0	ND	80	69-129%	---	---	
1,2,4-Trichlorobenzene	13.8	1.00	2.00	ug/L	1	20.0	ND	69	69-130%	---	---	
1,1,1-Trichloroethane	20.8	0.200	0.400	ug/L	1	20.0	ND	104	74-131%	---	---	
1,1,2-Trichloroethane	17.2	0.250	0.500	ug/L	1	20.0	ND	86	80-120%	---	---	
Trichloroethene (TCE)	14.9	0.200	0.400	ug/L	1	20.0	ND	74	79-123%	---	---	Q-01
Trichlorofluoromethane	25.6	1.00	2.00	ug/L	1	20.0	ND	128	65-141%	---	---	Q-54a
1,2,3-Trichloropropane	17.3	0.500	1.00	ug/L	1	20.0	ND	86	73-122%	---	---	
1,2,4-Trimethylbenzene	17.6	0.500	1.00	ug/L	1	20.0	ND	88	76-124%	---	---	
1,3,5-Trimethylbenzene	16.9	0.500	1.00	ug/L	1	20.0	ND	84	75-124%	---	---	
Vinyl chloride	19.6	0.200	0.400	ug/L	1	20.0	ND	98	58-137%	---	---	
m,p-Xylene	36.9	0.500	1.00	ug/L	1	40.0	ND	92	80-121%	---	---	
o-Xylene	17.1	0.250	0.500	ug/L	1	20.0	ND	86	78-122%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>86 %</i>		<i>80-120 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
Blank (23B0509-BLK1)			Prepared: 02/14/23 08:30 Analyzed: 02/14/23 10:53									
EPA 8260D												
Acetone	ND	10.0	20.0	ug/L	1	---	---	---	---	---	---	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Benzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	5.00	5.00	ug/L	1	---	---	---	---	---	---	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	5.00	5.00	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
Blank (23B0509-BLK1)			Prepared: 02/14/23 08:30 Analyzed: 02/14/23 10:53									
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	

Surr: 1,4-Difluorobenzene (Surr) Recovery: 95 % Limits: 80-120 % Dilution: 1x

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
Blank (23B0509-BLK1)						Prepared: 02/14/23 08:30 Analyzed: 02/14/23 10:53						
<i>Surr: Toluene-d8 (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
LCS (23B0509-BS1)						Prepared: 02/14/23 08:30 Analyzed: 02/14/23 09:58						
EPA 8260D												
Acetone	39.5	10.0	20.0	ug/L	1	40.0	---	99	80-120%	---	---	ICV-01
Acrylonitrile	19.9	1.00	2.00	ug/L	1	20.0	---	99	80-120%	---	---	
Benzene	19.3	0.100	0.200	ug/L	1	20.0	---	97	80-120%	---	---	
Bromobenzene	18.6	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
Bromochloromethane	22.5	0.500	1.00	ug/L	1	20.0	---	112	80-120%	---	---	
Bromodichloromethane	21.8	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
Bromoform	22.4	0.500	1.00	ug/L	1	20.0	---	112	80-120%	---	---	
Bromomethane	24.2	5.00	5.00	ug/L	1	20.0	---	121	80-120%	---	---	Q-56
2-Butanone (MEK)	38.2	5.00	10.0	ug/L	1	40.0	---	96	80-120%	---	---	ICV-01
n-Butylbenzene	21.5	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
sec-Butylbenzene	21.6	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
tert-Butylbenzene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
Carbon disulfide	21.6	5.00	10.0	ug/L	1	20.0	---	108	80-120%	---	---	
Carbon tetrachloride	23.7	0.500	1.00	ug/L	1	20.0	---	119	80-120%	---	---	
Chlorobenzene	19.8	0.250	0.500	ug/L	1	20.0	---	99	80-120%	---	---	
Chloroethane	34.9	5.00	5.00	ug/L	1	20.0	---	175	80-120%	---	---	Q-56
Chloroform	21.4	0.500	1.00	ug/L	1	20.0	---	107	80-120%	---	---	
Chloromethane	19.3	2.50	5.00	ug/L	1	20.0	---	97	80-120%	---	---	
2-Chlorotoluene	19.7	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
4-Chlorotoluene	19.3	0.500	1.00	ug/L	1	20.0	---	96	80-120%	---	---	
Dibromochloromethane	21.5	0.500	1.00	ug/L	1	20.0	---	107	80-120%	---	---	
1,2-Dibromo-3-chloropropane	16.3	2.50	5.00	ug/L	1	20.0	---	81	80-120%	---	---	
1,2-Dibromoethane (EDB)	19.5	0.250	0.500	ug/L	1	20.0	---	97	80-120%	---	---	
Dibromomethane	20.7	0.500	1.00	ug/L	1	20.0	---	103	80-120%	---	---	
1,2-Dichlorobenzene	20.3	0.250	0.500	ug/L	1	20.0	---	101	80-120%	---	---	
1,3-Dichlorobenzene	19.8	0.250	0.500	ug/L	1	20.0	---	99	80-120%	---	---	
1,4-Dichlorobenzene	19.6	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
Dichlorodifluoromethane	23.2	0.500	1.00	ug/L	1	20.0	---	116	80-120%	---	---	
1,1-Dichloroethane	20.8	0.200	0.400	ug/L	1	20.0	---	104	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
LCS (23B0509-BS1)			Prepared: 02/14/23 08:30 Analyzed: 02/14/23 09:58									
1,2-Dichloroethane (EDC)	22.7	0.200	0.400	ug/L	1	20.0	---	114	80-120%	---	---	
1,1-Dichloroethene	22.6	0.200	0.400	ug/L	1	20.0	---	113	80-120%	---	---	
cis-1,2-Dichloroethene	19.7	0.200	0.400	ug/L	1	20.0	---	98	80-120%	---	---	
trans-1,2-Dichloroethene	19.8	0.200	0.400	ug/L	1	20.0	---	99	80-120%	---	---	
1,2-Dichloropropane	19.3	0.250	0.500	ug/L	1	20.0	---	97	80-120%	---	---	
1,3-Dichloropropane	20.5	0.500	1.00	ug/L	1	20.0	---	102	80-120%	---	---	
2,2-Dichloropropane	22.0	0.500	1.00	ug/L	1	20.0	---	110	80-120%	---	---	
1,1-Dichloropropene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
cis-1,3-Dichloropropene	20.0	0.500	1.00	ug/L	1	20.0	---	100	80-120%	---	---	
trans-1,3-Dichloropropene	22.7	0.500	1.00	ug/L	1	20.0	---	114	80-120%	---	---	
Ethylbenzene	20.4	0.250	0.500	ug/L	1	20.0	---	102	80-120%	---	---	
Hexachlorobutadiene	19.5	2.50	5.00	ug/L	1	20.0	---	97	80-120%	---	---	
2-Hexanone	37.3	5.00	10.0	ug/L	1	40.0	---	93	80-120%	---	---	
Isopropylbenzene	20.8	0.500	1.00	ug/L	1	20.0	---	104	80-120%	---	---	
4-Isopropyltoluene	21.0	0.500	1.00	ug/L	1	20.0	---	105	80-120%	---	---	
Methylene chloride	20.0	5.00	10.0	ug/L	1	20.0	---	100	80-120%	---	---	
4-Methyl-2-pentanone (MiBK)	38.6	5.00	10.0	ug/L	1	40.0	---	96	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	18.4	0.500	1.00	ug/L	1	20.0	---	92	80-120%	---	---	
Naphthalene	17.6	1.00	2.00	ug/L	1	20.0	---	88	80-120%	---	---	
n-Propylbenzene	20.6	0.250	0.500	ug/L	1	20.0	---	103	80-120%	---	---	
Styrene	20.4	0.500	1.00	ug/L	1	20.0	---	102	80-120%	---	---	
1,1,1,2-Tetrachloroethane	19.5	0.200	0.400	ug/L	1	20.0	---	97	80-120%	---	---	
1,1,2,2-Tetrachloroethane	20.1	0.250	0.500	ug/L	1	20.0	---	100	80-120%	---	---	
Tetrachloroethene (PCE)	19.2	0.200	0.400	ug/L	1	20.0	---	96	80-120%	---	---	
Toluene	19.3	0.500	1.00	ug/L	1	20.0	---	97	80-120%	---	---	
1,2,3-Trichlorobenzene	19.5	1.00	2.00	ug/L	1	20.0	---	97	80-120%	---	---	
1,2,4-Trichlorobenzene	17.6	1.00	2.00	ug/L	1	20.0	---	88	80-120%	---	---	
1,1,1-Trichloroethane	22.1	0.200	0.400	ug/L	1	20.0	---	111	80-120%	---	---	
1,1,2-Trichloroethane	20.8	0.250	0.500	ug/L	1	20.0	---	104	80-120%	---	---	
Trichloroethene (TCE)	18.2	0.200	0.400	ug/L	1	20.0	---	91	80-120%	---	---	
Trichlorofluoromethane	27.4	1.00	2.00	ug/L	1	20.0	---	137	80-120%	---	---	Q-56
1,2,3-Trichloropropane	21.7	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
1,2,4-Trimethylbenzene	21.5	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
1,3,5-Trimethylbenzene	20.5	0.500	1.00	ug/L	1	20.0	---	102	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
LCS (23B0509-BS1)			Prepared: 02/14/23 08:30 Analyzed: 02/14/23 09:58									
Vinyl chloride	22.2	0.200	0.400	ug/L	1	20.0	---	111	80-120%	---	---	
m,p-Xylene	41.3	0.500	1.00	ug/L	1	40.0	---	103	80-120%	---	---	
o-Xylene	19.6	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>91 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23B0509-DUP1)						Prepared: 02/14/23 10:22 Analyzed: 02/14/23 12:00						
QC Source Sample: Non-SDG (A3B0393-04)												
Acetone	ND	10.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	11.4	0.100	0.200	ug/L	1	---	11.3	---	---	1	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for various VOCs like 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, etc.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C												
Water												
Duplicate (23B0509-DUP1)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 12:00									
QC Source Sample: Non-SDG (A3B0393-04)												
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	2.85	0.500	1.00	ug/L	1	---	2.73	---	---	4	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	0.840	0.500	1.00	ug/L	1	---	0.760	---	---	10	30%	Ja
o-Xylene	5.89	0.250	0.500	ug/L	1	---	5.58	---	---	5	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 94 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23B0509-DUP2)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 13:29									
QC Source Sample: Non-SDG (A3B0406-03)												
Acetone	ND	10.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for Batch 23B0509 - EPA 5030C, Water, Duplicate (23B0509-DUP2), and QC Source Sample: Non-SDG (A3B0406-03).

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C												
Water												
Duplicate (23B0509-DUP2)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 13:29									
QC Source Sample: Non-SDG (A3B0406-03)												
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						

Matrix Spike (23B0509-MS1)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 14:35									
QC Source Sample: Non-SDG (A3B0406-06)												
EPA 8260D												
Acetone	1090	10.0	20.0	ug/L	1	40.0	1070	47	39-160%	---	---	E, ICV-01
Acrylonitrile	22.5	1.00	2.00	ug/L	1	20.0	ND	99	63-135%	---	---	
Benzene	48.9	0.100	0.200	ug/L	1	20.0	29.5	97	79-120%	---	---	
Bromobenzene	18.5	0.250	0.500	ug/L	1	20.0	ND	92	80-120%	---	---	
Bromochloromethane	21.1	0.500	1.00	ug/L	1	20.0	ND	106	78-123%	---	---	
Bromodichloromethane	21.2	0.500	1.00	ug/L	1	20.0	ND	106	79-125%	---	---	
Bromoform	20.2	0.500	1.00	ug/L	1	20.0	ND	101	66-130%	---	---	
Bromomethane	82.5	5.00	5.00	ug/L	1	20.0	61.0	108	53-141%	---	---	Q-54
2-Butanone (MEK)	113	5.00	10.0	ug/L	1	40.0	69.1	110	56-143%	---	---	ICV-01
n-Butylbenzene	23.5	0.500	1.00	ug/L	1	20.0	0.690	114	75-128%	---	---	
sec-Butylbenzene	21.4	0.500	1.00	ug/L	1	20.0	1.07	102	77-126%	---	---	
tert-Butylbenzene	19.7	0.500	1.00	ug/L	1	20.0	ND	99	78-124%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

Project: St. Helens Lagoon
Project Number: M0830.03.006
Project Manager: David Weatherby

Report ID:
A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes rows for various compounds like Carbon disulfide, Chlorobenzene, etc.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Handwritten signature of Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0509 - EPA 5030C						Water						
Matrix Spike (23B0509-MS1)			Prepared: 02/14/23 10:22 Analyzed: 02/14/23 14:35									
QC Source Sample: Non-SDG (A3B0406-06)												
4-Methyl-2-pentanone (MiBK)	64.1	5.00	10.0	ug/L	1	40.0	22.9	103	67-130%	---	---	
Methyl tert-butyl ether (MTBE)	18.6	0.500	1.00	ug/L	1	20.0	ND	93	71-124%	---	---	
Naphthalene	95.8	1.00	2.00	ug/L	1	20.0	83.8	60	61-128%	---	---	Q-03
n-Propylbenzene	40.6	0.250	0.500	ug/L	1	20.0	21.4	96	76-126%	---	---	
Styrene	18.8	0.500	1.00	ug/L	1	20.0	ND	94	78-123%	---	---	
1,1,1,2-Tetrachloroethane	18.4	0.200	0.400	ug/L	1	20.0	ND	92	78-124%	---	---	
1,1,1,2,2-Tetrachloroethane	20.4	0.250	0.500	ug/L	1	20.0	ND	102	71-121%	---	---	
Tetrachloroethene (PCE)	19.9	0.200	0.400	ug/L	1	20.0	ND	100	74-129%	---	---	
Toluene	116	0.500	1.00	ug/L	1	20.0	107	43	80-121%	---	---	Q-01
1,2,3-Trichlorobenzene	19.4	1.00	2.00	ug/L	1	20.0	ND	97	69-129%	---	---	
1,2,4-Trichlorobenzene	18.0	1.00	2.00	ug/L	1	20.0	ND	90	69-130%	---	---	
1,1,1-Trichloroethane	22.3	0.200	0.400	ug/L	1	20.0	ND	111	74-131%	---	---	
1,1,2-Trichloroethane	19.3	0.250	0.500	ug/L	1	20.0	ND	97	80-120%	---	---	
Trichloroethene (TCE)	18.3	0.200	0.400	ug/L	1	20.0	ND	92	79-123%	---	---	
Trichlorofluoromethane	27.0	1.00	2.00	ug/L	1	20.0	ND	135	65-141%	---	---	Q-54b
1,2,3-Trichloropropane	20.8	0.500	1.00	ug/L	1	20.0	ND	104	73-122%	---	---	
1,2,4-Trimethylbenzene	264	0.500	1.00	ug/L	1	20.0	269	-25	76-124%	---	---	E, Q-03
1,3,5-Trimethylbenzene	84.9	0.500	1.00	ug/L	1	20.0	69.3	78	75-124%	---	---	
Vinyl chloride	25.1	0.200	0.400	ug/L	1	20.0	ND	126	58-137%	---	---	
m,p-Xylene	627	0.500	1.00	ug/L	1	40.0	802	-437	80-121%	---	---	Q-03, E
o-Xylene	393	0.250	0.500	ug/L	1	20.0	443	-251	78-122%	---	---	E, Q-03
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>95 %</i>		<i>80-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C						Water						
Blank (23B0743-BLK1)			Prepared: 02/20/23 13:10 Analyzed: 02/20/23 15:45									
EPA 8260D SIM												
Benzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (23B0743-BS1)			Prepared: 02/20/23 13:10 Analyzed: 02/20/23 14:52									
EPA 8260D SIM												
Benzene	0.227	0.0500	0.100	ug/L	1	0.200	---	114	80-120%	---	---	
Toluene	0.209	0.0500	0.100	ug/L	1	0.200	---	105	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C												
Water												
LCS (23B0743-BS1)												
Prepared: 02/20/23 13:10 Analyzed: 02/20/23 14:52												
Ethylbenzene	0.202	0.0500	0.100	ug/L	1	0.200	---	101	80-120%	---	---	
m,p-Xylene	0.408	0.100	0.200	ug/L	1	0.400	---	102	80-120%	---	---	
o-Xylene	0.204	0.0500	0.100	ug/L	1	0.200	---	102	80-120%	---	---	
1,2,4-Trimethylbenzene	0.207	0.0500	0.100	ug/L	1	0.200	---	104	80-120%	---	---	
1,3,5-Trimethylbenzene	0.205	0.0500	0.100	ug/L	1	0.200	---	103	80-120%	---	---	
Chloroform	0.232	0.0500	0.100	ug/L	1	0.200	---	116	80-120%	---	---	
1,2-Dibromo-3-chloropropane	0.202	0.100	0.200	ug/L	1	0.200	---	101	80-120%	---	---	
1,2-Dibromoethane (EDB)	0.199	0.0100	0.0200	ug/L	1	0.200	---	100	80-120%	---	---	
1,1-Dichloroethane	0.234	0.0100	0.0200	ug/L	1	0.200	---	117	80-120%	---	---	
1,2-Dichloroethane (EDC)	0.221	0.0100	0.0200	ug/L	1	0.200	---	111	80-120%	---	---	
1,1-Dichloroethene	0.228	0.0100	0.0200	ug/L	1	0.200	---	114	80-120%	---	---	
cis-1,2-Dichloroethene	0.235	0.0100	0.0200	ug/L	1	0.200	---	118	80-120%	---	---	
trans-1,2-Dichloroethene	0.228	0.0100	0.0200	ug/L	1	0.200	---	114	80-120%	---	---	
1,2-Dichloropropane	0.229	0.0100	0.0200	ug/L	1	0.200	---	114	80-120%	---	---	
cis-1,3-Dichloropropene	0.202	0.0100	0.0200	ug/L	1	0.200	---	101	80-120%	---	---	
trans-1,3-Dichloropropene	0.210	0.0100	0.0200	ug/L	1	0.200	---	105	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	0.223	0.0100	0.0200	ug/L	1	0.200	---	112	80-120%	---	---	
1,1,2,2-Tetrachloroethane	0.214	0.0100	0.0200	ug/L	1	0.200	---	107	80-120%	---	---	
Tetrachloroethene (PCE)	0.196	0.0100	0.0200	ug/L	1	0.200	---	98	80-120%	---	---	
Trichloroethene (TCE)	0.219	0.0100	0.0200	ug/L	1	0.200	---	110	80-120%	---	---	
1,2,3-Trichloropropane	0.196	0.0500	0.100	ug/L	1	0.200	---	98	80-120%	---	---	
Vinyl chloride	0.227	0.0100	0.0200	ug/L	1	0.200	---	113	80-120%	---	---	
1,1,2-Trichloroethane	0.204	0.0100	0.0200	ug/L	1	0.200	---	102	80-120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		Recovery: 104 %	Limits: 80-120 %			Dilution: 1x						
Toluene-d8 (Surr)		99 %	80-120 %			"						
4-Bromofluorobenzene (Surr)		95 %	80-120 %			"						

Duplicate (23B0743-DUP1)

Prepared: 02/20/23 13:10 Analyzed: 02/20/23 17:33

QC Source Sample: Non-SDG (A3B0522-01)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Benzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C												
Water												
Duplicate (23B0743-DUP1)												
Prepared: 02/20/23 13:10 Analyzed: 02/20/23 17:33												
QC Source Sample: Non-SDG (A3B0522-01)												
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						

Matrix Spike (23B0743-MS1)

Prepared: 02/20/23 13:10 Analyzed: 02/20/23 20:14

QC Source Sample: Non-SDG (A3B0522-05)

EPA 8260D SIM

Benzene	0.192	0.0500	0.100	ug/L	1	0.200	ND	96	79-120%	---	---	
Toluene	0.166	0.0500	0.100	ug/L	1	0.200	ND	83	80-121%	---	---	
Ethylbenzene	0.147	0.0500	0.100	ug/L	1	0.200	ND	74	79-121%	---	---	Q-01
m,p-Xylene	0.285	0.100	0.200	ug/L	1	0.400	ND	71	80-121%	---	---	Q-01
o-Xylene	0.142	0.0500	0.100	ug/L	1	0.200	ND	71	78-122%	---	---	Q-01
1,2,4-Trimethylbenzene	0.142	0.0500	0.100	ug/L	1	0.200	ND	71	76-124%	---	---	Q-01

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C						Water						
Matrix Spike (23B0743-MS1)			Prepared: 02/20/23 13:10 Analyzed: 02/20/23 20:14									
QC Source Sample: Non-SDG (A3B0522-05)												
1,3,5-Trimethylbenzene	0.132	0.0500	0.100	ug/L	1	0.200	ND	66	75-124%	---	---	Q-01
Chloroform	0.179	0.0500	0.100	ug/L	1	0.200	ND	90	79-124%	---	---	
1,2-Dibromo-3-chloropropane	0.134	0.100	0.200	ug/L	1	0.200	ND	67	62-128%	---	---	Ja
1,2-Dibromoethane (EDB)	0.150	0.0100	0.0200	ug/L	1	0.200	ND	75	77-121%	---	---	Q-01
1,1-Dichloroethane	0.191	0.0100	0.0200	ug/L	1	0.200	ND	95	77-125%	---	---	
1,2-Dichloroethane (EDC)	0.177	0.0100	0.0200	ug/L	1	0.200	ND	88	73-128%	---	---	
1,1-Dichloroethene	0.196	0.0100	0.0200	ug/L	1	0.200	ND	98	71-131%	---	---	
cis-1,2-Dichloroethene	0.204	0.0100	0.0200	ug/L	1	0.200	0.0212	91	78-123%	---	---	
trans-1,2-Dichloroethene	0.190	0.0100	0.0200	ug/L	1	0.200	ND	95	75-124%	---	---	
1,2-Dichloropropane	0.178	0.0100	0.0200	ug/L	1	0.200	ND	89	78-122%	---	---	
cis-1,3-Dichloropropene	0.154	0.0100	0.0200	ug/L	1	0.200	ND	77	75-124%	---	---	
trans-1,3-Dichloropropene	0.158	0.0100	0.0200	ug/L	1	0.200	ND	79	73-127%	---	---	
Methyl tert-butyl ether (MTBE)	0.178	0.0100	0.0200	ug/L	1	0.200	ND	89	71-124%	---	---	
1,1,2,2-Tetrachloroethane	0.164	0.0100	0.0200	ug/L	1	0.200	ND	82	71-121%	---	---	
Tetrachloroethene (PCE)	0.158	0.0100	0.0200	ug/L	1	0.200	ND	79	74-129%	---	---	
Trichloroethene (TCE)	0.175	0.0100	0.0200	ug/L	1	0.200	ND	87	79-123%	---	---	
1,2,3-Trichloropropane	0.154	0.0500	0.100	ug/L	1	0.200	ND	77	73-122%	---	---	
Vinyl chloride	0.227	0.0100	0.0200	ug/L	1	0.200	ND	113	58-137%	---	---	
1,1,2-Trichloroethane	0.157	0.0100	0.0200	ug/L	1	0.200	ND	78	80-120%	---	---	Q-01
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

Project: **St. Helens Lagoon**
Project Number: **M0830.03.006**
Project Manager: **David Weatherby**

Report ID:
A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0481-BLK1)						Prepared: 02/13/23 11:36 Analyzed: 02/13/23 18:15						
EPA 8270E												
Acenaphthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	Q-30
Acenaphthylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Chrysene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluoranthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluorene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	Q-30
2-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	Q-30
Naphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	Q-30
Phenanthrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Carbazole	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	Q-30
2-Chlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Phenol	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0481-BLK1)			Prepared: 02/13/23 11:36 Analyzed: 02/13/23 18:15									
2,3,5,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Hexachlorocyclopentadiene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Chloronaphthalene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	Q-30
1,2,4-Trichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
4-Bromophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
4-Chlorophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
Aniline	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Benzoic acid	ND	1.25	2.50	ug/L	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Isophorone	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0481-BLK1)			Prepared: 02/13/23 11:36 Analyzed: 02/13/23 18:15									
Azobenzene (1,2-DPH)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Pyridine	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
1,3-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
1,4-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 72 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 1x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>55 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>24 %</i>		<i>10-133 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>93 %</i>		<i>50-134 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>42 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>63 %</i>		<i>43-140 %</i>		<i>"</i>						
LCS (23B0481-BS1)			Prepared: 02/13/23 11:36 Analyzed: 02/13/23 18:50									
EPA 8270E												
Acenaphthene	1.80	0.0400	0.0800	ug/L	4	4.00	---	45	47-122%	---	---	Q-30
Acenaphthylene	1.99	0.0400	0.0800	ug/L	4	4.00	---	50	41-130%	---	---	
Anthracene	2.95	0.0400	0.0800	ug/L	4	4.00	---	74	57-123%	---	---	
Benz(a)anthracene	3.45	0.0400	0.0800	ug/L	4	4.00	---	86	58-125%	---	---	
Benzo(a)pyrene	3.42	0.0600	0.120	ug/L	4	4.00	---	85	54-128%	---	---	
Benzo(b)fluoranthene	3.66	0.0600	0.120	ug/L	4	4.00	---	91	53-131%	---	---	
Benzo(k)fluoranthene	3.63	0.0600	0.120	ug/L	4	4.00	---	91	57-129%	---	---	
Benzo(g,h,i)perylene	3.53	0.0400	0.0800	ug/L	4	4.00	---	88	50-134%	---	---	
Chrysene	3.35	0.0400	0.0800	ug/L	4	4.00	---	84	59-123%	---	---	
Dibenz(a,h)anthracene	3.43	0.0400	0.0800	ug/L	4	4.00	---	86	51-134%	---	---	
Fluoranthene	3.43	0.0400	0.0800	ug/L	4	4.00	---	86	57-128%	---	---	
Fluorene	2.34	0.0400	0.0800	ug/L	4	4.00	---	58	52-124%	---	---	
Indeno(1,2,3-cd)pyrene	3.51	0.0400	0.0800	ug/L	4	4.00	---	88	52-134%	---	---	
1-Methylnaphthalene	1.31	0.0800	0.160	ug/L	4	4.00	---	33	41-120%	---	---	Q-30
2-Methylnaphthalene	1.27	0.0800	0.160	ug/L	4	4.00	---	32	40-121%	---	---	Q-30

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (23B0481-BS1)			Prepared: 02/13/23 11:36 Analyzed: 02/13/23 18:50									
Naphthalene	1.37	0.0800	0.160	ug/L	4	4.00	---	34	40-121%	---	---	Q-30
Phenanthrene	2.83	0.0400	0.0800	ug/L	4	4.00	---	71	59-120%	---	---	
Pyrene	3.41	0.0400	0.0800	ug/L	4	4.00	---	85	57-126%	---	---	
Carbazole	3.27	0.0600	0.120	ug/L	4	4.00	---	82	60-122%	---	---	
Dibenzofuran	1.93	0.0400	0.0800	ug/L	4	4.00	---	48	53-120%	---	---	Q-30
2-Chlorophenol	2.20	0.200	0.400	ug/L	4	4.00	---	55	38-120%	---	---	
4-Chloro-3-methylphenol	2.38	0.400	0.800	ug/L	4	4.00	---	60	52-120%	---	---	
2,4-Dichlorophenol	2.26	0.200	0.400	ug/L	4	4.00	---	56	47-121%	---	---	
2,4-Dimethylphenol	2.41	0.200	0.400	ug/L	4	4.00	---	60	31-124%	---	---	
2,4-Dinitrophenol	2.67	1.00	2.00	ug/L	4	4.00	---	67	23-143%	---	---	
4,6-Dinitro-2-methylphenol	3.14	1.00	2.00	ug/L	4	4.00	---	78	44-137%	---	---	
2-Methylphenol	1.87	0.100	0.200	ug/L	4	4.00	---	47	30-120%	---	---	
3+4-Methylphenol(s)	1.63	0.100	0.200	ug/L	4	4.00	---	41	29-120%	---	---	
2-Nitrophenol	2.30	0.400	0.800	ug/L	4	4.00	---	58	47-123%	---	---	
4-Nitrophenol	1.07	0.400	0.800	ug/L	4	4.00	---	27	10-120%	---	---	
Pentachlorophenol (PCP)	2.78	0.400	0.800	ug/L	4	4.00	---	70	35-138%	---	---	
Phenol	0.921	0.800	0.800	ug/L	4	4.00	---	23	10-120%	---	---	
2,3,4,6-Tetrachlorophenol	2.82	0.200	0.400	ug/L	4	4.00	---	70	50-128%	---	---	
2,3,5,6-Tetrachlorophenol	2.68	0.200	0.400	ug/L	4	4.00	---	67	50-121%	---	---	
2,4,5-Trichlorophenol	2.55	0.200	0.400	ug/L	4	4.00	---	64	53-123%	---	---	
2,4,6-Trichlorophenol	2.33	0.200	0.400	ug/L	4	4.00	---	58	50-125%	---	---	
Bis(2-ethylhexyl)phthalate	3.51	0.800	1.60	ug/L	4	4.00	---	88	55-135%	---	---	
Butyl benzyl phthalate	3.64	0.800	1.60	ug/L	4	4.00	---	91	53-134%	---	---	
Diethylphthalate	3.93	0.800	1.60	ug/L	4	4.00	---	98	56-125%	---	---	
Dimethylphthalate	3.53	0.800	1.60	ug/L	4	4.00	---	88	45-127%	---	---	
Di-n-butylphthalate	4.14	0.800	1.60	ug/L	4	4.00	---	104	59-127%	---	---	
Di-n-octyl phthalate	3.86	0.800	1.60	ug/L	4	4.00	---	96	51-140%	---	---	
N-Nitrosodimethylamine	1.56	0.100	0.200	ug/L	4	4.00	---	39	19-120%	---	---	
N-Nitroso-di-n-propylamine	2.42	0.100	0.200	ug/L	4	4.00	---	61	49-120%	---	---	
N-Nitrosodiphenylamine	2.65	0.100	0.200	ug/L	4	4.00	---	66	51-123%	---	---	
Bis(2-Chloroethoxy) methane	2.62	0.100	0.200	ug/L	4	4.00	---	66	48-120%	---	---	
Bis(2-Chloroethyl) ether	2.30	0.100	0.200	ug/L	4	4.00	---	57	43-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	1.90	0.100	0.200	ug/L	4	4.00	---	48	41-120%	---	---	
Hexachlorobenzene	2.32	0.0400	0.0800	ug/L	4	4.00	---	58	53-125%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (23B0481-BS1)			Prepared: 02/13/23 11:36 Analyzed: 02/13/23 18:50									
Hexachlorobutadiene	0.893	0.100	0.200	ug/L	4	4.00	---	22	22-124%	---	---	
Hexachlorocyclopentadiene	0.414	0.200	0.400	ug/L	4	4.00	---	10	10-127%	---	---	Q-31
Hexachloroethane	0.858	0.100	0.200	ug/L	4	4.00	---	21	21-120%	---	---	
2-Chloronaphthalene	1.37	0.0400	0.0800	ug/L	4	4.00	---	34	40-120%	---	---	Q-30
1,2,4-Trichlorobenzene	1.08	0.100	0.200	ug/L	4	4.00	---	27	29-120%	---	---	Q-30
4-Bromophenyl phenyl ether	2.07	0.100	0.200	ug/L	4	4.00	---	52	55-124%	---	---	Q-30
4-Chlorophenyl phenyl ether	1.88	0.100	0.200	ug/L	4	4.00	---	47	53-121%	---	---	Q-30
Aniline	1.71	0.200	0.400	ug/L	4	4.00	---	43	10-120%	---	---	Q-31
4-Chloroaniline	1.98	0.100	0.200	ug/L	4	4.00	---	50	33-120%	---	---	
2-Nitroaniline	2.52	0.800	1.60	ug/L	4	4.00	---	63	55-127%	---	---	
3-Nitroaniline	2.86	0.800	1.60	ug/L	4	4.00	---	72	41-128%	---	---	
4-Nitroaniline	2.97	0.800	1.60	ug/L	4	4.00	---	74	25-120%	---	---	
Nitrobenzene	2.00	0.400	0.800	ug/L	4	4.00	---	50	45-121%	---	---	
2,4-Dinitrotoluene	3.33	0.400	0.800	ug/L	4	4.00	---	83	57-128%	---	---	
2,6-Dinitrotoluene	3.10	0.400	0.800	ug/L	4	4.00	---	78	57-124%	---	---	
Benzoic acid	3.11	0.200	0.200	ug/L	4	8.00	---	39	10-120%	---	---	Q-31
Benzyl alcohol	1.68	0.400	0.800	ug/L	4	4.00	---	42	31-120%	---	---	Q-31
Isophorone	2.65	0.100	0.200	ug/L	4	4.00	---	66	42-124%	---	---	
Azobenzene (1,2-DPH)	2.59	0.100	0.200	ug/L	4	4.00	---	65	61-120%	---	---	
Bis(2-Ethylhexyl) adipate	3.72	1.00	2.00	ug/L	4	4.00	---	93	63-121%	---	---	
3,3'-Dichlorobenzidine	14.6	2.00	4.00	ug/L	4	8.00	---	182	27-129%	---	---	Q-29, Q-41, Q-52
1,2-Dinitrobenzene	3.19	1.00	2.00	ug/L	4	4.00	---	80	59-120%	---	---	
1,3-Dinitrobenzene	2.82	1.00	2.00	ug/L	4	4.00	---	71	49-128%	---	---	
1,4-Dinitrobenzene	2.69	1.00	2.00	ug/L	4	4.00	---	67	54-120%	---	---	
Pyridine	1.19	0.400	0.800	ug/L	4	4.00	---	30	10-120%	---	---	
1,2-Dichlorobenzene	1.02	0.100	0.200	ug/L	4	4.00	---	25	32-120%	---	---	Q-30
1,3-Dichlorobenzene	0.971	0.100	0.200	ug/L	4	4.00	---	24	28-120%	---	---	Q-30
1,4-Dichlorobenzene	0.984	0.100	0.200	ug/L	4	4.00	---	25	29-120%	---	---	Q-30
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 52 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>52 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>19 %</i>		<i>10-133 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>89 %</i>		<i>50-134 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>38 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>67 %</i>		<i>43-140 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0481-BSD1)						Prepared: 02/13/23 11:36 Analyzed: 02/13/23 19:24						Q-19
EPA 8270E												
Acenaphthene	2.18	0.0400	0.0800	ug/L	4	4.00	---	55	47-122%	19	30%	
Acenaphthylene	2.48	0.0400	0.0800	ug/L	4	4.00	---	62	41-130%	22	30%	
Anthracene	3.41	0.0400	0.0800	ug/L	4	4.00	---	85	57-123%	14	30%	
Benz(a)anthracene	3.79	0.0400	0.0800	ug/L	4	4.00	---	95	58-125%	9	30%	
Benzo(a)pyrene	3.77	0.0600	0.120	ug/L	4	4.00	---	94	54-128%	10	30%	
Benzo(b)fluoranthene	3.97	0.0600	0.120	ug/L	4	4.00	---	99	53-131%	8	30%	
Benzo(k)fluoranthene	3.94	0.0600	0.120	ug/L	4	4.00	---	99	57-129%	8	30%	
Benzo(g,h,i)perylene	3.90	0.0400	0.0800	ug/L	4	4.00	---	97	50-134%	10	30%	
Chrysene	3.75	0.0400	0.0800	ug/L	4	4.00	---	94	59-123%	11	30%	
Dibenz(a,h)anthracene	3.78	0.0400	0.0800	ug/L	4	4.00	---	95	51-134%	10	30%	
Fluoranthene	3.83	0.0400	0.0800	ug/L	4	4.00	---	96	57-128%	11	30%	
Fluorene	2.68	0.0400	0.0800	ug/L	4	4.00	---	67	52-124%	14	30%	
Indeno(1,2,3-cd)pyrene	3.87	0.0400	0.0800	ug/L	4	4.00	---	97	52-134%	10	30%	
1-Methylnaphthalene	1.71	0.0800	0.160	ug/L	4	4.00	---	43	41-120%	27	30%	
2-Methylnaphthalene	1.67	0.0800	0.160	ug/L	4	4.00	---	42	40-121%	27	30%	
Naphthalene	1.75	0.0800	0.160	ug/L	4	4.00	---	44	40-121%	24	30%	
Phenanthrene	3.21	0.0400	0.0800	ug/L	4	4.00	---	80	59-120%	13	30%	
Pyrene	3.82	0.0400	0.0800	ug/L	4	4.00	---	95	57-126%	11	30%	
Carbazole	3.79	0.0600	0.120	ug/L	4	4.00	---	95	60-122%	15	30%	
Dibenzofuran	2.38	0.0400	0.0800	ug/L	4	4.00	---	59	53-120%	21	30%	
2-Chlorophenol	2.78	0.200	0.400	ug/L	4	4.00	---	70	38-120%	23	30%	
4-Chloro-3-methylphenol	3.07	0.400	0.800	ug/L	4	4.00	---	77	52-120%	25	30%	
2,4-Dichlorophenol	3.05	0.200	0.400	ug/L	4	4.00	---	76	47-121%	30	30%	
2,4-Dimethylphenol	2.99	0.200	0.400	ug/L	4	4.00	---	75	31-124%	22	30%	
2,4-Dinitrophenol	4.21	1.00	2.00	ug/L	4	4.00	---	105	23-143%	45	30%	Q-24
4,6-Dinitro-2-methylphenol	3.98	1.00	2.00	ug/L	4	4.00	---	100	44-137%	24	30%	
2-Methylphenol	2.47	0.100	0.200	ug/L	4	4.00	---	62	30-120%	28	30%	
3+4-Methylphenol(s)	2.17	0.100	0.200	ug/L	4	4.00	---	54	29-120%	28	30%	
2-Nitrophenol	3.61	0.400	0.800	ug/L	4	4.00	---	90	47-123%	44	30%	Q-24
4-Nitrophenol	1.21	0.400	0.800	ug/L	4	4.00	---	30	10-120%	13	30%	
Pentachlorophenol (PCP)	3.44	0.400	0.800	ug/L	4	4.00	---	86	35-138%	21	30%	
Phenol	1.03	0.800	0.800	ug/L	4	4.00	---	26	10-120%	12	30%	
2,3,4,6-Tetrachlorophenol	3.29	0.200	0.400	ug/L	4	4.00	---	82	50-128%	16	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0481-BSD1)						Prepared: 02/13/23 11:36 Analyzed: 02/13/23 19:24						Q-19
2,3,5,6-Tetrachlorophenol	3.24	0.200	0.400	ug/L	4	4.00	---	81	50-121%	19	30%	
2,4,5-Trichlorophenol	3.20	0.200	0.400	ug/L	4	4.00	---	80	53-123%	22	30%	
2,4,6-Trichlorophenol	3.06	0.200	0.400	ug/L	4	4.00	---	76	50-125%	27	30%	
Bis(2-ethylhexyl)phthalate	3.81	0.800	1.60	ug/L	4	4.00	---	95	55-135%	8	30%	
Butyl benzyl phthalate	4.02	0.800	1.60	ug/L	4	4.00	---	100	53-134%	10	30%	
Diethylphthalate	3.80	0.800	1.60	ug/L	4	4.00	---	95	56-125%	3	30%	
Dimethylphthalate	3.69	0.800	1.60	ug/L	4	4.00	---	92	45-127%	4	30%	
Di-n-butylphthalate	4.38	0.800	1.60	ug/L	4	4.00	---	109	59-127%	5	30%	
Di-n-octyl phthalate	4.17	0.800	1.60	ug/L	4	4.00	---	104	51-140%	8	30%	
N-Nitrosodimethylamine	1.86	0.100	0.200	ug/L	4	4.00	---	47	19-120%	18	30%	
N-Nitroso-di-n-propylamine	3.53	0.100	0.200	ug/L	4	4.00	---	88	49-120%	37	30%	Q-24
N-Nitrosodiphenylamine	3.23	0.100	0.200	ug/L	4	4.00	---	81	51-123%	20	30%	
Bis(2-Chloroethoxy) methane	3.29	0.100	0.200	ug/L	4	4.00	---	82	48-120%	23	30%	
Bis(2-Chloroethyl) ether	3.19	0.100	0.200	ug/L	4	4.00	---	80	43-120%	32	30%	Q-24
2,2'-Oxybis(1-Chloropropane)	2.56	0.100	0.200	ug/L	4	4.00	---	64	41-120%	29	30%	
Hexachlorobenzene	2.50	0.0400	0.0800	ug/L	4	4.00	---	63	53-125%	8	30%	
Hexachlorobutadiene	1.03	0.100	0.200	ug/L	4	4.00	---	26	22-124%	14	30%	
Hexachlorocyclopentadiene	0.590	0.200	0.400	ug/L	4	4.00	---	15	10-127%	35	30%	Q-24, Q-31
Hexachloroethane	1.10	0.100	0.200	ug/L	4	4.00	---	27	21-120%	24	30%	
2-Chloronaphthalene	1.75	0.0400	0.0800	ug/L	4	4.00	---	44	40-120%	24	30%	
1,2,4-Trichlorobenzene	1.31	0.100	0.200	ug/L	4	4.00	---	33	29-120%	19	30%	
4-Bromophenyl phenyl ether	2.45	0.100	0.200	ug/L	4	4.00	---	61	55-124%	17	30%	
4-Chlorophenyl phenyl ether	2.16	0.100	0.200	ug/L	4	4.00	---	54	53-121%	14	30%	
Aniline	2.22	0.200	0.400	ug/L	4	4.00	---	55	10-120%	26	30%	Q-31
4-Chloroaniline	2.51	0.100	0.200	ug/L	4	4.00	---	63	33-120%	24	30%	
2-Nitroaniline	3.40	0.800	1.60	ug/L	4	4.00	---	85	55-127%	30	30%	
3-Nitroaniline	3.45	0.800	1.60	ug/L	4	4.00	---	86	41-128%	19	30%	
4-Nitroaniline	2.84	0.800	1.60	ug/L	4	4.00	---	71	25-120%	4	30%	
Nitrobenzene	2.96	0.400	0.800	ug/L	4	4.00	---	74	45-121%	39	30%	Q-24
2,4-Dinitrotoluene	3.61	0.400	0.800	ug/L	4	4.00	---	90	57-128%	8	30%	
2,6-Dinitrotoluene	3.51	0.400	0.800	ug/L	4	4.00	---	88	57-124%	12	30%	
Benzoic acid	3.72	0.200	0.200	ug/L	4	8.00	---	46	10-120%	18	30%	Q-31
Benzyl alcohol	2.34	0.400	0.800	ug/L	4	4.00	---	59	31-120%	33	30%	Q-24, Q-31
Isophorone	3.43	0.100	0.200	ug/L	4	4.00	---	86	42-124%	25	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0481 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0481-BSD1)						Prepared: 02/13/23 11:36 Analyzed: 02/13/23 19:24						Q-19
Azobenzene (1,2-DPH)	3.20	0.100	0.200	ug/L	4	4.00	---	80	61-120%	21	30%	
Bis(2-Ethylhexyl) adipate	4.00	1.00	2.00	ug/L	4	4.00	---	100	63-121%	7	30%	
3,3'-Dichlorobenzidine	15.1	2.00	4.00	ug/L	4	8.00	---	189	27-129%	3	30%	Q-29, Q-41, Q-52
1,2-Dinitrobenzene	3.59	1.00	2.00	ug/L	4	4.00	---	90	59-120%	12	30%	
1,3-Dinitrobenzene	3.38	1.00	2.00	ug/L	4	4.00	---	85	49-128%	18	30%	
1,4-Dinitrobenzene	3.45	1.00	2.00	ug/L	4	4.00	---	86	54-120%	25	30%	
Pyridine	1.77	0.400	0.800	ug/L	4	4.00	---	44	10-120%	39	30%	Q-24
1,2-Dichlorobenzene	1.31	0.100	0.200	ug/L	4	4.00	---	33	32-120%	25	30%	
1,3-Dichlorobenzene	1.21	0.100	0.200	ug/L	4	4.00	---	30	28-120%	22	30%	
1,4-Dichlorobenzene	1.23	0.100	0.200	ug/L	4	4.00	---	31	29-120%	22	30%	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 79 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>66 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>23 %</i>		<i>10-133 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>95 %</i>		<i>50-134 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>41 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>83 %</i>		<i>43-140 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0312 - EPA 3510C (Neutral pH)						Water						
Blank (23B0312-BLK1)			Prepared: 02/08/23 12:07 Analyzed: 02/08/23 16:18									
<u>EPA 8270E OPPs</u>												
Azinphos methyl (Guthion)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Chlorpyrifos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Coumaphos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Demeton O	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Demeton S	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Diazinon	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorvos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dimethoate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Disulfoton	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
EPN	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Ethoprop	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Fensulfothion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Fenthion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Malathion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Merphos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Methyl parathion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Mevinphos (Phosdrin)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Monocrotophos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Naled (Dibrom)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Parathion, ethyl	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Phorate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Ronnel (Fenchlorphos)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Sulfotep	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Sulprofos (Bolstar)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
TEPP	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachlorvinphos (Rabon)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tokuthion (Prothiofos)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Trichloronate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 88 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 1x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>93 %</i>		<i>58-121 %</i>		<i>"</i>						

LCS (23B0312-BS1) Prepared: 02/08/23 12:07 Analyzed: 02/08/23 16:53

EPA 8270E OPPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0312 - EPA 3510C (Neutral pH)						Water						
LCS (23B0312-BS1)			Prepared: 02/08/23 12:07 Analyzed: 02/08/23 16:53									
Azinphos methyl (Guthion)	4.66	0.500	1.00	ug/L	2	4.00	---	116	43-135%	---	---	
Chlorpyrifos	3.89	0.500	1.00	ug/L	2	4.00	---	97	47-133%	---	---	
Coumaphos	4.47	0.500	1.00	ug/L	2	4.00	---	112	45-135%	---	---	
Demeton O	1.86	0.500	1.00	ug/L	2	1.84	---	101	10-125%	---	---	
Demeton S	1.85	0.500	1.00	ug/L	2	1.94	---	95	21-162%	---	---	
Diazinon	4.42	0.500	1.00	ug/L	2	4.00	---	110	43-129%	---	---	
Dichlorvos	4.64	0.500	1.00	ug/L	2	4.00	---	116	39-138%	---	---	
Dimethoate	3.79	0.500	1.00	ug/L	2	4.00	---	95	26-125%	---	---	
Disulfoton	4.09	0.500	1.00	ug/L	2	4.00	---	102	36-134%	---	---	
EPN	4.52	0.500	1.00	ug/L	2	4.00	---	113	47-133%	---	---	
Ethoprop	4.21	0.500	1.00	ug/L	2	4.00	---	105	52-125%	---	---	
Fensulfothion	4.79	0.500	1.00	ug/L	2	4.00	---	120	15-141%	---	---	
Fenthion	4.20	0.500	1.00	ug/L	2	4.00	---	105	42-137%	---	---	
Malathion	3.86	0.500	1.00	ug/L	2	4.00	---	96	44-132%	---	---	
Merphos	4.66	0.500	1.00	ug/L	2	4.00	---	116	26-133%	---	---	
Methyl parathion	4.47	0.500	1.00	ug/L	2	4.00	---	112	49-134%	---	---	
Mevinphos (Phosdrin)	4.24	0.500	1.00	ug/L	2	4.00	---	106	10-196%	---	---	
Monocrotophos	1.14	0.500	1.00	ug/L	2	4.00	---	29	10-159%	---	---	
Naled (Dibrom)	4.26	0.500	1.00	ug/L	2	4.00	---	107	10-146%	---	---	
Parathion, ethyl	4.33	0.500	1.00	ug/L	2	4.00	---	108	52-134%	---	---	
Phorate	4.45	0.500	1.00	ug/L	2	4.00	---	111	23-139%	---	---	
Ronnel (Fenchlorphos)	3.95	0.500	1.00	ug/L	2	4.00	---	99	42-133%	---	---	
Sulfotep	3.86	0.500	1.00	ug/L	2	4.00	---	97	47-126%	---	---	
Sulprofos (Bolstar)	4.07	0.500	1.00	ug/L	2	4.00	---	102	47-135%	---	---	
TEPP	3.87	0.500	1.00	ug/L	2	4.00	---	97	10-208%	---	---	
Tetrachlorvinphos (Rabon)	4.76	0.500	1.00	ug/L	2	4.00	---	119	42-125%	---	---	
Tokuthion (Prothiofos)	4.47	0.500	1.00	ug/L	2	4.00	---	112	43-132%	---	---	
Trichloronate	3.92	0.500	1.00	ug/L	2	4.00	---	98	28-137%	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 95 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 2x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>102 %</i>		<i>58-121 %</i>		<i>"</i>						

LCS Dup (23B0312-BSD1)			Prepared: 02/08/23 12:07 Analyzed: 02/08/23 17:28								Q-19	
EPA 8270E OPPs												
Azinphos methyl (Guthion)	4.57	0.500	1.00	ug/L	2	4.00	---	114	43-135%	2	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0312 - EPA 3510C (Neutral pH)						Water						
LCS Dup (23B0312-BSD1)						Prepared: 02/08/23 12:07 Analyzed: 02/08/23 17:28						Q-19
Chlorpyrifos	3.82	0.500	1.00	ug/L	2	4.00	---	96	47-133%	2	30%	
Coumaphos	4.35	0.500	1.00	ug/L	2	4.00	---	109	45-135%	3	30%	
Demeton O	1.85	0.500	1.00	ug/L	2	1.84	---	100	10-125%	0.7	30%	
Demeton S	1.81	0.500	1.00	ug/L	2	1.94	---	93	21-162%	2	30%	
Diazinon	4.30	0.500	1.00	ug/L	2	4.00	---	108	43-129%	3	30%	
Dichlorvos	4.60	0.500	1.00	ug/L	2	4.00	---	115	39-138%	0.8	30%	
Dimethoate	3.76	0.500	1.00	ug/L	2	4.00	---	94	26-125%	0.8	30%	
Disulfoton	3.96	0.500	1.00	ug/L	2	4.00	---	99	36-134%	3	30%	
EPN	4.48	0.500	1.00	ug/L	2	4.00	---	112	47-133%	0.9	30%	
Ethoprop	4.09	0.500	1.00	ug/L	2	4.00	---	102	52-125%	3	30%	
Fensulfothion	4.78	0.500	1.00	ug/L	2	4.00	---	119	15-141%	0.3	30%	
Fenthion	4.00	0.500	1.00	ug/L	2	4.00	---	100	42-137%	5	30%	
Malathion	3.72	0.500	1.00	ug/L	2	4.00	---	93	44-132%	4	30%	
Merphos	4.61	0.500	1.00	ug/L	2	4.00	---	115	26-133%	1	30%	
Methyl parathion	4.41	0.500	1.00	ug/L	2	4.00	---	110	49-134%	1	30%	
Mevinphos (Phosdrin)	4.26	0.500	1.00	ug/L	2	4.00	---	106	10-196%	0.3	30%	
Monocrotophos	1.22	0.500	1.00	ug/L	2	4.00	---	31	10-159%	7	30%	
Naled (Dibrom)	4.13	0.500	1.00	ug/L	2	4.00	---	103	10-146%	3	30%	
Parathion, ethyl	4.11	0.500	1.00	ug/L	2	4.00	---	103	52-134%	5	30%	
Phorate	4.17	0.500	1.00	ug/L	2	4.00	---	104	23-139%	7	30%	
Ronnel (Fenchlorphos)	3.88	0.500	1.00	ug/L	2	4.00	---	97	42-133%	2	30%	
Sulfotep	3.77	0.500	1.00	ug/L	2	4.00	---	94	47-126%	2	30%	
Sulprofos (Bolstar)	3.92	0.500	1.00	ug/L	2	4.00	---	98	47-135%	4	30%	
TEPP	3.80	0.500	1.00	ug/L	2	4.00	---	95	10-208%	2	30%	
Tetrachlorvinphos (Rabon)	4.59	0.500	1.00	ug/L	2	4.00	---	115	42-125%	4	30%	
Tokuthion (Prothiofos)	4.41	0.500	1.00	ug/L	2	4.00	---	110	43-132%	1	30%	
Trichloronate	3.81	0.500	1.00	ug/L	2	4.00	---	95	28-137%	3	30%	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 2x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>97 %</i>		<i>58-121 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0217 - 04 21 23 1023

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0281 - EPA 3015A						Water						
Blank (23B0281-BLK1)						Prepared: 02/08/23 07:43 Analyzed: 02/09/23 15:08						
<u>EPA 6020B</u>												
Antimony	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Barium	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Beryllium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Cadmium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Chromium	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Copper	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Lead	ND	0.110	0.200	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Nickel	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Selenium	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Silver	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Thallium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Zinc	ND	2.00	4.00	ug/L	1	---	---	---	---	---	---	
Blank (23B0281-BLK2)						Prepared: 02/08/23 07:43 Analyzed: 02/10/23 11:47						
<u>EPA 6020B</u>												
Mercury	ND	0.0400	0.0800	ug/L	1	---	---	---	---	---	---	Q-16
LCS (23B0281-BS1)						Prepared: 02/08/23 07:43 Analyzed: 02/09/23 15:13						
<u>EPA 6020B</u>												
Antimony	27.9	0.500	1.00	ug/L	1	27.8	---	101	80-120%	---	---	
Arsenic	53.8	0.500	1.00	ug/L	1	55.6	---	97	80-120%	---	---	
Barium	58.1	1.00	2.00	ug/L	1	55.6	---	105	80-120%	---	---	
Beryllium	26.7	0.100	0.200	ug/L	1	27.8	---	96	80-120%	---	---	
Cadmium	56.5	0.100	0.200	ug/L	1	55.6	---	102	80-120%	---	---	
Chromium	54.2	1.00	2.00	ug/L	1	55.6	---	98	80-120%	---	---	
Copper	56.4	1.00	2.00	ug/L	1	55.6	---	101	80-120%	---	---	
Lead	56.3	0.110	0.200	ug/L	1	55.6	---	101	80-120%	---	---	
Manganese	56.0	0.500	1.00	ug/L	1	55.6	---	101	80-120%	---	---	
Mercury	1.08	0.0400	0.0800	ug/L	1	1.11	---	97	80-120%	---	---	
Nickel	56.6	1.00	2.00	ug/L	1	55.6	---	102	80-120%	---	---	
Selenium	28.2	0.500	1.00	ug/L	1	27.8	---	101	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0281 - EPA 3015A						Water						
LCS (23B0281-BS1)						Prepared: 02/08/23 07:43 Analyzed: 02/09/23 15:13						
Silver	29.6	0.100	0.200	ug/L	1	27.8	---	107	80-120%	---	---	
Thallium	27.1	0.100	0.200	ug/L	1	27.8	---	97	80-120%	---	---	
Zinc	54.6	2.00	4.00	ug/L	1	55.6	---	98	80-120%	---	---	
Duplicate (23B0281-DUP1)						Prepared: 02/08/23 07:43 Analyzed: 02/09/23 15:23						
QC Source Sample: Non-SDG (A3B0239-01)												
Antimony	4.01	0.500	1.00	ug/L	1	---	4.16	---	---	4	20%	
Arsenic	0.636	0.500	1.00	ug/L	1	---	0.643	---	---	1	20%	Ja
Barium	14.9	1.00	2.00	ug/L	1	---	14.4	---	---	3	20%	
Beryllium	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
Cadmium	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
Chromium	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	20%	
Copper	6.31	1.00	2.00	ug/L	1	---	6.12	---	---	3	20%	
Lead	0.998	0.110	0.200	ug/L	1	---	1.06	---	---	6	20%	
Manganese	14.8	0.500	1.00	ug/L	1	---	14.9	---	---	0.7	20%	
Mercury	ND	0.0400	0.0800	ug/L	1	---	ND	---	---	---	20%	
Nickel	1.16	1.00	2.00	ug/L	1	---	1.21	---	---	4	20%	Ja
Selenium	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	20%	
Silver	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
Thallium	ND	0.100	0.200	ug/L	1	---	0.156	---	---	***	20%	
Zinc	95.2	2.00	4.00	ug/L	1	---	93.3	---	---	2	20%	
Matrix Spike (23B0281-MS1)						Prepared: 02/08/23 07:43 Analyzed: 02/09/23 15:28						
QC Source Sample: Non-SDG (A3B0239-01)												
EPA 6020B												
Antimony	33.3	0.500	1.00	ug/L	1	27.8	4.16	105	75-125%	---	---	
Arsenic	54.5	0.500	1.00	ug/L	1	55.6	0.643	97	75-125%	---	---	
Barium	73.4	1.00	2.00	ug/L	1	55.6	14.4	106	75-125%	---	---	
Beryllium	28.3	0.100	0.200	ug/L	1	27.8	ND	102	75-125%	---	---	
Cadmium	57.3	0.100	0.200	ug/L	1	55.6	ND	103	75-125%	---	---	
Chromium	54.4	1.00	2.00	ug/L	1	55.6	ND	98	75-125%	---	---	
Copper	60.9	1.00	2.00	ug/L	1	55.6	6.12	99	75-125%	---	---	
Lead	56.5	0.110	0.200	ug/L	1	55.6	1.06	100	75-125%	---	---	
Manganese	70.3	0.500	1.00	ug/L	1	55.6	14.9	100	75-125%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0281 - EPA 3015A						Water						
Matrix Spike (23B0281-MS1)						Prepared: 02/08/23 07:43 Analyzed: 02/09/23 15:28						
QC Source Sample: Non-SDG (A3B0239-01)												
Mercury	1.07	0.0400	0.0800	ug/L	1	1.11	ND	96	75-125%	---	---	
Nickel	56.0	1.00	2.00	ug/L	1	55.6	1.21	99	75-125%	---	---	
Selenium	28.2	0.500	1.00	ug/L	1	27.8	ND	102	75-125%	---	---	
Silver	29.8	0.100	0.200	ug/L	1	27.8	ND	107	75-125%	---	---	
Thallium	26.7	0.100	0.200	ug/L	1	27.8	0.156	96	75-125%	---	---	
Zinc	147	2.00	4.00	ug/L	1	55.6	93.3	97	75-125%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
---	--	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B1025 - EPA 3510C						Water						
Blank (W3B1025-BLK1)			Prepared: 02/13/23 07:55 Analyzed: 02/25/23 03:52									
<u>EPA 8151A</u>												
2,4-D	ND	0.34	0.50	ug/l	1	---	---	---	---	---	---	---
2,4-DB	ND	0.99	2.5	ug/l	1	---	---	---	---	---	---	---
2,4,5-T	ND	0.14	0.25	ug/l	1	---	---	---	---	---	---	---
2,4,5-TP (Silvex)	ND	0.14	0.25	ug/l	1	---	---	---	---	---	---	---
3,5-Dichlorobenzoic acid	ND	0.28	1.2	ug/l	1	---	---	---	---	---	---	---
4-Nitrophenol	ND	0.50	1.2	ug/l	1	---	---	---	---	---	---	---
Acifluorfen	ND	0.24	0.50	ug/l	1	---	---	---	---	---	---	---
Bentazon	ND	0.55	2.5	ug/l	1	---	---	---	---	---	---	---
Dalapon	ND	0.16	0.50	ug/l	1	---	---	---	---	---	---	---
Dicamba	ND	0.19	0.75	ug/l	1	---	---	---	---	---	---	---
Dichloroprop	ND	0.24	1.0	ug/l	1	---	---	---	---	---	---	---
Dinoseb	ND	0.090	0.50	ug/l	1	---	---	---	---	---	---	---
DCPA	ND	0.20	0.25	ug/l	1	---	---	---	---	---	---	---
MCPA	ND	40	100	ug/l	1	---	---	---	---	---	---	---
MCPP	ND	27	100	ug/l	1	---	---	---	---	---	---	---
Pentachlorophenol	ND	0.18	0.25	ug/l	1	---	---	---	---	---	---	---
Picloram	ND	0.13	0.75	ug/l	1	---	---	---	---	---	---	---
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 98 %</i>		<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>						

LCS (W3B1025-BS1)			Prepared: 02/13/23 07:55 Analyzed: 02/25/23 04:23									
<u>EPA 8151A</u>												
2,4-D	2.18	0.34	0.50	ug/l	1	3.00	---	73	56-164%	---	---	---
2,4-DB	3.61	0.99	2.5	ug/l	1	6.00	---	60	27-161%	---	---	---
2,4,5-T	1.05	0.14	0.25	ug/l	1	1.50	---	70	39-151%	---	---	---
2,4,5-TP (Silvex)	1.08	0.14	0.25	ug/l	1	1.50	---	72	46-142%	---	---	---
3,5-Dichlorobenzoic acid	2.36	0.28	1.2	ug/l	1	3.00	---	79	54-154%	---	---	---
4-Nitrophenol	4.05	0.50	1.2	ug/l	1	6.00	---	68	3-105%	---	---	---
Acifluorfen	1.43	0.24	0.50	ug/l	1	1.50	---	95	39-134%	---	---	---
Bentazon	4.78	0.55	2.5	ug/l	1	6.00	---	80	44-139%	---	---	---
Dalapon	2.21	0.16	0.50	ug/l	1	3.00	---	74	40-139%	---	---	---
Dicamba	2.28	0.19	0.75	ug/l	1	3.00	---	76	46-140%	---	---	---

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B1025 - EPA 3510C						Water						
LCS (W3B1025-BS1)			Prepared: 02/13/23 07:55 Analyzed: 02/25/23 04:23									
Dichloroprop	2.31	0.24	1.0	ug/l	1	3.00	---	77	43-158%	---	---	
Dinoseb	1.15	0.090	0.50	ug/l	1	1.50	---	77	42-146%	---	---	
DCPA	1.18	0.20	0.25	ug/l	1	1.50	---	79	34-135%	---	---	
MCPA	228	40	100	ug/l	1	300	---	76	28-144%	---	---	
MCPP	193	27	100	ug/l	1	300	---	64	31-153%	---	---	
Pentachlorophenol	1.08	0.18	0.25	ug/l	1	1.50	---	72	37-136%	---	---	
Picloram	1.05	0.13	0.75	ug/l	1	1.50	---	70	35-138%	---	---	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 94 %</i>		<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>						

LCS Dup (W3B1025-BSD1)						Prepared: 02/13/23 07:55 Analyzed: 02/25/23 04:54						
EPA 8151A												
2,4-D	2.72	0.34	0.50	ug/l	1	3.00	---	91	56-164%	22	25%	
2,4-DB	4.58	0.99	2.5	ug/l	1	6.00	---	76	27-161%	24	25%	
2,4,5-T	1.26	0.14	0.25	ug/l	1	1.50	---	84	39-151%	18	25%	
2,4,5-TP (Silvex)	1.34	0.14	0.25	ug/l	1	1.50	---	89	46-142%	22	25%	
3,5-Dichlorobenzoic acid	2.87	0.28	1.2	ug/l	1	3.00	---	96	54-154%	20	25%	
4-Nitrophenol	4.87	0.50	1.2	ug/l	1	6.00	---	81	3-105%	18	25%	
Acifluorfen	1.81	0.24	0.50	ug/l	1	1.50	---	121	39-134%	23	25%	
Bentazon	5.96	0.55	2.5	ug/l	1	6.00	---	99	44-139%	22	25%	
Dalapon	2.63	0.16	0.50	ug/l	1	3.00	---	88	40-139%	17	25%	
Dicamba	2.73	0.19	0.75	ug/l	1	3.00	---	91	46-140%	18	25%	
Dichloroprop	2.74	0.24	1.0	ug/l	1	3.00	---	91	43-158%	17	25%	
Dinoseb	1.43	0.090	0.50	ug/l	1	1.50	---	95	42-146%	22	25%	
DCPA	1.44	0.20	0.25	ug/l	1	1.50	---	96	34-135%	20	25%	
MCPA	278	40	100	ug/l	1	300	---	93	28-144%	20	25%	
MCPP	236	27	100	ug/l	1	300	---	79	31-153%	20	25%	
Pentachlorophenol	1.31	0.18	0.25	ug/l	1	1.50	---	87	37-136%	19	25%	
Picloram	1.34	0.13	0.75	ug/l	1	1.50	---	89	35-138%	24	25%	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 112 %</i>		<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Hexavalent Chromium by IC

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B1145 - _NONE (LC)							Water					
Blank (W3B1145-BLK1)			Prepared: 02/14/23 10:02 Analyzed: 02/14/23 16:44									
<u>EPA 218.6</u>												
Chromium 6+	ND	0.0079	0.020	ug/l	1	---	---	---	---	---	---	
LCS (W3B1145-BS1)			Prepared: 02/14/23 10:02 Analyzed: 02/14/23 16:44									
<u>EPA 218.6</u>												
Chromium 6+	4.87	0.0079	0.020	ug/l	1	5.00	---	97	90-110%	---	---	
Matrix Spike (W3B1145-MS1)			Prepared: 02/14/23 10:02 Analyzed: 02/14/23 16:44									
<u>QC Source Sample: Non-SDG (3B08159-05)</u>												
<u>EPA 218.6</u>												
Chromium 6+	7.53	0.0079	0.020	ug/l	1	5.00	0.227	146	88-112%	---	---	MS-05
Matrix Spike (W3B1145-MS2)			Prepared: 02/14/23 10:02 Analyzed: 02/14/23 16:44									
<u>QC Source Sample: Non-SDG (3B08159-07)</u>												
<u>EPA 218.6</u>												
Chromium 6+	6.10	0.0079	0.020	ug/l	1	5.00	0.0353	121	88-112%	---	---	MS-05
Matrix Spike Dup (W3B1145-MSD1)			Prepared: 02/14/23 10:02 Analyzed: 02/14/23 16:44									
<u>QC Source Sample: Non-SDG (3B08159-05)</u>												
Chromium 6+	5.78	0.0079	0.020	ug/l	1	5.00	0.227	111	88-112%	26	10%	MS-05
Matrix Spike Dup (W3B1145-MSD2)			Prepared: 02/14/23 10:02 Analyzed: 02/14/23 16:44									
<u>QC Source Sample: Non-SDG (3B08159-07)</u>												
Chromium 6+	6.53	0.0079	0.020	ug/l	1	5.00	0.0353	130	88-112%	7	10%	MS-05

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0657</u>							
A3B0217-01	Water	NWTPH-Dx	02/07/23 08:30	02/17/23 07:46	890mL/5mL	1000mL/5mL	1.12

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0509</u>							
A3B0217-01RE1	Water	NWTPH-Gx (MS)	02/07/23 08:30	02/14/23 10:24	5mL/5mL	5mL/5mL	1.00

Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0344</u>							
A3B0217-03	Water	EPA 8260D	02/07/23 00:00	02/09/23 08:37	5mL/5mL	5mL/5mL	1.00
<u>Batch: 23B0509</u>							
A3B0217-01RE1	Water	EPA 8260D	02/07/23 08:30	02/14/23 10:24	5mL/5mL	5mL/5mL	1.00

Volatile Organic Compounds by EPA 8260D SIM

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0743</u>							
A3B0217-01	Water	EPA 8260D SIM	02/07/23 08:30	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00
A3B0217-03	Water	EPA 8260D SIM	02/07/23 00:00	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00

Semivolatile Organic Compounds by EPA 8270E

Prep: EPA 3510C (Acid/Base Neutral)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0481</u>							
A3B0217-01RE3	Water	EPA 8270E	02/07/23 08:30	02/13/23 11:36	780mL/1mL	1000mL/1mL	1.28
A3B0217-01RE4	Water	EPA 8270E	02/07/23 08:30	02/13/23 11:36	780mL/1mL	1000mL/1mL	1.28

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

SAMPLE PREPARATION INFORMATION

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Prep: EPA 3510C (Neutral pH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0312							
A3B0217-01RE1	Water	EPA 8270E OPPs	02/07/23 08:30	02/08/23 12:07	760mL/2mL	1000mL/2mL	1.32

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0281							
A3B0217-01	Water	EPA 6020B	02/07/23 08:30	02/08/23 07:43	45mL/50mL	45mL/50mL	1.00
A3B0217-01RE2	Water	EPA 6020B	02/07/23 08:30	02/08/23 07:43	45mL/50mL	45mL/50mL	1.00

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

Weck Laboratories, Inc.

SAMPLE PREPARATION INFORMATION

Chlorinated Herbicides by GC/ECD

Prep: EPA 3510C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: <u>W3B1025</u>							
A3B0217-01	Water	EPA 8151A	02/07/23 08:30	02/13/23 07:55	952ml/10ml	1000ml/10ml	1.05

Hexavalent Chromium by IC

Prep: NONE (LC)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: <u>W3B1145</u>							
A3B0217-01	Water	EPA 218.6	02/07/23 08:30	02/14/23 10:02	5ml/5ml	5ml/5ml	1.00

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- E** Estimated Value. The result is above the calibration range of the instrument.
- F-12** The result for this hydrocarbon range is primarily due to the presence of individual analyte peaks in the quantitation range. No fuel pattern detected.
- ICV-01** Estimated Result. Initial Calibration Verification (ICV) failed high. There is no effect on non-detect results.
- Ja** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-03** Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-19** Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
- Q-24** The RPD for this spike and spike duplicate is above established control limits. Recoveries for both the spike and spike duplicate are within control limits.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-30** Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
- Q-31** Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- Q-41** Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-52** Due to known erratic recoveries, the result and reporting levels for this analyte are reported as Estimated Values. This analyte may not have passed all QC requirements for this method.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +1%. The results are reported as Estimated Values.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +13%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +17%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +19%. The results are reported as Estimated Values.
- Q-54d** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +55%. The results are reported as Estimated Values.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- S-06** Surrogate recovery is outside of established control limits.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

V-04 Composite of VOA vials analyzed due to sediment in vials.

Weck Laboratories, Inc.

MS-05 The spike recovery and/or RPD were outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.
 - " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A3B0217 - 04 21 23 1023)

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Handwritten signature of Philip Nerenberg



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
--------	----------	--------	---------	--------	---------------

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0217 - 04 21 23 1023

CHAIN OF CUSTODY

APEX LABS

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Lab # **A3B0217** of **17** COC

Company: Maul Foster Alongi		Project Name: St. Helens Lagoon		Project # M0830.03.006															
Address: 3140 NE Broadway St, Portland, OR 97232		Phone: (971) 544-2139		Email: dweatherby@mfaulfoster.com, mtbenzinger@mfaulfoster.com															
Sampled by: <i>Cathy Schwab</i>																			
Sampler signature: <i>[Signature]</i>																			
Site Location: <input type="checkbox"/> OR <input checked="" type="checkbox"/> WA																			
Other: _____																			
LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	Frozen Storage*	Composite**	NWTPH-GX	8260D VOCs	TL VOCs 8260D-SM	TOT Metals 6020B***	Cr-VI 7196A/218.6	NWTPH-DX	SVOCs 8270E	OP Pest 8270E	Chlorinated Herb 8151A	LL OC Pest 8270E/1699	Dioxins/Furans 16138	PCB Congeners 1688C	PFAS EPA-537 Mod/537.1
MFA-B3A-283827-042360	08/07/23	0830	W	2			X	X	X	X	X	X	X	X	X	X	X	X	X
Field Blank	08/07/23	0820	W	2															X
Trip Blank	08/07/23		W	2			X	X											

SPECIAL INSTRUCTIONS:
 *Store a portion of each sediment sample at standard temperature (0-6 °C) until all 5 components have been received, then composite and analyze for Metals and Hg
 Composite MeOH-preserved VOAs and analyze for NWTPH-GX, VOCs, and LL-VOCs.
 **Store 250 ml PFAS sediment containers at 0-6 °C until all 5 components have been received, then submit to Bureau Veritas for composting and analysis.
 ***Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Se, Ag, Tl, Zn

TAT Requested:
 STANDARD

SAMPLER HELD FOR 30 DA Received via:		RECEIVED BY:	
Signature: <i>[Signature]</i>	Date: 08/07/23	Signature: <i>[Signature]</i>	Date: 08/07/23
Printed Name: <i>Cathy Schwab</i>	Time: 1315	Printed Name: <i>[Name]</i>	Time: 217123
Company: <i>MFA</i>		Company: <i>[Company]</i>	

RELINQUISHED BY:		RECEIVED BY:	
Signature: <i>[Signature]</i>	Date: 08/07/23	Signature: <i>[Signature]</i>	Date: 08/07/23
Printed Name: <i>[Name]</i>	Time: 1315	Printed Name: <i>[Name]</i>	Time: 14:29
Company: <i>MFA</i>		Company: <i>[Company]</i>	

Philip Nerenberg



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0217 - 04 21 23 1023
--	---	---

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster Alongi Element WO#: A3B0217

Project/Project #: St. Helens Lagoon / M0830.03.006

Delivery Info:

Date/time received: 2/7/23 @ 14:29 By: RWP

Delivered by: Apex Client NESS FedEx UPS Radio Morgan SDS Evergreen Other

Cooler Inspection Date/time inspected: 2/7/23 @ 14:29 By: RWP

Chain of Custody included? Yes No

Signed/dated by client? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>4.4</u>						
Custody seals? (Y/N)	<u>N</u>						
Received on ice? (Y/N)	<u>X</u>						
Temp. blanks? (Y/N)	<u>N</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition (In/Out):	<u>IN</u>						

Cooler out of temp? (Y/N) Possible reason why: _____

Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No

Sample Inspection: Date/time inspected: 2/7/23 @ 17:17 By: ZAM

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: All VOA's have sediment 515 for MFA-B3A-20230207-GW-360 here sediment.

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: TS# 2239

Labeled by: ZAM

Witness: [Signature]

Cooler Inspected by: [Signature]

Form Y-003 R-00

Philip Nerenberg



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Tuesday, May 2, 2023

David Weatherby
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A3B0522 - St. Helens Lagoon - M0830.03.006

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A3B0522, which was received by the laboratory on 2/15/2023 at 7:30:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: pnerenberg@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler#1	1.9 degC	Cooler#2	0.3 degC
Cooler#3	0.3 degC	Cooler#4	0.4 degC
Cooler#5	0.9 degC	Cooler#6	5.4 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW3-20230214-GW-35	A3B0522-01	Water	02/14/23 10:05	02/15/23 07:30
MW3-20230214-GW-35-DUP	A3B0522-02	Water	02/14/23 10:05	02/15/23 07:30
MW5-20230214-GW-40	A3B0522-03	Water	02/14/23 12:51	02/15/23 07:30
MW4-20230214-GW-40	A3B0522-04	Water	02/14/23 14:37	02/15/23 07:30
MW6-20230214-GW-40.25	A3B0522-05	Water	02/14/23 16:17	02/15/23 07:30
Field Blank-02	A3B0522-06	Water	02/14/23 16:10	02/15/23 07:30
Trip Blank	A3B0522-07	Water	02/14/23 00:00	02/15/23 07:30

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL CASE NARRATIVE

A3B0522	Apex Laboratories
----------------	--------------------------

Amended Report Revision 1:

EPA Method 8270E data correction.

This report supersedes all previous reports.

Samples were originally reported from an out of hold time batch (23B0895). The samples were re-extracted due to low Blank Spike recoveries. The original in hold time batch (23B0761) is now reported.

Mark Zehr
Organics Manager
4/21/2023

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0986			
Diesel	ND	0.103	0.206	mg/L	1	03/01/23 01:12	NWTPH-Dx		
Oil	ND	0.206	0.412	mg/L	1	03/01/23 01:12	NWTPH-Dx		
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 81 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/01/23 01:12</i>	<i>NWTPH-Dx</i>	
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0986			
Diesel	ND	0.108	0.215	mg/L	1	03/01/23 01:32	NWTPH-Dx		
Oil	ND	0.215	0.430	mg/L	1	03/01/23 01:32	NWTPH-Dx		
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 70 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/01/23 01:32</i>	<i>NWTPH-Dx</i>	
MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: 23B0986			PRES
Diesel	0.139	0.103	0.206	mg/L	1	03/01/23 01:53	NWTPH-Dx	Ja	
Oil	ND	0.206	0.412	mg/L	1	03/01/23 01:53	NWTPH-Dx		
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 90 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/01/23 01:53</i>	<i>NWTPH-Dx</i>	
MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water		Batch: 23B0986			
Diesel	0.148	0.106	0.213	mg/L	1	03/01/23 02:13	NWTPH-Dx	Ja	
Oil	0.213	0.213	0.426	mg/L	1	03/01/23 02:13	NWTPH-Dx	Ja	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 79 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/01/23 02:13</i>	<i>NWTPH-Dx</i>	
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0986			
Diesel	0.180	0.105	0.211	mg/L	1	03/01/23 02:34	NWTPH-Dx	Ja	
Oil	0.316	0.211	0.421	mg/L	1	03/01/23 02:34	NWTPH-Dx	Ja	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/01/23 02:34</i>	<i>NWTPH-Dx</i>	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 17:01	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 17:01</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>109 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 17:01</i>	<i>NWTPH-Gx (MS)</i>
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 17:23	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 17:23</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>106 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 17:23</i>	<i>NWTPH-Gx (MS)</i>
MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 17:45	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 102 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 17:45</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>107 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 17:45</i>	<i>NWTPH-Gx (MS)</i>
MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water		Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 18:07	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 97 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 18:07</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>105 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 18:07</i>	<i>NWTPH-Gx (MS)</i>
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 18:30	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 18:30</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>108 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 18:30</i>	<i>NWTPH-Gx (MS)</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 17:01	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Benzene	ND	0.100	0.200	ug/L	1	02/22/23 17:01	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 17:01	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 17:01	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 17:01	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Chloroform	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 17:01	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
1,3-Dichlorobenzene	0.350	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0828		
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Ethylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 17:01	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 17:01	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 17:01	EPA 8260D	
4-Methyl-2-pentanone (MIBK)	ND	5.00	10.0	ug/L	1	02/22/23 17:01	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 17:01	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
Toluene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
Vinyl chloride	ND	0.200	0.400	ug/L	1	02/22/23 17:01	EPA 8260D	
m,p-Xylene	ND	0.500	1.00	ug/L	1	02/22/23 17:01	EPA 8260D	
o-Xylene	ND	0.250	0.500	ug/L	1	02/22/23 17:01	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)			Matrix: Water			Batch: 23B0828		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 98 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>02/22/23 17:01</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>104 %</i>	<i>80-120 %</i>	<i>1</i>	<i>02/22/23 17:01</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>100 %</i>	<i>80-120 %</i>	<i>1</i>	<i>02/22/23 17:01</i>	<i>EPA 8260D</i>	
MW3-20230214-GW-35-DUP (A3B0522-02)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 17:23	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Benzene	ND	0.100	0.200	ug/L	1	02/22/23 17:23	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 17:23	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 17:23	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 17:23	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Chloroform	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 17:23	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
1,3-Dichlorobenzene	0.440	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0828		
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Ethylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 17:23	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 17:23	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 17:23	EPA 8260D	
4-Methyl-2-pentanone (MIBK)	ND	5.00	10.0	ug/L	1	02/22/23 17:23	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 17:23	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
Toluene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35-DUP (A3B0522-02)			Matrix: Water			Batch: 23B0828		
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
Vinyl chloride	ND	0.200	0.400	ug/L	1	02/22/23 17:23	EPA 8260D	
m,p-Xylene	ND	0.500	1.00	ug/L	1	02/22/23 17:23	EPA 8260D	
o-Xylene	ND	0.250	0.500	ug/L	1	02/22/23 17:23	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 17:23</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 17:23</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 17:23</i>	<i>EPA 8260D</i>
MW5-20230214-GW-40 (A3B0522-03)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 17:45	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Benzene	ND	0.100	0.200	ug/L	1	02/22/23 17:45	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 17:45	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 17:45	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 17:45	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Chloroform	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 17:45	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03)			Matrix: Water		Batch: 23B0828			
1,3-Dichlorobenzene	0.260	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Ethylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 17:45	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 17:45	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 17:45	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/22/23 17:45	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 17:45	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
Toluene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03)			Matrix: Water			Batch: 23B0828		
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
Vinyl chloride	ND	0.200	0.400	ug/L	1	02/22/23 17:45	EPA 8260D	
m,p-Xylene	ND	0.500	1.00	ug/L	1	02/22/23 17:45	EPA 8260D	
o-Xylene	ND	0.250	0.500	ug/L	1	02/22/23 17:45	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 17:45</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>				<i>102 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/22/23 17:45</i>
<i>4-Bromofluorobenzene (Surr)</i>				<i>100 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/22/23 17:45</i>

MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 18:07	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Benzene	ND	0.100	0.200	ug/L	1	02/22/23 18:07	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 18:07	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 18:07	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 18:07	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Chloroform	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 18:07	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water			Batch: 23B0828		
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
1,3-Dichlorobenzene	0.330	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Ethylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 18:07	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 18:07	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 18:07	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/22/23 18:07	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 18:07	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
Toluene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water			Batch: 23B0828		
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
Vinyl chloride	ND	0.200	0.400	ug/L	1	02/22/23 18:07	EPA 8260D	
m,p-Xylene	ND	0.500	1.00	ug/L	1	02/22/23 18:07	EPA 8260D	
o-Xylene	ND	0.250	0.500	ug/L	1	02/22/23 18:07	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>02/22/23 18:07</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/22/23 18:07</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/22/23 18:07</i>	<i>EPA 8260D</i>	

MW6-20230214-GW-40.25 (A3B0522-05)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 18:30	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Benzene	ND	0.100	0.200	ug/L	1	02/22/23 18:30	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 18:30	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 18:30	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 18:30	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Chloroform	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0828		
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 18:30	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
1,3-Dichlorobenzene	0.250	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Ethylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 18:30	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 18:30	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 18:30	EPA 8260D	
4-Methyl-2-pentanone (MIBK)	ND	5.00	10.0	ug/L	1	02/22/23 18:30	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 18:30	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW6-20230214-GW-40.25 (A3B0522-05)			Matrix: Water			Batch: 23B0828		
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
Toluene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
Vinyl chloride	ND	0.200	0.400	ug/L	1	02/22/23 18:30	EPA 8260D	
m,p-Xylene	ND	0.500	1.00	ug/L	1	02/22/23 18:30	EPA 8260D	
o-Xylene	ND	0.250	0.500	ug/L	1	02/22/23 18:30	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 18:30</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 18:30</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 18:30</i>	<i>EPA 8260D</i>

Trip Blank (A3B0522-07)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 16:16	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Benzene	ND	0.100	0.200	ug/L	1	02/22/23 16:16	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 16:16	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 16:16	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 16:16	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0522-07)			Matrix: Water			Batch: 23B0828		
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Chloroform	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 16:16	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Ethylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 16:16	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 16:16	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 16:16	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/22/23 16:16	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0522-07)			Matrix: Water			Batch: 23B0828		
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 16:16	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
Toluene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
Vinyl chloride	ND	0.200	0.400	ug/L	1	02/22/23 16:16	EPA 8260D	
m,p-Xylene	ND	0.500	1.00	ug/L	1	02/22/23 16:16	EPA 8260D	
o-Xylene	ND	0.250	0.500	ug/L	1	02/22/23 16:16	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 16:16</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 16:16</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 16:16</i>	<i>EPA 8260D</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)			Matrix: Water		Batch: 23B0743			
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Chloroform	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 17:06	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>02/20/23 17:06</i>	<i>EPA 8260D SIM</i>	
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/20/23 17:06</i>	<i>EPA 8260D SIM</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/20/23 17:06</i>	<i>EPA 8260D SIM</i>	

MW3-20230214-GW-35-DUP (A3B0522-02)			Matrix: Water		Batch: 23B0743			
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0743		
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Chloroform	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:27	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/20/23 18:27</i>	<i>EPA 8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 18:27</i>	<i>EPA 8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 18:27</i>	<i>EPA 8260D SIM</i>

MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: 23B0743		
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Chloroform	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03)			Matrix: Water			Batch: 23B0743		
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
cis-1,2-Dichloroethene	0.0291	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,1,1,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 18:54	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/20/23 18:54</i>	<i>EPA 8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 18:54</i>	<i>EPA 8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 18:54</i>	<i>EPA 8260D SIM</i>

MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water			Batch: 23B0743		
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Chloroform	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water		Batch: 23B0743		
1,1-Dichloroethene	ND	0.0200	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0200	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,1,1,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:20	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>02/20/23 19:20</i>	<i>EPA 8260D SIM</i>	
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/20/23 19:20</i>	<i>EPA 8260D SIM</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/20/23 19:20</i>	<i>EPA 8260D SIM</i>	

MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0743		
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
Chloroform	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
cis-1,2-Dichloroethene	0.0212	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW6-20230214-GW-40.25 (A3B0522-05)			Matrix: Water			Batch: 23B0743		
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 19:47	EPA 8260D SIM	Q-42
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/20/23 19:47</i>	<i>EPA 8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 19:47</i>	<i>EPA 8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 19:47</i>	<i>EPA 8260D SIM</i>

Trip Blank (A3B0522-07)			Matrix: Water			Batch: 23B0743		
Benzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
Chloroform	0.218	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

<p><u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232</p>	<p>Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby</p>	<p style="text-align: right;">Report ID: A3B0522 - 05 02 23 1624</p>
--	---	--

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0522-07)			Matrix: Water			Batch: 23B0743		
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	02/20/23 16:39	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/20/23 16:39</i>	<i>EPA 8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 16:39</i>	<i>EPA 8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/20/23 16:39</i>	<i>EPA 8260D SIM</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0761		AMEND
Acenaphthene	0.0419	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Acenaphthylene	0.0340	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Anthracene	0.0165	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
Benz(a)anthracene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Benzo(a)pyrene	ND	0.0144	0.0288	ug/L	1	02/21/23 19:16	EPA 8270E	
Benzo(b)fluoranthene	ND	0.0144	0.0288	ug/L	1	02/21/23 19:16	EPA 8270E	
Benzo(k)fluoranthene	ND	0.0144	0.0288	ug/L	1	02/21/23 19:16	EPA 8270E	
Benzo(g,h,i)perylene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Chrysene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Dibenz(a,h)anthracene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Fluoranthene	0.0240	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Fluorene	0.0586	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
1-Methylnaphthalene	0.0239	0.0192	0.0385	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30, Ja
2-Methylnaphthalene	ND	0.0192	0.0385	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
Naphthalene	0.0722	0.0192	0.0385	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
Phenanthrene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Pyrene	ND	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	
Carbazole	0.0178	0.0144	0.0288	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
Dibenzofuran	0.0174	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
2-Chlorophenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
2,4-Dichlorophenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
2,4-Dimethylphenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
2,4-Dinitrophenol	ND	0.240	0.481	ug/L	1	02/21/23 19:16	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.240	0.481	ug/L	1	02/21/23 19:16	EPA 8270E	
2-Methylphenol	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
2-Nitrophenol	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
4-Nitrophenol	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
Phenol	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0761		AMEND
2,3,5,6-Tetrachlorophenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
Butyl benzyl phthalate	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
Diethylphthalate	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
Dimethylphthalate	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
Di-n-butylphthalate	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
Di-n-octyl phthalate	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
N-Nitrosodiphenylamine	0.0257	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
Bis(2-Chloroethoxy) methane	0.0623	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
Bis(2-Chloroethyl) ether	0.0407	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
2,2'-Oxybis(1-Chloropropane)	0.0264	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
Hexachlorobenzene	0.0179	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
Hexachlorobutadiene	0.0358	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30, Ja
Hexachlorocyclopentadiene	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
Hexachloroethane	0.0378	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30, Ja
2-Chloronaphthalene	0.0513	0.00962	0.0192	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
1,2,4-Trichlorobenzene	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
4-Bromophenyl phenyl ether	0.0493	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
4-Chlorophenyl phenyl ether	0.0507	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
Aniline	ND	0.0481	0.0962	ug/L	1	02/21/23 19:16	EPA 8270E	
4-Chloroaniline	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
2-Nitroaniline	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
3-Nitroaniline	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
4-Nitroaniline	ND	0.192	0.385	ug/L	1	02/21/23 19:16	EPA 8270E	
Nitrobenzene	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
2,4-Dinitrotoluene	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
2,6-Dinitrotoluene	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
Benzoic acid	ND	2.40	2.40	ug/L	1	02/21/23 19:16	EPA 8270E	
Benzyl alcohol	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0761		AMEND
Isophorone	0.0272	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Ja
Azobenzene (1,2-DPH)	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	
Bis(2-Ethylhexyl) adipate	ND	0.240	0.481	ug/L	1	02/21/23 19:16	EPA 8270E	
3,3'-Dichlorobenzidine	ND	0.481	0.962	ug/L	1	02/21/23 19:16	EPA 8270E	Q-52
1,2-Dinitrobenzene	ND	0.240	0.481	ug/L	1	02/21/23 19:16	EPA 8270E	
1,3-Dinitrobenzene	ND	0.240	0.481	ug/L	1	02/21/23 19:16	EPA 8270E	
1,4-Dinitrobenzene	ND	0.240	0.481	ug/L	1	02/21/23 19:16	EPA 8270E	
Pyridine	ND	0.0962	0.192	ug/L	1	02/21/23 19:16	EPA 8270E	
1,2-Dichlorobenzene	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
1,3-Dichlorobenzene	0.0950	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
1,4-Dichlorobenzene	ND	0.0240	0.0481	ug/L	1	02/21/23 19:16	EPA 8270E	Q-30
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 42 %</i>		<i>Limits: 44-120 %</i>	<i>1</i>	<i>02/21/23 19:16</i>	<i>EPA 8270E</i>	<i>S-06</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>31 %</i>		<i>44-120 %</i>	<i>1</i>	<i>02/21/23 19:16</i>	<i>EPA 8270E</i>	<i>S-06</i>
<i>Phenol-d6 (Surr)</i>		<i>18 %</i>		<i>10-133 %</i>	<i>1</i>	<i>02/21/23 19:16</i>	<i>EPA 8270E</i>	
<i>p-Terphenyl-d14 (Surr)</i>		<i>73 %</i>		<i>50-134 %</i>	<i>1</i>	<i>02/21/23 19:16</i>	<i>EPA 8270E</i>	
<i>2-Fluorophenol (Surr)</i>		<i>27 %</i>		<i>19-120 %</i>	<i>1</i>	<i>02/21/23 19:16</i>	<i>EPA 8270E</i>	
<i>2,4,6-Tribromophenol (Surr)</i>		<i>64 %</i>		<i>43-140 %</i>	<i>1</i>	<i>02/21/23 19:16</i>	<i>EPA 8270E</i>	

MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0761		AMEND
Acenaphthene	0.0167	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	Ja
Acenaphthylene	0.0129	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	Ja
Anthracene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Benz(a)anthracene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Benzo(a)pyrene	ND	0.0142	0.0283	ug/L	1	02/21/23 19:50	EPA 8270E	
Benzo(b)fluoranthene	ND	0.0142	0.0283	ug/L	1	02/21/23 19:50	EPA 8270E	
Benzo(k)fluoranthene	ND	0.0142	0.0283	ug/L	1	02/21/23 19:50	EPA 8270E	
Benzo(g,h,i)perylene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Chrysene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Dibenz(a,h)anthracene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Fluoranthene	0.0106	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	Ja
Fluorene	0.0201	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
1-Methylnaphthalene	ND	0.0189	0.0377	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30
2-Methylnaphthalene	ND	0.0189	0.0377	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
---	--	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0761		AMEND
Naphthalene	0.0362	0.0189	0.0377	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30, Ja
Phenanthrene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Pyrene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
Carbazole	ND	0.0142	0.0283	ug/L	1	02/21/23 19:50	EPA 8270E	
Dibenzofuran	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	
2-Chlorophenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E	
2,4-Dichlorophenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
2,4-Dimethylphenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
2,4-Dinitrophenol	ND	0.236	0.472	ug/L	1	02/21/23 19:50	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.236	0.472	ug/L	1	02/21/23 19:50	EPA 8270E	
2-Methylphenol	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	
2-Nitrophenol	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E	
4-Nitrophenol	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E	
Phenol	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
2,3,5,6-Tetrachlorophenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
Butyl benzyl phthalate	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
Diethylphthalate	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
Dimethylphthalate	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
Di-n-butylphthalate	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
Di-n-octyl phthalate	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	
Bis(2-Chloroethoxy) methane	0.0257	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Ja
Bis(2-Chloroethyl) ether	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0761		AMEND	
Hexachlorobenzene	ND	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E		
Hexachlorobutadiene	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
Hexachlorocyclopentadiene	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
Hexachloroethane	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
2-Chloronaphthalene	0.0206	0.00943	0.0189	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
1,2,4-Trichlorobenzene	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
4-Bromophenyl phenyl ether	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E		
4-Chlorophenyl phenyl ether	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E		
Aniline	ND	0.0472	0.0943	ug/L	1	02/21/23 19:50	EPA 8270E		
4-Chloroaniline	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E		
2-Nitroaniline	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E		
3-Nitroaniline	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E		
4-Nitroaniline	ND	0.189	0.377	ug/L	1	02/21/23 19:50	EPA 8270E		
Nitrobenzene	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E		
2,4-Dinitrotoluene	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E		
2,6-Dinitrotoluene	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E		
Benzoic acid	ND	2.36	2.36	ug/L	1	02/21/23 19:50	EPA 8270E		
Benzyl alcohol	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E		
Isophorone	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E		
Azobenzene (1,2-DPH)	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E		
Bis(2-Ethylhexyl) adipate	ND	0.236	0.472	ug/L	1	02/21/23 19:50	EPA 8270E		
3,3'-Dichlorobenzidine	ND	0.472	0.943	ug/L	1	02/21/23 19:50	EPA 8270E	Q-52	
1,2-Dinitrobenzene	ND	0.236	0.472	ug/L	1	02/21/23 19:50	EPA 8270E		
1,3-Dinitrobenzene	ND	0.236	0.472	ug/L	1	02/21/23 19:50	EPA 8270E		
1,4-Dinitrobenzene	ND	0.236	0.472	ug/L	1	02/21/23 19:50	EPA 8270E		
Pyridine	ND	0.0943	0.189	ug/L	1	02/21/23 19:50	EPA 8270E		
1,2-Dichlorobenzene	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
1,3-Dichlorobenzene	0.0939	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
1,4-Dichlorobenzene	ND	0.0236	0.0472	ug/L	1	02/21/23 19:50	EPA 8270E	Q-30	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 34 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>02/21/23 19:50</i>	<i>EPA 8270E</i>	<i>S-06</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>27 %</i>		<i>44-120 %</i>		<i>1</i>	<i>02/21/23 19:50</i>	<i>EPA 8270E</i>	<i>S-06</i>
<i>Phenol-d6 (Surr)</i>		<i>13 %</i>		<i>10-133 %</i>		<i>1</i>	<i>02/21/23 19:50</i>	<i>EPA 8270E</i>	
<i>p-Terphenyl-d14 (Surr)</i>		<i>55 %</i>		<i>50-134 %</i>		<i>1</i>	<i>02/21/23 19:50</i>	<i>EPA 8270E</i>	
<i>2-Fluorophenol (Surr)</i>		<i>23 %</i>		<i>19-120 %</i>		<i>1</i>	<i>02/21/23 19:50</i>	<i>EPA 8270E</i>	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0761		AMEND
<i>Surrogate: 2,4,6-Tribromophenol (Surr)</i>		<i>Recovery: 49 %</i>		<i>Limits: 43-140 %</i>		<i>1</i>	<i>02/21/23 19:50</i>	<i>EPA 8270E</i>
MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: 23B0761		AMEND
Acenaphthene	0.0296	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Acenaphthylene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Anthracene	ND	0.0235	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Benz(a)anthracene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Benzo(a)pyrene	ND	0.0176	0.0353	ug/L	1	02/21/23 20:25	EPA 8270E	
Benzo(b)fluoranthene	ND	0.0176	0.0353	ug/L	1	02/21/23 20:25	EPA 8270E	
Benzo(k)fluoranthene	ND	0.0176	0.0353	ug/L	1	02/21/23 20:25	EPA 8270E	
Benzo(g,h,i)perylene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Chrysene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Dibenz(a,h)anthracene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Fluoranthene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Fluorene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
1-Methylnaphthalene	ND	0.0235	0.0471	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
2-Methylnaphthalene	ND	0.0235	0.0471	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
Naphthalene	ND	0.0235	0.0471	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
Phenanthrene	ND	0.0235	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Pyrene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Carbazole	ND	0.0176	0.0353	ug/L	1	02/21/23 20:25	EPA 8270E	
Dibenzofuran	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
2-Chlorophenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.235	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
2,4-Dichlorophenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
2,4-Dimethylphenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
2,4-Dinitrophenol	ND	0.294	0.588	ug/L	1	02/21/23 20:25	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.294	0.588	ug/L	1	02/21/23 20:25	EPA 8270E	
2-Methylphenol	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
2-Nitrophenol	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
4-Nitrophenol	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: 23B0761		AMEND
Phenol	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
2,3,5,6-Tetrachlorophenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
Butyl benzyl phthalate	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
Diethylphthalate	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
Dimethylphthalate	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
Di-n-butylphthalate	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
Di-n-octyl phthalate	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0588	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0588	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
Bis(2-Chloroethyl) ether	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
Hexachlorobenzene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	
Hexachlorobutadiene	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
Hexachlorocyclopentadiene	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
Hexachloroethane	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
2-Chloronaphthalene	ND	0.0118	0.0235	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
1,2,4-Trichlorobenzene	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
4-Bromophenyl phenyl ether	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
4-Chlorophenyl phenyl ether	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
Aniline	ND	0.0588	0.118	ug/L	1	02/21/23 20:25	EPA 8270E	
4-Chloroaniline	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
2-Nitroaniline	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
3-Nitroaniline	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
4-Nitroaniline	ND	0.235	0.471	ug/L	1	02/21/23 20:25	EPA 8270E	
Nitrobenzene	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
2,4-Dinitrotoluene	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
2,6-Dinitrotoluene	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: 23B0761		AMEND
Benzoic acid	ND	2.94	2.94	ug/L	1	02/21/23 20:25	EPA 8270E	
Benzyl alcohol	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
Isophorone	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
Azobenzene (1,2-DPH)	ND	0.0588	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	
Bis(2-Ethylhexyl) adipate	ND	0.294	0.588	ug/L	1	02/21/23 20:25	EPA 8270E	
3,3'-Dichlorobenzidine	ND	0.588	1.18	ug/L	1	02/21/23 20:25	EPA 8270E	Q-52
1,2-Dinitrobenzene	ND	0.294	0.588	ug/L	1	02/21/23 20:25	EPA 8270E	
1,3-Dinitrobenzene	ND	0.294	0.588	ug/L	1	02/21/23 20:25	EPA 8270E	
1,4-Dinitrobenzene	ND	0.294	0.588	ug/L	1	02/21/23 20:25	EPA 8270E	
Pyridine	ND	0.118	0.235	ug/L	1	02/21/23 20:25	EPA 8270E	
1,2-Dichlorobenzene	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
1,3-Dichlorobenzene	0.108	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
1,4-Dichlorobenzene	ND	0.0294	0.0588	ug/L	1	02/21/23 20:25	EPA 8270E	Q-30
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 63 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>02/21/23 20:25</i>	<i>EPA 8270E</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>46 %</i>		<i>44-120 %</i>		<i>1</i>	<i>02/21/23 20:25</i>	<i>EPA 8270E</i>
<i>Phenol-d6 (Surr)</i>		<i>29 %</i>		<i>10-133 %</i>		<i>1</i>	<i>02/21/23 20:25</i>	<i>EPA 8270E</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>89 %</i>		<i>50-134 %</i>		<i>1</i>	<i>02/21/23 20:25</i>	<i>EPA 8270E</i>
<i>2-Fluorophenol (Surr)</i>		<i>44 %</i>		<i>19-120 %</i>		<i>1</i>	<i>02/21/23 20:25</i>	<i>EPA 8270E</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>85 %</i>		<i>43-140 %</i>		<i>1</i>	<i>02/21/23 20:25</i>	<i>EPA 8270E</i>

MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water		Batch: 23B0761		AMEND
Acenaphthene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Acenaphthylene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Anthracene	ND	0.0247	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Benz(a)anthracene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Benzo(a)pyrene	ND	0.0185	0.0370	ug/L	1	02/21/23 21:00	EPA 8270E	
Benzo(b)fluoranthene	ND	0.0185	0.0370	ug/L	1	02/21/23 21:00	EPA 8270E	
Benzo(k)fluoranthene	ND	0.0185	0.0370	ug/L	1	02/21/23 21:00	EPA 8270E	
Benzo(g,h,i)perylene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Chrysene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Dibenz(a,h)anthracene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Fluoranthene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Fluorene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water		Batch: 23B0761		AMEND
1-Methylnaphthalene	ND	0.0247	0.0494	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
2-Methylnaphthalene	ND	0.0247	0.0494	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
Naphthalene	ND	0.0247	0.0494	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
Phenanthrene	ND	0.0247	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Pyrene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Carbazole	ND	0.0185	0.0370	ug/L	1	02/21/23 21:00	EPA 8270E	
Dibenzofuran	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
2-Chlorophenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.247	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
2,4-Dichlorophenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
2,4-Dimethylphenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
2,4-Dinitrophenol	ND	0.309	0.617	ug/L	1	02/21/23 21:00	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.309	0.617	ug/L	1	02/21/23 21:00	EPA 8270E	
2-Methylphenol	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0617	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
2-Nitrophenol	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
4-Nitrophenol	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
Phenol	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
2,3,5,6-Tetrachlorophenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
Butyl benzyl phthalate	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
Diethylphthalate	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
Dimethylphthalate	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
Di-n-butylphthalate	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
Di-n-octyl phthalate	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0617	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water		Batch: 23B0761		AMEND
Bis(2-Chloroethyl) ether	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
Hexachlorobenzene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	
Hexachlorobutadiene	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
Hexachlorocyclopentadiene	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
Hexachloroethane	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
2-Chloronaphthalene	ND	0.0123	0.0247	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
1,2,4-Trichlorobenzene	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
4-Bromophenyl phenyl ether	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
4-Chlorophenyl phenyl ether	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
Aniline	ND	0.0617	0.123	ug/L	1	02/21/23 21:00	EPA 8270E	
4-Chloroaniline	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
2-Nitroaniline	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
3-Nitroaniline	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
4-Nitroaniline	ND	0.247	0.494	ug/L	1	02/21/23 21:00	EPA 8270E	
Nitrobenzene	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
2,4-Dinitrotoluene	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
2,6-Dinitrotoluene	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
Benzoic acid	ND	1.54	3.09	ug/L	1	02/21/23 21:00	EPA 8270E	
Benzyl alcohol	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
Isophorone	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
Azobenzene (1,2-DPH)	ND	0.0617	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	
Bis(2-Ethylhexyl) adipate	ND	0.309	0.617	ug/L	1	02/21/23 21:00	EPA 8270E	
3,3'-Dichlorobenzidine	ND	0.617	1.23	ug/L	1	02/21/23 21:00	EPA 8270E	Q-52
1,2-Dinitrobenzene	ND	0.309	0.617	ug/L	1	02/21/23 21:00	EPA 8270E	
1,3-Dinitrobenzene	ND	0.309	0.617	ug/L	1	02/21/23 21:00	EPA 8270E	
1,4-Dinitrobenzene	ND	0.309	0.617	ug/L	1	02/21/23 21:00	EPA 8270E	
Pyridine	ND	0.123	0.247	ug/L	1	02/21/23 21:00	EPA 8270E	
1,2-Dichlorobenzene	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
1,3-Dichlorobenzene	0.122	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
1,4-Dichlorobenzene	ND	0.0309	0.0617	ug/L	1	02/21/23 21:00	EPA 8270E	Q-30
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 63 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>02/21/23 21:00</i>	<i>EPA 8270E</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>48 %</i>		<i>44-120 %</i>		<i>1</i>	<i>02/21/23 21:00</i>	<i>EPA 8270E</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232
Project: St. Helens Lagoon
Project Number: M0830.03.006
Project Manager: David Weatherby
Report ID: A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Table with columns: Analyte, Sample Result, Detection Limit, Reporting Limit, Units, Dilution, Date Analyzed, Method Ref., Notes. Includes sections for MW4-20230214-GW-40 and MW6-20230214-GW-40.25.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0761		AMEND
2-Nitrophenol	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
4-Nitrophenol	ND	0.222	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
Phenol	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0556	0.111	ug/L	1	02/21/23 21:34	EPA 8270E	
2,3,5,6-Tetrachlorophenol	ND	0.0556	0.111	ug/L	1	02/21/23 21:34	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0556	0.111	ug/L	1	02/21/23 21:34	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0556	0.111	ug/L	1	02/21/23 21:34	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
Butyl benzyl phthalate	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
Diethylphthalate	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
Dimethylphthalate	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
Di-n-butylphthalate	0.347	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	Ja
Di-n-octyl phthalate	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
Bis(2-Chloroethoxy) methane	0.0519	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Ja
Bis(2-Chloroethyl) ether	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
Hexachlorobenzene	ND	0.0111	0.0222	ug/L	1	02/21/23 21:34	EPA 8270E	
Hexachlorobutadiene	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
Hexachlorocyclopentadiene	ND	0.0556	0.111	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
Hexachloroethane	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
2-Chloronaphthalene	0.0255	0.0111	0.0222	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
1,2,4-Trichlorobenzene	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
4-Bromophenyl phenyl ether	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
4-Chlorophenyl phenyl ether	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
Aniline	ND	0.0556	0.111	ug/L	1	02/21/23 21:34	EPA 8270E	
4-Chloroaniline	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
2-Nitroaniline	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
3-Nitroaniline	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	
4-Nitroaniline	ND	0.222	0.444	ug/L	1	02/21/23 21:34	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0761		AMEND
Nitrobenzene	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
2,4-Dinitrotoluene	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
2,6-Dinitrotoluene	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
Benzoic acid	ND	2.78	2.78	ug/L	1	02/21/23 21:34	EPA 8270E	
Benzyl alcohol	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
Isophorone	0.0398	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Ja
Azobenzene (1,2-DPH)	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	
Bis(2-Ethylhexyl) adipate	ND	0.278	0.556	ug/L	1	02/21/23 21:34	EPA 8270E	
3,3'-Dichlorobenzidine	ND	0.556	1.11	ug/L	1	02/21/23 21:34	EPA 8270E	Q-52
1,2-Dinitrobenzene	ND	0.278	0.556	ug/L	1	02/21/23 21:34	EPA 8270E	
1,3-Dinitrobenzene	ND	0.278	0.556	ug/L	1	02/21/23 21:34	EPA 8270E	
1,4-Dinitrobenzene	ND	0.278	0.556	ug/L	1	02/21/23 21:34	EPA 8270E	
Pyridine	ND	0.111	0.222	ug/L	1	02/21/23 21:34	EPA 8270E	
1,2-Dichlorobenzene	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
1,3-Dichlorobenzene	0.0919	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
1,4-Dichlorobenzene	ND	0.0278	0.0556	ug/L	1	02/21/23 21:34	EPA 8270E	Q-30
<i>Surrogate: 2-Fluorobiphenyl (Surr)</i>		<i>Recovery: 47 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>02/21/23 21:34</i>	<i>EPA 8270E</i>
<i>Phenol-d6 (Surr)</i>		<i>27 %</i>		<i>10-133 %</i>		<i>1</i>	<i>02/21/23 21:34</i>	<i>EPA 8270E</i>
<i>p-Terphenyl-d14 (Surr)</i>		<i>76 %</i>		<i>50-134 %</i>		<i>1</i>	<i>02/21/23 21:34</i>	<i>EPA 8270E</i>
<i>2-Fluorophenol (Surr)</i>		<i>22 %</i>		<i>19-120 %</i>		<i>1</i>	<i>02/21/23 21:34</i>	<i>EPA 8270E</i>
<i>2,4,6-Tribromophenol (Surr)</i>		<i>55 %</i>		<i>43-140 %</i>		<i>1</i>	<i>02/21/23 21:34</i>	<i>EPA 8270E</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)				Matrix: Water		Batch: 23B0739		
Azinphos methyl (Guthion)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Chlorpyrifos	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Coumaphos	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Demeton O	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Demeton S	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Diazinon	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Dichlorvos	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Dimethoate	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Disulfoton	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
EPN	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Ethoprop	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Fensulfothion	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Fenthion	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Malathion	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Merphos	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Methyl parathion	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Monocrotophos	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Parathion, ethyl	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Phorate	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Ronnel (Fenchlorphos)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Sulfotep	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
TEPP	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
Trichloronate	ND	0.248	0.495	ug/L	1	02/20/23 20:32	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 77 %</i>		<i>Limits: 56-124 %</i>	<i>1</i>	<i>02/20/23 20:32</i>	<i>EPA 8270E OPPs</i>	
<i>Triphenyl phosphate (Surr)</i>		<i>104 %</i>		<i>58-121 %</i>	<i>1</i>	<i>02/20/23 20:32</i>	<i>EPA 8270E OPPs</i>	

MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: 23B0739		
Azinphos methyl (Guthion)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
---	--	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35-DUP (A3B0522-02)			Matrix: Water			Batch: 23B0739		
Chlorpyrifos	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Coumaphos	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Demeton O	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Demeton S	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Diazinon	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Dichlorvos	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Dimethoate	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Disulfoton	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
EPN	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Ethoprop	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Fensulfothion	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Fenthion	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Malathion	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Merphos	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Methyl parathion	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Monocrotophos	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Parathion, ethyl	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Phorate	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Ronnel (Fenclorophos)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Sulfotep	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
TEPP	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
Trichloronate	ND	0.248	0.495	ug/L	1	02/20/23 21:07	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 91 %</i>		<i>Limits: 56-124 %</i>		<i>1</i>	<i>02/20/23 21:07</i>	<i>EPA 8270E OPPs</i>
<i>Triphenyl phosphate (Surr)</i>		<i>110 %</i>		<i>58-121 %</i>		<i>1</i>	<i>02/20/23 21:07</i>	<i>EPA 8270E OPPs</i>

MW5-20230214-GW-40 (A3B0522-03)			Matrix: Water			Batch: 23B0739		
Azinphos methyl (Guthion)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Chlorpyrifos	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	

Apex Laboratories

Philip Nerenberg

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
---	--	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03)			Matrix: Water			Batch: 23B0739		
Coumaphos	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Demeton O	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Demeton S	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Diazinon	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Dichlorvos	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Dimethoate	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Disulfoton	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
EPN	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Ethoprop	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Fensulfothion	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Fenthion	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Malathion	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Merphos	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Methyl parathion	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Monocrotophos	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Parathion, ethyl	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Phorate	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Ronnel (Fenchlorphos)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Sulfotep	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
TEPP	ND	0.549	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
Trichloronate	ND	0.275	0.549	ug/L	1	02/20/23 21:42	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 92 %</i>		<i>Limits: 56-124 %</i>		<i>1</i>	<i>02/20/23 21:42</i>	<i>EPA 8270E OPPs</i>
<i>Triphenyl phosphate (Surr)</i>		<i>98 %</i>		<i>58-121 %</i>		<i>1</i>	<i>02/20/23 21:42</i>	<i>EPA 8270E OPPs</i>

MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water			Batch: 23B0739		
Azinphos methyl (Guthion)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Chlorpyrifos	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Coumaphos	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
---	--	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water			Batch: 23B0739		
Demeton O	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Demeton S	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Diazinon	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Dichlorvos	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Dimethoate	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Disulfoton	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
EPN	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Ethoprop	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Fensulfothion	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Fenthion	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Malathion	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Merphos	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Methyl parathion	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Monocrotophos	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Parathion, ethyl	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Phorate	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Ronnel (Fenclorphos)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Sulfotep	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
TEPP	ND	0.538	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
Trichloronate	ND	0.269	0.538	ug/L	1	02/20/23 22:18	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 56-124 %</i>		<i>1</i>	<i>02/20/23 22:18</i>	<i>EPA 8270E OPPs</i>
<i>Triphenyl phosphate (Surr)</i>		<i>102 %</i>		<i>58-121 %</i>		<i>1</i>	<i>02/20/23 22:18</i>	<i>EPA 8270E OPPs</i>

MW6-20230214-GW-40.25 (A3B0522-05)			Matrix: Water			Batch: 23B0739		
Azinphos methyl (Guthion)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Chlorpyrifos	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Coumaphos	ND	0.532	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Demeton O	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
---	--	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: 23B0739		
Demeton S	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Diazinon	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Dichlorvos	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Dimethoate	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Disulfoton	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
EPN	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Ethoprop	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Fensulfothion	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Fenthion	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Malathion	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Merphos	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Methyl parathion	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Monocrotophos	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Parathion, ethyl	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Phorate	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Ronnel (Fenclorophos)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Sulfotep	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
TEPP	ND	0.532	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
Trichloronate	ND	0.266	0.532	ug/L	1	02/20/23 22:53	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 56-124 %</i>		<i>1</i>	<i>02/20/23 22:53</i>	<i>EPA 8270E OPPs</i>
<i>Triphenyl phosphate (Surr)</i>		<i>96 %</i>		<i>58-121 %</i>		<i>1</i>	<i>02/20/23 22:53</i>	<i>EPA 8270E OPPs</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW3-20230214-GW-35 (A3B0522-01)								
Matrix: Water								
Batch: 23B0647								
Antimony	ND	0.500	1.00	ug/L	1	02/18/23 04:30	EPA 6020B	
Arsenic	0.773	0.500	1.00	ug/L	1	02/18/23 04:30	EPA 6020B	Ja
Barium	70.1	1.00	2.00	ug/L	1	02/18/23 04:30	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/18/23 04:30	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/18/23 04:30	EPA 6020B	
Chromium	ND	1.00	2.00	ug/L	1	02/18/23 04:30	EPA 6020B	
Copper	ND	1.00	2.00	ug/L	1	02/18/23 04:30	EPA 6020B	
Lead	ND	0.110	0.200	ug/L	1	02/18/23 04:30	EPA 6020B	
Manganese	826	0.500	1.00	ug/L	1	02/18/23 04:30	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/18/23 04:30	EPA 6020B	
Nickel	1.21	1.00	2.00	ug/L	1	02/18/23 04:30	EPA 6020B	Ja
Selenium	ND	0.500	1.00	ug/L	1	02/18/23 04:30	EPA 6020B	
Silver	ND	0.100	0.200	ug/L	1	02/18/23 04:30	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/18/23 04:30	EPA 6020B	
Zinc	ND	2.00	4.00	ug/L	1	02/18/23 04:30	EPA 6020B	

MW3-20230214-GW-35-DUP (A3B0522-02)								
Matrix: Water								
Batch: 23B0647								
Antimony	ND	0.500	1.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Arsenic	0.722	0.500	1.00	ug/L	1	02/18/23 04:45	EPA 6020B	Ja
Barium	70.9	1.00	2.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/18/23 04:45	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/18/23 04:45	EPA 6020B	
Chromium	ND	1.00	2.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Copper	ND	1.00	2.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Lead	ND	0.110	0.200	ug/L	1	02/18/23 04:45	EPA 6020B	
Manganese	826	0.500	1.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/18/23 04:45	EPA 6020B	
Nickel	ND	1.00	2.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Selenium	ND	0.500	1.00	ug/L	1	02/18/23 04:45	EPA 6020B	
Silver	ND	0.100	0.200	ug/L	1	02/18/23 04:45	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/18/23 04:45	EPA 6020B	
Zinc	ND	2.00	4.00	ug/L	1	02/18/23 04:45	EPA 6020B	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW5-20230214-GW-40 (A3B0522-03) Matrix: Water								
Batch: 23B0647								
Antimony	ND	0.500	1.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Arsenic	11.2	0.500	1.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Barium	760	1.00	2.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/18/23 04:51	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/18/23 04:51	EPA 6020B	
Chromium	ND	1.00	2.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Copper	ND	1.00	2.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Lead	ND	0.110	0.200	ug/L	1	02/18/23 04:51	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/18/23 04:51	EPA 6020B	
Nickel	2.46	1.00	2.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Selenium	ND	0.500	1.00	ug/L	1	02/18/23 04:51	EPA 6020B	
Silver	ND	0.100	0.200	ug/L	1	02/18/23 04:51	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/18/23 04:51	EPA 6020B	
Zinc	ND	2.00	4.00	ug/L	1	02/18/23 04:51	EPA 6020B	
MW5-20230214-GW-40 (A3B0522-03RE1) Matrix: Water								
Batch: 23B0647								
Manganese	6640	25.0	50.0	ug/L	50	02/20/23 16:04	EPA 6020B	
MW4-20230214-GW-40 (A3B0522-04) Matrix: Water								
Batch: 23B0647								
Antimony	ND	0.500	1.00	ug/L	1	02/18/23 05:07	EPA 6020B	
Arsenic	25.8	0.500	1.00	ug/L	1	02/18/23 05:07	EPA 6020B	
Barium	856	1.00	2.00	ug/L	1	02/18/23 05:07	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/18/23 05:07	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/18/23 05:07	EPA 6020B	
Chromium	2.26	1.00	2.00	ug/L	1	02/18/23 05:07	EPA 6020B	
Copper	1.18	1.00	2.00	ug/L	1	02/18/23 05:07	EPA 6020B	Ja
Lead	0.375	0.110	0.200	ug/L	1	02/18/23 05:07	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/18/23 05:07	EPA 6020B	
Nickel	4.04	1.00	2.00	ug/L	1	02/18/23 05:07	EPA 6020B	
Selenium	ND	0.500	1.00	ug/L	1	02/18/23 05:07	EPA 6020B	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)				Matrix: Water				
Silver	ND	0.100	0.200	ug/L	1	02/18/23 05:07	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/18/23 05:07	EPA 6020B	
Zinc	3.58	2.00	4.00	ug/L	1	02/18/23 05:07	EPA 6020B	Ja
MW4-20230214-GW-40 (A3B0522-04RE1)				Matrix: Water				
Batch: 23B0647								
Manganese	4080	25.0	50.0	ug/L	50	02/20/23 16:09	EPA 6020B	
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water				
Batch: 23B0647								
Antimony	ND	0.500	1.00	ug/L	1	02/18/23 05:12	EPA 6020B	
Arsenic	27.7	0.500	1.00	ug/L	1	02/18/23 05:12	EPA 6020B	
Barium	617	1.00	2.00	ug/L	1	02/18/23 05:12	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/18/23 05:12	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/18/23 05:12	EPA 6020B	
Chromium	1.20	1.00	2.00	ug/L	1	02/18/23 05:12	EPA 6020B	Ja
Copper	ND	1.00	2.00	ug/L	1	02/18/23 05:12	EPA 6020B	
Lead	ND	0.110	0.200	ug/L	1	02/18/23 05:12	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/18/23 05:12	EPA 6020B	
Nickel	2.49	1.00	2.00	ug/L	1	02/18/23 05:12	EPA 6020B	
Selenium	ND	0.500	1.00	ug/L	1	02/18/23 05:12	EPA 6020B	
Silver	ND	0.100	0.200	ug/L	1	02/18/23 05:12	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/18/23 05:12	EPA 6020B	
MW6-20230214-GW-40.25 (A3B0522-05RE1)				Matrix: Water				
Batch: 23B0647								
Manganese	2860	25.0	50.0	ug/L	50	02/20/23 16:14	EPA 6020B	
MW6-20230214-GW-40.25 (A3B0522-05RE2)				Matrix: Water				
Batch: 23B0647								
Zinc	5.18	2.00	4.00	ug/L	1	02/20/23 16:20	EPA 6020B	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW3-20230214-GW-35 (A3B0522-01)			Matrix: Water		Batch: W3B1728				
Batch: W3B1728									
2,4-D	ND	1.7	2.5	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
2,4-DB	ND	5.0	12	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
2,4,5-T	ND	0.70	1.2	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
2,4,5-TP (Silvex)	ND	0.70	1.2	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
3,5-Dichlorobenzoic acid	ND	1.4	6.2	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
4-Nitrophenol	ND	2.5	6.2	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Acifluorfen	ND	1.2	2.5	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Bentazon	ND	2.8	12	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Dalapon	ND	0.80	2.5	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Dicamba	ND	0.95	3.8	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Dichloroprop	ND	1.2	5.0	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Dinoseb	ND	0.45	2.5	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
DCPA	ND	1.0	1.2	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
MCPA	ND	200	500	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
MCPP	ND	140	500	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Pentachlorophenol	ND	0.90	1.2	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Picloram	ND	0.65	3.8	ug/l	5	03/02/23 07:31	EPA 8151A	M-04	
Batch: W3B1728									
<i>Surrogate: 2,4-DCAA</i>		<i>Recovery: 47 %</i>		<i>Limits: 56-156 %</i>		<i>5</i>	<i>03/02/23 07:31</i>	<i>EPA 8151A</i>	<i>S-04</i>

MW3-20230214-GW-35-DUP (A3B0522-02)			Matrix: Water		Batch: W3B1728			
Batch: W3B1728								
2,4-D	ND	1.7	2.5	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
2,4-DB	ND	5.0	12	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
2,4,5-T	ND	0.70	1.2	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
2,4,5-TP (Silvex)	ND	0.70	1.2	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
3,5-Dichlorobenzoic acid	ND	1.4	6.2	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
4-Nitrophenol	ND	2.5	6.2	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
Acifluorfen	ND	1.2	2.5	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
Bentazon	ND	2.8	12	ug/l	5	03/02/23 08:02	EPA 8151A	M-04
Dalapon	ND	0.80	2.5	ug/l	5	03/02/23 08:02	EPA 8151A	M-04

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW3-20230214-GW-35-DUP (A3B0522-02)				Matrix: Water		Batch: W3B1728			
Dicamba	ND	0.95	3.8	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
Dichloroprop	ND	1.2	5.0	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
Dinoseb	ND	0.45	2.5	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
DCPA	ND	1.0	1.2	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
MCPA	ND	200	500	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
MCPP	ND	140	500	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
Pentachlorophenol	ND	0.90	1.2	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
Picloram	ND	0.65	3.8	ug/l	5	03/02/23 08:02	EPA 8151A	M-04	
Batch: W3B1728									
Surrogate: 2,4-DCAA		Recovery: 61 %		Limits: 56-156 %		5	03/02/23 08:02	EPA 8151A	

MW5-20230214-GW-40 (A3B0522-03)				Matrix: Water		Batch: W3B1728			
Batch: W3B1728									
2,4-D	ND	1.7	2.5	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
2,4-DB	ND	5.0	12	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
2,4,5-T	ND	0.70	1.2	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
2,4,5-TP (Silvex)	ND	0.70	1.2	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
3,5-Dichlorobenzoic acid	ND	1.4	6.2	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
4-Nitrophenol	ND	2.5	6.2	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Acifluorfen	ND	1.2	2.5	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Bentazon	ND	2.8	12	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Dalapon	ND	0.80	2.5	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Dicamba	ND	0.95	3.8	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Dichloroprop	ND	1.2	5.0	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Dinoseb	ND	0.45	2.5	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
DCPA	ND	1.0	1.2	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
MCPA	ND	200	500	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
MCPP	ND	140	500	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Pentachlorophenol	ND	0.90	1.2	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Picloram	ND	0.65	3.8	ug/l	5	03/02/23 08:33	EPA 8151A	M-04	
Batch: W3B1728									
Surrogate: 2,4-DCAA		Recovery: 82 %		Limits: 56-156 %		5	03/02/23 08:33	EPA 8151A	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
---	--	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW4-20230214-GW-40 (A3B0522-04)			Matrix: Water		Batch: W3B1728			
<i>Batch: W3B1728</i>								
2,4-D	ND	1.7	2.5	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
2,4-DB	ND	5.0	12	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
2,4,5-T	ND	0.70	1.2	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
2,4,5-TP (Silvex)	ND	0.70	1.2	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
3,5-Dichlorobenzoic acid	ND	1.4	6.2	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
4-Nitrophenol	ND	2.5	6.2	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Acifluorfen	ND	1.2	2.5	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Bentazon	ND	2.8	12	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Dalapon	ND	0.80	2.5	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Dicamba	ND	0.95	3.8	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Dichloroprop	ND	1.2	5.0	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Dinoseb	ND	0.45	2.5	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
DCPA	ND	1.0	1.2	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
MCPA	ND	200	500	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
MCPP	ND	140	500	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Pentachlorophenol	ND	0.90	1.2	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
Picloram	ND	0.65	3.8	ug/l	5	03/02/23 09:04	EPA 8151A	M-04
<i>Batch: W3B1728</i>								
<i>Surrogate: 2,4-DCAA</i>		<i>Recovery: 76 %</i>		<i>Limits: 56-156 %</i>		<i>5</i>	<i>03/02/23 09:04</i>	<i>EPA 8151A</i>

MW6-20230214-GW-40.25 (A3B0522-05)			Matrix: Water		Batch: W3B1728			
<i>Batch: W3B1728</i>								
2,4-D	ND	1.7	2.5	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
2,4-DB	ND	5.0	12	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
2,4,5-T	ND	0.70	1.2	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
2,4,5-TP (Silvex)	ND	0.70	1.2	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
3,5-Dichlorobenzoic acid	ND	1.4	6.2	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
4-Nitrophenol	ND	2.5	6.2	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
Acifluorfen	ND	1.2	2.5	ug/l	5	03/02/23 09:36	EPA 8151A	M-04
Bentazon	ND	2.8	12	ug/l	5	03/02/23 09:36	EPA 8151A	M-04

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW6-20230214-GW-40.25 (A3B0522-05)				Matrix: Water		Batch: W3B1728			
Dalapon	ND	0.80	2.5	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
Dicamba	ND	0.95	3.8	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
Dichloroprop	ND	1.2	5.0	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
Dinoseb	ND	0.45	2.5	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
DCPA	ND	1.0	1.2	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
MCPA	ND	200	500	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
MCPP	ND	140	500	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
Pentachlorophenol	ND	0.90	1.2	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
Picloram	ND	0.65	3.8	ug/l	5	03/02/23 09:36	EPA 8151A	M-04	
Batch: W3B1728									
<i>Surrogate: 2,4-DCAA</i>		<i>Recovery: 72 %</i>		<i>Limits: 56-156 %</i>		<i>5</i>	<i>03/02/23 09:36</i>	<i>EPA 8151A</i>	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with client information: Maul Foster & Alongi, INC., Project: St. Helens Lagoon, Project Number: M0830.03.006, Project Manager: David Weatherby, Report ID: A3B0522 - 05 02 23 1624

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Hexavalent Chromium by IC

Main data table with columns: Analyte, Sample Result, Detection Limit, Reporting Limit, Units, Dilution, Date Analyzed, Method Ref., Notes. Contains 6 rows of sample results for Hexavalent Chromium.

Apex Laboratories

Philip Nerenberg (signature)

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0986 - EPA 3510C (Fuels/Acid Ext.)						Water						
Blank (23B0986-BLK1)						Prepared: 02/28/23 11:48 Analyzed: 03/01/23 00:10						
<u>NWTPH-Dx</u>												
Diesel	ND	0.100	0.200	mg/L	1	---	---	---	---	---	---	
Oil	ND	0.200	0.400	mg/L	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 83 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (23B0986-BS1)						Prepared: 02/28/23 11:48 Analyzed: 03/01/23 00:31						
<u>NWTPH-Dx</u>												
Diesel	0.708	0.100	0.200	mg/L	1	1.25	---	57	36-132%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS Dup (23B0986-BSD1)						Prepared: 02/28/23 11:48 Analyzed: 03/01/23 00:51						
<u>NWTPH-Dx</u>												
Diesel	0.714	0.100	0.200	mg/L	1	1.25	---	57	36-132%	0.8	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	---	---	---	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>106 %</i>		<i>50-150 %</i>		<i>"</i>						
LCS (23B0828-BS2)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 10:40									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.545	0.0500	0.100	mg/L	1	0.500	---	109	80-120%	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
<u>QC Source Sample: MW3-20230214-GW-35-DUP (A3B0522-02)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 99 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>105 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0828-DUP2)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:06									
<u>QC Source Sample: Non-SDG (A3B0674-01)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>107 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes a list of compounds like Acetone, Benzene, etc., with their respective results and limits.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47									
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	10.0	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	2.00	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	

Surr: 1,4-Difluorobenzene (Surr) Recovery: 98 % Limits: 80-120 % Dilution: 1x

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)						Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47						
<i>Surr: Toluene-d8 (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
LCS (23B0828-BS1)						Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:02						
EPA 8260D												
Acetone	34.2	10.0	20.0	ug/L	1	40.0	---	85	80-120%	---	---	ICV-01
Acrylonitrile	16.6	1.00	2.00	ug/L	1	20.0	---	83	80-120%	---	---	
Benzene	17.8	0.100	0.200	ug/L	1	20.0	---	89	80-120%	---	---	
Bromobenzene	17.6	0.250	0.500	ug/L	1	20.0	---	88	80-120%	---	---	
Bromochloromethane	20.3	0.500	1.00	ug/L	1	20.0	---	101	80-120%	---	---	
Bromodichloromethane	21.1	0.500	1.00	ug/L	1	20.0	---	106	80-120%	---	---	
Bromoform	21.8	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
Bromomethane	26.5	5.00	5.00	ug/L	1	20.0	---	132	80-120%	---	---	Q-56
2-Butanone (MEK)	32.2	5.00	10.0	ug/L	1	40.0	---	80	80-120%	---	---	ICV-01
n-Butylbenzene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
sec-Butylbenzene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
tert-Butylbenzene	18.0	0.500	1.00	ug/L	1	20.0	---	90	80-120%	---	---	
Carbon disulfide	20.0	5.00	10.0	ug/L	1	20.0	---	100	80-120%	---	---	
Carbon tetrachloride	24.2	0.500	1.00	ug/L	1	20.0	---	121	80-120%	---	---	Q-56
Chlorobenzene	19.7	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
Chloroethane	33.8	5.00	5.00	ug/L	1	20.0	---	169	80-120%	---	---	Q-56
Chloroform	20.0	0.500	1.00	ug/L	1	20.0	---	100	80-120%	---	---	
Chloromethane	18.0	2.50	5.00	ug/L	1	20.0	---	90	80-120%	---	---	
2-Chlorotoluene	18.8	0.500	1.00	ug/L	1	20.0	---	94	80-120%	---	---	
4-Chlorotoluene	17.9	0.500	1.00	ug/L	1	20.0	---	90	80-120%	---	---	
Dibromochloromethane	21.5	0.500	1.00	ug/L	1	20.0	---	107	80-120%	---	---	
1,2-Dibromo-3-chloropropane	16.8	2.50	5.00	ug/L	1	20.0	---	84	80-120%	---	---	
1,2-Dibromoethane (EDB)	20.0	0.250	0.500	ug/L	1	20.0	---	100	80-120%	---	---	
Dibromomethane	19.8	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
1,2-Dichlorobenzene	19.7	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
1,3-Dichlorobenzene	18.8	0.250	0.500	ug/L	1	20.0	---	94	80-120%	---	---	
1,4-Dichlorobenzene	18.6	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
Dichlorodifluoromethane	24.4	0.500	1.00	ug/L	1	20.0	---	122	80-120%	---	---	Q-56
1,1-Dichloroethane	18.7	0.200	0.400	ug/L	1	20.0	---	93	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
LCS (23B0828-BS1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:02									
1,2-Dichloroethane (EDC)	22.5	0.200	0.400	ug/L	1	20.0	---	112	80-120%	---	---	
1,1-Dichloroethene	20.6	0.200	0.400	ug/L	1	20.0	---	103	80-120%	---	---	
cis-1,2-Dichloroethene	18.0	0.200	0.400	ug/L	1	20.0	---	90	80-120%	---	---	
trans-1,2-Dichloroethene	18.3	0.200	0.400	ug/L	1	20.0	---	92	80-120%	---	---	
1,2-Dichloropropane	17.3	0.250	0.500	ug/L	1	20.0	---	87	80-120%	---	---	
1,3-Dichloropropane	18.9	0.500	1.00	ug/L	1	20.0	---	94	80-120%	---	---	
2,2-Dichloropropane	21.5	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
1,1-Dichloropropene	18.6	0.500	1.00	ug/L	1	20.0	---	93	80-120%	---	---	
cis-1,3-Dichloropropene	19.2	0.500	1.00	ug/L	1	20.0	---	96	80-120%	---	---	
trans-1,3-Dichloropropene	21.7	0.500	1.00	ug/L	1	20.0	---	108	80-120%	---	---	
Ethylbenzene	19.5	0.250	0.500	ug/L	1	20.0	---	97	80-120%	---	---	
Hexachlorobutadiene	18.8	2.50	5.00	ug/L	1	20.0	---	94	80-120%	---	---	
2-Hexanone	31.4	10.0	10.0	ug/L	1	40.0	---	79	80-120%	---	---	Q-55
Isopropylbenzene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
4-Isopropyltoluene	19.3	0.500	1.00	ug/L	1	20.0	---	97	80-120%	---	---	
Methylene chloride	18.8	5.00	10.0	ug/L	1	20.0	---	94	80-120%	---	---	
4-Methyl-2-pentanone (MiBK)	34.3	5.00	10.0	ug/L	1	40.0	---	86	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	17.2	0.500	1.00	ug/L	1	20.0	---	86	80-120%	---	---	
Naphthalene	15.0	2.00	2.00	ug/L	1	20.0	---	75	80-120%	---	---	Q-55
n-Propylbenzene	18.6	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
Styrene	19.3	0.500	1.00	ug/L	1	20.0	---	96	80-120%	---	---	
1,1,1,2-Tetrachloroethane	19.8	0.200	0.400	ug/L	1	20.0	---	99	80-120%	---	---	
1,1,2,2-Tetrachloroethane	18.6	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
Tetrachloroethene (PCE)	19.3	0.200	0.400	ug/L	1	20.0	---	96	80-120%	---	---	
Toluene	19.0	0.500	1.00	ug/L	1	20.0	---	95	80-120%	---	---	
1,2,3-Trichlorobenzene	17.6	1.00	2.00	ug/L	1	20.0	---	88	80-120%	---	---	
1,2,4-Trichlorobenzene	16.4	1.00	2.00	ug/L	1	20.0	---	82	80-120%	---	---	
1,1,1-Trichloroethane	21.6	0.200	0.400	ug/L	1	20.0	---	108	80-120%	---	---	
1,1,2-Trichloroethane	19.8	0.250	0.500	ug/L	1	20.0	---	99	80-120%	---	---	
Trichloroethene (TCE)	16.7	0.200	0.400	ug/L	1	20.0	---	83	80-120%	---	---	
Trichlorofluoromethane	26.0	1.00	2.00	ug/L	1	20.0	---	130	80-120%	---	---	Q-56
1,2,3-Trichloropropane	19.5	0.500	1.00	ug/L	1	20.0	---	98	80-120%	---	---	
1,2,4-Trimethylbenzene	19.6	0.500	1.00	ug/L	1	20.0	---	98	80-120%	---	---	
1,3,5-Trimethylbenzene	18.9	0.500	1.00	ug/L	1	20.0	---	94	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
LCS (23B0828-BS1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:02									
Vinyl chloride	22.3	0.200	0.400	ug/L	1	20.0	---	111	80-120%	---	---	
m,p-Xylene	40.9	0.500	1.00	ug/L	1	40.0	---	102	80-120%	---	---	
o-Xylene	18.5	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>88 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
QC Source Sample: MW3-20230214-GW-35-DUP (A3B0522-02)												
Acetone	ND	10.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
QC Source Sample: MW3-20230214-GW-35-DUP (A3B0522-02)												
1,3-Dichlorobenzene	0.370	0.250	0.500	ug/L	1	---	0.440	---	---	17	30%	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Hexanone	ND	10.0	10.0	ug/L	1	---	ND	---	---	---	30%	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	2.00	2.00	ug/L	1	---	ND	---	---	---	30%	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Styrene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C												
Water												
Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
QC Source Sample: MW3-20230214-GW-35-DUP (A3B0522-02)												
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23B0828-DUP2)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:06									
QC Source Sample: Non-SDG (A3B0674-01)												
Acetone	ND	10.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for Batch 23B0828 - EPA 5030C, Water, Duplicate (23B0828-DUP2), and QC Source Sample: Non-SDG (A3B0674-01).

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Duplicate (23B0828-DUP2)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:06									
QC Source Sample: Non-SDG (A3B0674-01)												
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						

Matrix Spike (23B0828-MS1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:28									
QC Source Sample: Non-SDG (A3B0730-01)												
EPA 8260D												
Acetone	41.6	10.0	20.0	ug/L	1	40.0	ND	104	39-160%	---	---	ICV-01
Acrylonitrile	16.8	1.00	2.00	ug/L	1	20.0	ND	84	63-135%	---	---	
Benzene	19.6	0.100	0.200	ug/L	1	20.0	ND	98	79-120%	---	---	
Bromobenzene	16.9	0.250	0.500	ug/L	1	20.0	ND	85	80-120%	---	---	
Bromochloromethane	20.8	0.500	1.00	ug/L	1	20.0	ND	104	78-123%	---	---	
Bromodichloromethane	22.8	0.500	1.00	ug/L	1	20.0	ND	114	79-125%	---	---	
Bromoform	23.0	0.500	1.00	ug/L	1	20.0	ND	115	66-130%	---	---	
Bromomethane	30.9	5.00	5.00	ug/L	1	20.0	ND	155	53-141%	---	---	Q-01
2-Butanone (MEK)	34.8	5.00	10.0	ug/L	1	40.0	ND	87	56-143%	---	---	ICV-01
n-Butylbenzene	12.4	0.500	1.00	ug/L	1	20.0	ND	62	75-128%	---	---	Q-01
sec-Butylbenzene	14.0	0.500	1.00	ug/L	1	20.0	ND	70	77-126%	---	---	Q-01
tert-Butylbenzene	13.8	0.500	1.00	ug/L	1	20.0	ND	69	78-124%	---	---	Q-01

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Matrix Spike (23B0828-MS1)						Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:28						
QC Source Sample: Non-SDG (A3B0730-01)												
Carbon disulfide	22.2	5.00	10.0	ug/L	1	20.0	ND	111	64-133%	---	---	
Carbon tetrachloride	26.1	0.500	1.00	ug/L	1	20.0	ND	130	72-136%	---	---	Q-54
Chlorobenzene	19.4	0.250	0.500	ug/L	1	20.0	ND	97	80-120%	---	---	
Chloroethane	41.1	5.00	5.00	ug/L	1	20.0	ND	205	60-138%	---	---	Q-42
Chloroform	22.4	0.500	1.00	ug/L	1	20.0	0.880	107	79-124%	---	---	
Chloromethane	19.4	2.50	5.00	ug/L	1	20.0	ND	97	50-139%	---	---	
2-Chlorotoluene	16.8	0.500	1.00	ug/L	1	20.0	ND	84	79-122%	---	---	
4-Chlorotoluene	15.8	0.500	1.00	ug/L	1	20.0	ND	79	78-122%	---	---	
Dibromochloromethane	21.8	0.500	1.00	ug/L	1	20.0	ND	109	74-126%	---	---	
1,2-Dibromo-3-chloropropane	15.9	2.50	5.00	ug/L	1	20.0	ND	80	62-128%	---	---	
1,2-Dibromoethane (EDB)	19.6	0.250	0.500	ug/L	1	20.0	ND	98	77-121%	---	---	
Dibromomethane	21.4	0.500	1.00	ug/L	1	20.0	ND	107	79-123%	---	---	
1,2-Dichlorobenzene	17.7	0.250	0.500	ug/L	1	20.0	ND	88	80-120%	---	---	
1,3-Dichlorobenzene	16.9	0.250	0.500	ug/L	1	20.0	ND	84	80-120%	---	---	
1,4-Dichlorobenzene	17.0	0.250	0.500	ug/L	1	20.0	ND	85	79-120%	---	---	
Dichlorodifluoromethane	26.8	0.500	1.00	ug/L	1	20.0	ND	134	32-152%	---	---	
1,1-Dichloroethane	20.6	0.200	0.400	ug/L	1	20.0	ND	103	77-125%	---	---	
1,2-Dichloroethane (EDC)	23.4	0.200	0.400	ug/L	1	20.0	ND	117	73-128%	---	---	
1,1-Dichloroethene	23.6	0.200	0.400	ug/L	1	20.0	ND	118	71-131%	---	---	
cis-1,2-Dichloroethene	18.1	0.200	0.400	ug/L	1	20.0	ND	90	78-123%	---	---	
trans-1,2-Dichloroethene	19.0	0.200	0.400	ug/L	1	20.0	ND	95	75-124%	---	---	
1,2-Dichloropropane	18.6	0.250	0.500	ug/L	1	20.0	ND	93	78-122%	---	---	
1,3-Dichloropropane	18.9	0.500	1.00	ug/L	1	20.0	ND	95	80-120%	---	---	
2,2-Dichloropropane	20.6	0.500	1.00	ug/L	1	20.0	ND	103	60-139%	---	---	
1,1-Dichloropropene	19.9	0.500	1.00	ug/L	1	20.0	ND	100	79-125%	---	---	
cis-1,3-Dichloropropene	19.1	0.500	1.00	ug/L	1	20.0	ND	95	75-124%	---	---	
trans-1,3-Dichloropropene	21.0	0.500	1.00	ug/L	1	20.0	ND	105	73-127%	---	---	
Ethylbenzene	19.5	0.250	0.500	ug/L	1	20.0	ND	98	79-121%	---	---	
Hexachlorobutadiene	10.7	2.50	5.00	ug/L	1	20.0	ND	54	66-134%	---	---	Q-01
2-Hexanone	29.2	10.0	10.0	ug/L	1	40.0	ND	73	57-139%	---	---	
Isopropylbenzene	17.7	0.500	1.00	ug/L	1	20.0	ND	89	72-131%	---	---	
4-Isopropyltoluene	13.5	0.500	1.00	ug/L	1	20.0	ND	68	77-127%	---	---	Q-01
Methylene chloride	19.1	5.00	10.0	ug/L	1	20.0	ND	95	74-124%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Matrix Spike (23B0828-MS1)						Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:28						
QC Source Sample: Non-SDG (A3B0730-01)												
4-Methyl-2-pentanone (MiBK)	34.6	5.00	10.0	ug/L	1	40.0	ND	87	67-130%	---	---	
Methyl tert-butyl ether (MTBE)	17.3	0.500	1.00	ug/L	1	20.0	ND	87	71-124%	---	---	
Naphthalene	13.4	2.00	2.00	ug/L	1	20.0	ND	67	61-128%	---	---	Q-54b
n-Propylbenzene	16.3	0.250	0.500	ug/L	1	20.0	ND	82	76-126%	---	---	
Styrene	18.6	0.500	1.00	ug/L	1	20.0	ND	93	78-123%	---	---	
1,1,1,2-Tetrachloroethane	19.4	0.200	0.400	ug/L	1	20.0	ND	97	78-124%	---	---	
1,1,1,2,2-Tetrachloroethane	14.2	0.250	0.500	ug/L	1	20.0	ND	71	71-121%	---	---	
Tetrachloroethene (PCE)	19.0	0.200	0.400	ug/L	1	20.0	ND	95	74-129%	---	---	
Toluene	20.0	0.500	1.00	ug/L	1	20.0	0.500	97	80-121%	---	---	
1,2,3-Trichlorobenzene	12.6	1.00	2.00	ug/L	1	20.0	ND	63	69-129%	---	---	Q-01
1,2,4-Trichlorobenzene	10.8	1.00	2.00	ug/L	1	20.0	ND	54	69-130%	---	---	Q-01
1,1,1-Trichloroethane	23.9	0.200	0.400	ug/L	1	20.0	ND	120	74-131%	---	---	
1,1,2-Trichloroethane	19.0	0.250	0.500	ug/L	1	20.0	ND	95	80-120%	---	---	
Trichloroethene (TCE)	21.5	0.200	0.400	ug/L	1	20.0	ND	107	79-123%	---	---	
Trichlorofluoromethane	30.1	1.00	2.00	ug/L	1	20.0	ND	151	65-141%	---	---	Q-54a
1,2,3-Trichloropropane	19.1	0.500	1.00	ug/L	1	20.0	ND	95	73-122%	---	---	
1,2,4-Trimethylbenzene	18.0	0.500	1.00	ug/L	1	20.0	0.580	87	76-124%	---	---	
1,3,5-Trimethylbenzene	16.3	0.500	1.00	ug/L	1	20.0	ND	82	75-124%	---	---	
Vinyl chloride	24.1	0.200	0.400	ug/L	1	20.0	ND	121	58-137%	---	---	
m,p-Xylene	39.7	0.500	1.00	ug/L	1	40.0	0.820	97	80-121%	---	---	
o-Xylene	17.8	0.250	0.500	ug/L	1	20.0	0.280	88	78-122%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97%</i>		<i>Limits: 80-120%</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98%</i>		<i>80-120%</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>89%</i>		<i>80-120%</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C						Water						
Blank (23B0743-BLK1)			Prepared: 02/20/23 13:10 Analyzed: 02/20/23 15:45									
EPA 8260D SIM												
Benzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (23B0743-BS1)			Prepared: 02/20/23 13:10 Analyzed: 02/20/23 14:52									
EPA 8260D SIM												
Benzene	0.227	0.0500	0.100	ug/L	1	0.200	---	114	80-120%	---	---	
Toluene	0.209	0.0500	0.100	ug/L	1	0.200	---	105	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C												
Water												
LCS (23B0743-BS1)												
Prepared: 02/20/23 13:10 Analyzed: 02/20/23 14:52												
Ethylbenzene	0.202	0.0500	0.100	ug/L	1	0.200	---	101	80-120%	---	---	
m,p-Xylene	0.408	0.100	0.200	ug/L	1	0.400	---	102	80-120%	---	---	
o-Xylene	0.204	0.0500	0.100	ug/L	1	0.200	---	102	80-120%	---	---	
1,2,4-Trimethylbenzene	0.207	0.0500	0.100	ug/L	1	0.200	---	104	80-120%	---	---	
1,3,5-Trimethylbenzene	0.205	0.0500	0.100	ug/L	1	0.200	---	103	80-120%	---	---	
Chloroform	0.232	0.0500	0.100	ug/L	1	0.200	---	116	80-120%	---	---	
1,2-Dibromo-3-chloropropane	0.202	0.100	0.200	ug/L	1	0.200	---	101	80-120%	---	---	
1,2-Dibromoethane (EDB)	0.199	0.0100	0.0200	ug/L	1	0.200	---	100	80-120%	---	---	
1,1-Dichloroethane	0.234	0.0100	0.0200	ug/L	1	0.200	---	117	80-120%	---	---	
1,2-Dichloroethane (EDC)	0.221	0.0100	0.0200	ug/L	1	0.200	---	111	80-120%	---	---	
1,1-Dichloroethene	0.228	0.0100	0.0200	ug/L	1	0.200	---	114	80-120%	---	---	
cis-1,2-Dichloroethene	0.235	0.0100	0.0200	ug/L	1	0.200	---	118	80-120%	---	---	
trans-1,2-Dichloroethene	0.228	0.0100	0.0200	ug/L	1	0.200	---	114	80-120%	---	---	
1,2-Dichloropropane	0.229	0.0100	0.0200	ug/L	1	0.200	---	114	80-120%	---	---	
cis-1,3-Dichloropropene	0.202	0.0100	0.0200	ug/L	1	0.200	---	101	80-120%	---	---	
trans-1,3-Dichloropropene	0.210	0.0100	0.0200	ug/L	1	0.200	---	105	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	0.223	0.0100	0.0200	ug/L	1	0.200	---	112	80-120%	---	---	
1,1,2,2-Tetrachloroethane	0.214	0.0100	0.0200	ug/L	1	0.200	---	107	80-120%	---	---	
Tetrachloroethene (PCE)	0.196	0.0100	0.0200	ug/L	1	0.200	---	98	80-120%	---	---	
Trichloroethene (TCE)	0.219	0.0100	0.0200	ug/L	1	0.200	---	110	80-120%	---	---	
1,2,3-Trichloropropane	0.196	0.0500	0.100	ug/L	1	0.200	---	98	80-120%	---	---	
Vinyl chloride	0.227	0.0100	0.0200	ug/L	1	0.200	---	113	80-120%	---	---	
1,1,2-Trichloroethane	0.204	0.0100	0.0200	ug/L	1	0.200	---	102	80-120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 104 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 99 % 80-120 % "												
4-Bromofluorobenzene (Surr) 95 % 80-120 % "												

Duplicate (23B0743-DUP1)

Prepared: 02/20/23 13:10 Analyzed: 02/20/23 17:33

QC Source Sample: MW3-20230214-GW-35 (A3B0522-01)

EPA 8260D SIM

Benzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C												
Water												
Duplicate (23B0743-DUP1)												
Prepared: 02/20/23 13:10 Analyzed: 02/20/23 17:33												
QC Source Sample: MW3-20230214-GW-35 (A3B0522-01)												
o-Xylene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr) Recovery: 103 % Limits: 80-120 % Dilution: 1x</i>												
<i>Toluene-d8 (Surr) 99 % 80-120 % "</i>												
<i>4-Bromofluorobenzene (Surr) 99 % 80-120 % "</i>												

Matrix Spike (23B0743-MS1)												
Prepared: 02/20/23 13:10 Analyzed: 02/20/23 20:14												
QC Source Sample: MW6-20230214-GW-40.25 (A3B0522-05)												
EPA 8260D SIM												
Benzene	0.192	0.0500	0.100	ug/L	1	0.200	ND	96	79-120%	---	---	
Toluene	0.166	0.0500	0.100	ug/L	1	0.200	ND	83	80-121%	---	---	
Ethylbenzene	0.147	0.0500	0.100	ug/L	1	0.200	ND	74	79-121%	---	---	Q-01
m,p-Xylene	0.285	0.100	0.200	ug/L	1	0.400	ND	71	80-121%	---	---	Q-01
o-Xylene	0.142	0.0500	0.100	ug/L	1	0.200	ND	71	78-122%	---	---	Q-01

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0743 - EPA 5030C						Water						
Matrix Spike (23B0743-MS1)			Prepared: 02/20/23 13:10 Analyzed: 02/20/23 20:14									
QC Source Sample: MW6-20230214-GW-40.25 (A3B0522-05)												
1,2,4-Trimethylbenzene	0.142	0.0500	0.100	ug/L	1	0.200	ND	71	76-124%	---	---	Q-01
1,3,5-Trimethylbenzene	0.132	0.0500	0.100	ug/L	1	0.200	ND	66	75-124%	---	---	Q-01
Chloroform	0.179	0.0500	0.100	ug/L	1	0.200	ND	90	79-124%	---	---	
1,2-Dibromo-3-chloropropane	0.134	0.100	0.200	ug/L	1	0.200	ND	67	62-128%	---	---	Ja
1,2-Dibromoethane (EDB)	0.150	0.0100	0.0200	ug/L	1	0.200	ND	75	77-121%	---	---	Q-01
1,1-Dichloroethane	0.191	0.0100	0.0200	ug/L	1	0.200	ND	95	77-125%	---	---	
1,2-Dichloroethane (EDC)	0.177	0.0100	0.0200	ug/L	1	0.200	ND	88	73-128%	---	---	
1,1-Dichloroethene	0.196	0.0100	0.0200	ug/L	1	0.200	ND	98	71-131%	---	---	
cis-1,2-Dichloroethene	0.204	0.0100	0.0200	ug/L	1	0.200	0.0212	91	78-123%	---	---	
trans-1,2-Dichloroethene	0.190	0.0100	0.0200	ug/L	1	0.200	ND	95	75-124%	---	---	
1,2-Dichloropropane	0.178	0.0100	0.0200	ug/L	1	0.200	ND	89	78-122%	---	---	
cis-1,3-Dichloropropene	0.154	0.0100	0.0200	ug/L	1	0.200	ND	77	75-124%	---	---	
trans-1,3-Dichloropropene	0.158	0.0100	0.0200	ug/L	1	0.200	ND	79	73-127%	---	---	
Methyl tert-butyl ether (MTBE)	0.178	0.0100	0.0200	ug/L	1	0.200	ND	89	71-124%	---	---	
1,1,2,2-Tetrachloroethane	0.164	0.0100	0.0200	ug/L	1	0.200	ND	82	71-121%	---	---	
Tetrachloroethene (PCE)	0.158	0.0100	0.0200	ug/L	1	0.200	ND	79	74-129%	---	---	
Trichloroethene (TCE)	0.175	0.0100	0.0200	ug/L	1	0.200	ND	87	79-123%	---	---	
1,2,3-Trichloropropane	0.154	0.0500	0.100	ug/L	1	0.200	ND	77	73-122%	---	---	
Vinyl chloride	0.227	0.0100	0.0200	ug/L	1	0.200	ND	113	58-137%	---	---	
1,1,2-Trichloroethane	0.157	0.0100	0.0200	ug/L	1	0.200	ND	78	80-120%	---	---	Q-01
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0761-BLK1)			Prepared: 02/21/23 06:52 Analyzed: 02/21/23 16:21									
<u>EPA 8270E</u>												
Acenaphthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Chrysene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluoranthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluorene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	Q-30
2-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	Q-30
Naphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	Q-30
Phenanthrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Carbazole	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Phenol	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0761-BLK1)			Prepared: 02/21/23 06:52 Analyzed: 02/21/23 16:21									
2,3,5,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
Hexachlorocyclopentadiene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	Q-30
Hexachloroethane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
2-Chloronaphthalene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	Q-30
1,2,4-Trichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
4-Bromophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Aniline	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Benzoic acid	ND	1.25	2.50	ug/L	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Isophorone	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0761-BLK1)			Prepared: 02/21/23 06:52 Analyzed: 02/21/23 16:21									
Azobenzene (1,2-DPH)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Ethylhexyl) adipate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
3,3'-Dichlorobenzidine	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-52
1,2-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Pyridine	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
1,3-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
1,4-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 45 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 1x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>45 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>19 %</i>		<i>10-133 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>92 %</i>		<i>50-134 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>33 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>53 %</i>		<i>43-140 %</i>		<i>"</i>						

LCS (23B0761-BS1)			Prepared: 02/21/23 06:52 Analyzed: 02/21/23 16:55									
EPA 8270E												
Acenaphthene	1.96	0.0400	0.0800	ug/L	4	4.00	---	49	47-122%	---	---	
Acenaphthylene	2.12	0.0400	0.0800	ug/L	4	4.00	---	53	41-130%	---	---	
Anthracene	3.19	0.0400	0.0800	ug/L	4	4.00	---	80	57-123%	---	---	
Benz(a)anthracene	3.52	0.0400	0.0800	ug/L	4	4.00	---	88	58-125%	---	---	
Benzo(a)pyrene	3.47	0.0600	0.120	ug/L	4	4.00	---	87	54-128%	---	---	
Benzo(b)fluoranthene	3.69	0.0600	0.120	ug/L	4	4.00	---	92	53-131%	---	---	
Benzo(k)fluoranthene	3.55	0.0600	0.120	ug/L	4	4.00	---	89	57-129%	---	---	
Benzo(g,h,i)perylene	3.65	0.0400	0.0800	ug/L	4	4.00	---	91	50-134%	---	---	
Chrysene	3.47	0.0400	0.0800	ug/L	4	4.00	---	87	59-123%	---	---	
Dibenz(a,h)anthracene	3.40	0.0400	0.0800	ug/L	4	4.00	---	85	51-134%	---	---	
Fluoranthene	3.45	0.0400	0.0800	ug/L	4	4.00	---	86	57-128%	---	---	
Fluorene	2.56	0.0400	0.0800	ug/L	4	4.00	---	64	52-124%	---	---	
Indeno(1,2,3-cd)pyrene	3.58	0.0400	0.0800	ug/L	4	4.00	---	90	52-134%	---	---	
1-Methylnaphthalene	1.36	0.0800	0.160	ug/L	4	4.00	---	34	41-120%	---	---	Q-30
2-Methylnaphthalene	1.33	0.0800	0.160	ug/L	4	4.00	---	33	40-121%	---	---	Q-30

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (23B0761-BS1)			Prepared: 02/21/23 06:52 Analyzed: 02/21/23 16:55									
Naphthalene	1.28	0.0800	0.160	ug/L	4	4.00	---	32	40-121%	---	---	Q-30
Phenanthrene	2.97	0.0400	0.0800	ug/L	4	4.00	---	74	59-120%	---	---	
Pyrene	3.43	0.0400	0.0800	ug/L	4	4.00	---	86	57-126%	---	---	
Carbazole	3.40	0.0600	0.120	ug/L	4	4.00	---	85	60-122%	---	---	
Dibenzofuran	2.23	0.0400	0.0800	ug/L	4	4.00	---	56	53-120%	---	---	
2-Chlorophenol	2.14	0.200	0.400	ug/L	4	4.00	---	53	38-120%	---	---	
4-Chloro-3-methylphenol	2.70	0.400	0.800	ug/L	4	4.00	---	67	52-120%	---	---	
2,4-Dichlorophenol	2.42	0.200	0.400	ug/L	4	4.00	---	61	47-121%	---	---	
2,4-Dimethylphenol	2.37	0.200	0.400	ug/L	4	4.00	---	59	31-124%	---	---	
2,4-Dinitrophenol	3.27	1.00	2.00	ug/L	4	4.00	---	82	23-143%	---	---	
4,6-Dinitro-2-methylphenol	3.50	1.00	2.00	ug/L	4	4.00	---	88	44-137%	---	---	
2-Methylphenol	1.92	0.100	0.200	ug/L	4	4.00	---	48	30-120%	---	---	
3+4-Methylphenol(s)	1.78	0.100	0.200	ug/L	4	4.00	---	45	29-120%	---	---	
2-Nitrophenol	2.42	0.400	0.800	ug/L	4	4.00	---	61	47-123%	---	---	
4-Nitrophenol	1.26	0.400	0.800	ug/L	4	4.00	---	31	10-120%	---	---	
Pentachlorophenol (PCP)	3.04	0.400	0.800	ug/L	4	4.00	---	76	35-138%	---	---	
Phenol	0.886	0.800	0.800	ug/L	4	4.00	---	22	10-120%	---	---	
2,3,4,6-Tetrachlorophenol	3.08	0.200	0.400	ug/L	4	4.00	---	77	50-128%	---	---	
2,3,5,6-Tetrachlorophenol	3.07	0.200	0.400	ug/L	4	4.00	---	77	50-121%	---	---	
2,4,5-Trichlorophenol	2.76	0.200	0.400	ug/L	4	4.00	---	69	53-123%	---	---	
2,4,6-Trichlorophenol	2.57	0.200	0.400	ug/L	4	4.00	---	64	50-125%	---	---	
Bis(2-ethylhexyl)phthalate	4.09	0.800	1.60	ug/L	4	4.00	---	102	55-135%	---	---	
Butyl benzyl phthalate	4.12	0.800	1.60	ug/L	4	4.00	---	103	53-134%	---	---	
Diethylphthalate	3.88	0.800	1.60	ug/L	4	4.00	---	97	56-125%	---	---	
Dimethylphthalate	3.45	0.800	1.60	ug/L	4	4.00	---	86	45-127%	---	---	
Di-n-butylphthalate	4.32	0.800	1.60	ug/L	4	4.00	---	108	59-127%	---	---	
Di-n-octyl phthalate	4.40	0.800	1.60	ug/L	4	4.00	---	110	51-140%	---	---	
N-Nitrosodimethylamine	1.54	0.100	0.200	ug/L	4	4.00	---	39	19-120%	---	---	
N-Nitroso-di-n-propylamine	2.41	0.100	0.200	ug/L	4	4.00	---	60	49-120%	---	---	
N-Nitrosodiphenylamine	2.66	0.100	0.200	ug/L	4	4.00	---	67	51-123%	---	---	
Bis(2-Chloroethoxy) methane	2.57	0.100	0.200	ug/L	4	4.00	---	64	48-120%	---	---	
Bis(2-Chloroethyl) ether	2.08	0.100	0.200	ug/L	4	4.00	---	52	43-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	1.93	0.100	0.200	ug/L	4	4.00	---	48	41-120%	---	---	
Hexachlorobenzene	2.67	0.0400	0.0800	ug/L	4	4.00	---	67	53-125%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (23B0761-BS1)			Prepared: 02/21/23 06:52 Analyzed: 02/21/23 16:55									
Hexachlorobutadiene	0.599	0.100	0.200	ug/L	4	4.00	---	15	22-124%	---	---	Q-30
Hexachlorocyclopentadiene	0.436	0.200	0.400	ug/L	4	4.00	---	11	10-127%	---	---	
Hexachloroethane	0.574	0.100	0.200	ug/L	4	4.00	---	14	21-120%	---	---	Q-30
2-Chloronaphthalene	1.57	0.0400	0.0800	ug/L	4	4.00	---	39	40-120%	---	---	Q-30
1,2,4-Trichlorobenzene	0.892	0.100	0.200	ug/L	4	4.00	---	22	29-120%	---	---	Q-30
4-Bromophenyl phenyl ether	2.51	0.100	0.200	ug/L	4	4.00	---	63	55-124%	---	---	
4-Chlorophenyl phenyl ether	2.29	0.100	0.200	ug/L	4	4.00	---	57	53-121%	---	---	
Aniline	1.75	0.200	0.400	ug/L	4	4.00	---	44	10-120%	---	---	
4-Chloroaniline	2.08	0.100	0.200	ug/L	4	4.00	---	52	33-120%	---	---	Q-31
2-Nitroaniline	2.91	0.800	1.60	ug/L	4	4.00	---	73	55-127%	---	---	
3-Nitroaniline	3.04	0.800	1.60	ug/L	4	4.00	---	76	41-128%	---	---	
4-Nitroaniline	3.44	0.800	1.60	ug/L	4	4.00	---	86	25-120%	---	---	
Nitrobenzene	2.01	0.400	0.800	ug/L	4	4.00	---	50	45-121%	---	---	
2,4-Dinitrotoluene	3.40	0.400	0.800	ug/L	4	4.00	---	85	57-128%	---	---	
2,6-Dinitrotoluene	3.02	0.400	0.800	ug/L	4	4.00	---	75	57-124%	---	---	
Benzoic acid	3.76	2.00	2.00	ug/L	4	8.00	---	47	10-120%	---	---	Q-31
Benzyl alcohol	1.94	0.400	0.800	ug/L	4	4.00	---	49	31-120%	---	---	
Isophorone	2.59	0.100	0.200	ug/L	4	4.00	---	65	42-124%	---	---	
Azobenzene (1,2-DPH)	2.84	0.100	0.200	ug/L	4	4.00	---	71	61-120%	---	---	
Bis(2-Ethylhexyl) adipate	4.31	1.00	2.00	ug/L	4	4.00	---	108	63-121%	---	---	
3,3'-Dichlorobenzidine	12.7	2.00	4.00	ug/L	4	8.00	---	159	27-129%	---	---	Q-29, Q-52
1,2-Dinitrobenzene	3.16	1.00	2.00	ug/L	4	4.00	---	79	59-120%	---	---	
1,3-Dinitrobenzene	3.13	1.00	2.00	ug/L	4	4.00	---	78	49-128%	---	---	
1,4-Dinitrobenzene	3.12	1.00	2.00	ug/L	4	4.00	---	78	54-120%	---	---	
Pyridine	1.50	0.400	0.800	ug/L	4	4.00	---	38	10-120%	---	---	
1,2-Dichlorobenzene	0.771	0.100	0.200	ug/L	4	4.00	---	19	32-120%	---	---	Q-30
1,3-Dichlorobenzene	0.699	0.100	0.200	ug/L	4	4.00	---	17	28-120%	---	---	Q-30
1,4-Dichlorobenzene	0.719	0.100	0.200	ug/L	4	4.00	---	18	29-120%	---	---	Q-30
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 52 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>						
<i>2-Fluorobiphenyl (Surr)</i>		<i>53 %</i>		<i>44-120 %</i>		<i>"</i>						
<i>Phenol-d6 (Surr)</i>		<i>19 %</i>		<i>10-133 %</i>		<i>"</i>						
<i>p-Terphenyl-d14 (Surr)</i>		<i>100 %</i>		<i>50-134 %</i>		<i>"</i>						
<i>2-Fluorophenol (Surr)</i>		<i>35 %</i>		<i>19-120 %</i>		<i>"</i>						
<i>2,4,6-Tribromophenol (Surr)</i>		<i>76 %</i>		<i>43-140 %</i>		<i>"</i>						

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0761-BSD1)						Prepared: 02/21/23 06:52 Analyzed: 02/21/23 17:30						Q-19
EPA 8270E												
Acenaphthene	1.99	0.0400	0.0800	ug/L	4	4.00	---	50	47-122%	2	30%	
Acenaphthylene	2.19	0.0400	0.0800	ug/L	4	4.00	---	55	41-130%	3	30%	
Anthracene	3.14	0.0400	0.0800	ug/L	4	4.00	---	79	57-123%	1	30%	
Benz(a)anthracene	3.68	0.0400	0.0800	ug/L	4	4.00	---	92	58-125%	4	30%	
Benzo(a)pyrene	3.48	0.0600	0.120	ug/L	4	4.00	---	87	54-128%	0.3	30%	
Benzo(b)fluoranthene	3.64	0.0600	0.120	ug/L	4	4.00	---	91	53-131%	2	30%	
Benzo(k)fluoranthene	3.55	0.0600	0.120	ug/L	4	4.00	---	89	57-129%	0.2	30%	
Benzo(g,h,i)perylene	3.80	0.0400	0.0800	ug/L	4	4.00	---	95	50-134%	4	30%	
Chrysene	3.40	0.0400	0.0800	ug/L	4	4.00	---	85	59-123%	2	30%	
Dibenz(a,h)anthracene	3.52	0.0400	0.0800	ug/L	4	4.00	---	88	51-134%	3	30%	
Fluoranthene	3.32	0.0400	0.0800	ug/L	4	4.00	---	83	57-128%	4	30%	
Fluorene	2.59	0.0400	0.0800	ug/L	4	4.00	---	65	52-124%	1	30%	
Indeno(1,2,3-cd)pyrene	3.68	0.0400	0.0800	ug/L	4	4.00	---	92	52-134%	3	30%	
1-Methylnaphthalene	1.41	0.0800	0.160	ug/L	4	4.00	---	35	41-120%	4	30%	Q-30
2-Methylnaphthalene	1.39	0.0800	0.160	ug/L	4	4.00	---	35	40-121%	5	30%	Q-30
Naphthalene	1.39	0.0800	0.160	ug/L	4	4.00	---	35	40-121%	8	30%	Q-30
Phenanthrene	2.94	0.0400	0.0800	ug/L	4	4.00	---	73	59-120%	1	30%	
Pyrene	3.28	0.0400	0.0800	ug/L	4	4.00	---	82	57-126%	4	30%	
Carbazole	3.36	0.0600	0.120	ug/L	4	4.00	---	84	60-122%	1	30%	
Dibenzofuran	2.27	0.0400	0.0800	ug/L	4	4.00	---	57	53-120%	2	30%	
2-Chlorophenol	2.22	0.200	0.400	ug/L	4	4.00	---	55	38-120%	4	30%	
4-Chloro-3-methylphenol	2.90	0.400	0.800	ug/L	4	4.00	---	72	52-120%	7	30%	
2,4-Dichlorophenol	2.61	0.200	0.400	ug/L	4	4.00	---	65	47-121%	8	30%	
2,4-Dimethylphenol	2.52	0.200	0.400	ug/L	4	4.00	---	63	31-124%	6	30%	
2,4-Dinitrophenol	3.41	1.00	2.00	ug/L	4	4.00	---	85	23-143%	4	30%	
4,6-Dinitro-2-methylphenol	3.57	1.00	2.00	ug/L	4	4.00	---	89	44-137%	2	30%	
2-Methylphenol	1.99	0.100	0.200	ug/L	4	4.00	---	50	30-120%	4	30%	
3+4-Methylphenol(s)	1.88	0.100	0.200	ug/L	4	4.00	---	47	29-120%	5	30%	
2-Nitrophenol	2.74	0.400	0.800	ug/L	4	4.00	---	68	47-123%	12	30%	
4-Nitrophenol	1.35	0.400	0.800	ug/L	4	4.00	---	34	10-120%	7	30%	
Pentachlorophenol (PCP)	2.94	0.400	0.800	ug/L	4	4.00	---	73	35-138%	3	30%	
Phenol	0.961	0.800	0.800	ug/L	4	4.00	---	24	10-120%	8	30%	
2,3,4,6-Tetrachlorophenol	3.24	0.200	0.400	ug/L	4	4.00	---	81	50-128%	5	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0761-BSD1)						Prepared: 02/21/23 06:52 Analyzed: 02/21/23 17:30						Q-19
2,3,5,6-Tetrachlorophenol	3.20	0.200	0.400	ug/L	4	4.00	---	80	50-121%	4	30%	
2,4,5-Trichlorophenol	2.99	0.200	0.400	ug/L	4	4.00	---	75	53-123%	8	30%	
2,4,6-Trichlorophenol	2.81	0.200	0.400	ug/L	4	4.00	---	70	50-125%	9	30%	
Bis(2-ethylhexyl)phthalate	4.34	0.800	1.60	ug/L	4	4.00	---	108	55-135%	6	30%	
Butyl benzyl phthalate	4.38	0.800	1.60	ug/L	4	4.00	---	109	53-134%	6	30%	
Diethylphthalate	3.98	0.800	1.60	ug/L	4	4.00	---	99	56-125%	3	30%	
Dimethylphthalate	3.55	0.800	1.60	ug/L	4	4.00	---	89	45-127%	3	30%	
Di-n-butylphthalate	4.28	0.800	1.60	ug/L	4	4.00	---	107	59-127%	1	30%	
Di-n-octyl phthalate	4.34	0.800	1.60	ug/L	4	4.00	---	109	51-140%	1	30%	
N-Nitrosodimethylamine	1.65	0.100	0.200	ug/L	4	4.00	---	41	19-120%	7	30%	
N-Nitroso-di-n-propylamine	2.56	0.100	0.200	ug/L	4	4.00	---	64	49-120%	6	30%	
N-Nitrosodiphenylamine	2.79	0.100	0.200	ug/L	4	4.00	---	70	51-123%	5	30%	
Bis(2-Chloroethoxy) methane	2.84	0.100	0.200	ug/L	4	4.00	---	71	48-120%	10	30%	
Bis(2-Chloroethyl) ether	2.26	0.100	0.200	ug/L	4	4.00	---	57	43-120%	8	30%	
2,2'-Oxybis(1-Chloropropane)	2.08	0.100	0.200	ug/L	4	4.00	---	52	41-120%	8	30%	
Hexachlorobenzene	2.52	0.0400	0.0800	ug/L	4	4.00	---	63	53-125%	6	30%	
Hexachlorobutadiene	0.594	0.100	0.200	ug/L	4	4.00	---	15	22-124%	0.9	30%	Q-30
Hexachlorocyclopentadiene	0.356	0.200	0.200	ug/L	4	4.00	---	9	10-127%	20	30%	Q-30
Hexachloroethane	0.608	0.100	0.200	ug/L	4	4.00	---	15	21-120%	6	30%	Q-30
2-Chloronaphthalene	1.58	0.0400	0.0800	ug/L	4	4.00	---	39	40-120%	0.7	30%	Q-30
1,2,4-Trichlorobenzene	0.937	0.100	0.200	ug/L	4	4.00	---	23	29-120%	5	30%	Q-30
4-Bromophenyl phenyl ether	2.45	0.100	0.200	ug/L	4	4.00	---	61	55-124%	2	30%	
4-Chlorophenyl phenyl ether	2.22	0.100	0.200	ug/L	4	4.00	---	56	53-121%	3	30%	
Aniline	1.78	0.200	0.400	ug/L	4	4.00	---	44	10-120%	1	30%	
4-Chloroaniline	2.23	0.100	0.200	ug/L	4	4.00	---	56	33-120%	7	30%	Q-31
2-Nitroaniline	3.16	0.800	1.60	ug/L	4	4.00	---	79	55-127%	8	30%	
3-Nitroaniline	3.23	0.800	1.60	ug/L	4	4.00	---	81	41-128%	6	30%	
4-Nitroaniline	3.42	0.800	1.60	ug/L	4	4.00	---	85	25-120%	0.6	30%	
Nitrobenzene	2.17	0.400	0.800	ug/L	4	4.00	---	54	45-121%	8	30%	
2,4-Dinitrotoluene	3.53	0.400	0.800	ug/L	4	4.00	---	88	57-128%	4	30%	
2,6-Dinitrotoluene	3.24	0.400	0.800	ug/L	4	4.00	---	81	57-124%	7	30%	
Benzoic acid	3.88	2.00	2.00	ug/L	4	8.00	---	48	10-120%	3	30%	Q-31
Benzyl alcohol	2.04	0.400	0.800	ug/L	4	4.00	---	51	31-120%	5	30%	
Isophorone	2.81	0.100	0.200	ug/L	4	4.00	---	70	42-124%	8	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0761 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0761-BSD1)						Prepared: 02/21/23 06:52 Analyzed: 02/21/23 17:30						Q-19
Azobenzene (1,2-DPH)	2.90	0.100	0.200	ug/L	4	4.00	---	73	61-120%	2	30%	
Bis(2-Ethylhexyl) adipate	4.74	1.00	2.00	ug/L	4	4.00	---	118	63-121%	9	30%	
3,3'-Dichlorobenzidine	12.0	2.00	4.00	ug/L	4	8.00	---	151	27-129%	5	30%	Q-29, Q-52
1,2-Dinitrobenzene	3.39	1.00	2.00	ug/L	4	4.00	---	85	59-120%	7	30%	
1,3-Dinitrobenzene	3.32	1.00	2.00	ug/L	4	4.00	---	83	49-128%	6	30%	
1,4-Dinitrobenzene	3.38	1.00	2.00	ug/L	4	4.00	---	85	54-120%	8	30%	
Pyridine	1.67	0.400	0.800	ug/L	4	4.00	---	42	10-120%	10	30%	
1,2-Dichlorobenzene	0.842	0.100	0.200	ug/L	4	4.00	---	21	32-120%	9	30%	Q-30
1,3-Dichlorobenzene	0.756	0.100	0.200	ug/L	4	4.00	---	19	28-120%	8	30%	Q-30
1,4-Dichlorobenzene	0.798	0.100	0.200	ug/L	4	4.00	---	20	29-120%	10	30%	Q-30
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 55 % Limits: 44-120 % Dilution: 4x</i>												
<i>2-Fluorobiphenyl (Surr) 57 % 44-120 % "</i>												
<i>Phenol-d6 (Surr) 21 % 10-133 % "</i>												
<i>p-Terphenyl-d14 (Surr) 108 % 50-134 % "</i>												
<i>2-Fluorophenol (Surr) 38 % 19-120 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 76 % 43-140 % "</i>												

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street
Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for Batch 23B0739 - EPA 3510C (Neutral pH) Water, Blank (23B0739-BLK1), and EPA 8270E OPPs list.

LCS (23B0739-BS1)

Prepared: 02/20/23 11:30 Analyzed: 02/20/23 19:20

EPA 8270E OPPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0739 - EPA 3510C (Neutral pH)						Water						
LCS (23B0739-BS1)			Prepared: 02/20/23 11:30 Analyzed: 02/20/23 19:20									
Azinphos methyl (Guthion)	4.32	0.500	1.00	ug/L	2	4.00	---	108	43-135%	---	---	
Chlorpyrifos	3.38	0.500	1.00	ug/L	2	4.00	---	84	47-133%	---	---	
Coumaphos	4.16	0.500	1.00	ug/L	2	4.00	---	104	45-135%	---	---	
Demeton O	1.55	0.500	1.00	ug/L	2	1.84	---	84	10-125%	---	---	
Demeton S	1.68	0.500	1.00	ug/L	2	1.94	---	87	21-162%	---	---	
Diazinon	4.26	0.500	1.00	ug/L	2	4.00	---	107	43-129%	---	---	
Dichlorvos	4.50	0.500	1.00	ug/L	2	4.00	---	113	39-138%	---	---	
Dimethoate	3.35	0.500	1.00	ug/L	2	4.00	---	84	26-125%	---	---	
Disulfoton	3.74	0.500	1.00	ug/L	2	4.00	---	94	36-134%	---	---	
EPN	4.29	0.500	1.00	ug/L	2	4.00	---	107	47-133%	---	---	
Ethoprop	4.14	0.500	1.00	ug/L	2	4.00	---	104	52-125%	---	---	
Fensulfothion	4.33	0.500	1.00	ug/L	2	4.00	---	108	15-141%	---	---	
Fenthion	3.66	0.500	1.00	ug/L	2	4.00	---	92	42-137%	---	---	
Malathion	3.64	0.500	1.00	ug/L	2	4.00	---	91	44-132%	---	---	
Merphos	4.52	0.500	1.00	ug/L	2	4.00	---	113	26-133%	---	---	B-02
Methyl parathion	4.32	0.500	1.00	ug/L	2	4.00	---	108	49-134%	---	---	
Mevinphos (Phosdrin)	4.03	0.500	1.00	ug/L	2	4.00	---	101	10-196%	---	---	
Monocrotophos	0.975	0.500	0.500	ug/L	2	4.00	---	24	10-159%	---	---	
Naled (Dibrom)	4.24	0.500	1.00	ug/L	2	4.00	---	106	10-146%	---	---	
Parathion, ethyl	4.21	0.500	1.00	ug/L	2	4.00	---	105	52-134%	---	---	
Phorate	4.27	0.500	1.00	ug/L	2	4.00	---	107	23-139%	---	---	
Ronnel (Fenclorphos)	3.47	0.500	1.00	ug/L	2	4.00	---	87	42-133%	---	---	
Sulfotep	3.56	0.500	1.00	ug/L	2	4.00	---	89	47-126%	---	---	
Sulprofos (Bolstar)	3.01	0.500	1.00	ug/L	2	4.00	---	75	47-135%	---	---	
TEPP	3.48	0.500	1.00	ug/L	2	4.00	---	87	10-208%	---	---	B-02
Tetrachlorvinphos (Rabon)	4.50	0.500	1.00	ug/L	2	4.00	---	112	42-125%	---	---	
Tokuthion (Prothiofos)	3.77	0.500	1.00	ug/L	2	4.00	---	94	43-132%	---	---	
Trichloronate	3.32	0.500	1.00	ug/L	2	4.00	---	83	28-137%	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 2x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>109 %</i>		<i>58-121 %</i>		<i>"</i>						

LCS Dup (23B0739-BSD1)			Prepared: 02/20/23 11:30 Analyzed: 02/20/23 19:56									Q-19
EPA 8270E OPPs												
Azinphos methyl (Guthion)	4.31	0.500	1.00	ug/L	2	4.00	---	108	43-135%	0.4	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0739 - EPA 3510C (Neutral pH)						Water						
LCS Dup (23B0739-BSD1)						Prepared: 02/20/23 11:30 Analyzed: 02/20/23 19:56						Q-19
Chlorpyrifos	3.60	0.500	1.00	ug/L	2	4.00	---	90	47-133%	7	30%	
Coumaphos	4.14	0.500	1.00	ug/L	2	4.00	---	104	45-135%	0.5	30%	
Demeton O	1.45	0.500	1.00	ug/L	2	1.84	---	79	10-125%	7	30%	
Demeton S	1.70	0.500	1.00	ug/L	2	1.94	---	88	21-162%	1	30%	
Diazinon	4.29	0.500	1.00	ug/L	2	4.00	---	107	43-129%	0.7	30%	
Dichlorvos	4.40	0.500	1.00	ug/L	2	4.00	---	110	39-138%	2	30%	
Dimethoate	3.56	0.500	1.00	ug/L	2	4.00	---	89	26-125%	6	30%	
Disulfoton	3.74	0.500	1.00	ug/L	2	4.00	---	94	36-134%	0.04	30%	
EPN	4.32	0.500	1.00	ug/L	2	4.00	---	108	47-133%	0.7	30%	
Ethoprop	3.99	0.500	1.00	ug/L	2	4.00	---	100	52-125%	4	30%	
Fensulfothion	4.22	0.500	1.00	ug/L	2	4.00	---	105	15-141%	3	30%	
Fenthion	3.67	0.500	1.00	ug/L	2	4.00	---	92	42-137%	0.3	30%	
Malathion	3.64	0.500	1.00	ug/L	2	4.00	---	91	44-132%	0.01	30%	
Merphos	4.51	0.500	1.00	ug/L	2	4.00	---	113	26-133%	0.2	30%	B-02
Methyl parathion	4.39	0.500	1.00	ug/L	2	4.00	---	110	49-134%	2	30%	
Mevinphos (Phosdrin)	4.06	0.500	1.00	ug/L	2	4.00	---	101	10-196%	0.6	30%	
Monocrotophos	0.998	0.500	0.500	ug/L	2	4.00	---	25	10-159%	2	30%	
Naled (Dibrom)	3.97	0.500	1.00	ug/L	2	4.00	---	99	10-146%	7	30%	
Parathion, ethyl	4.18	0.500	1.00	ug/L	2	4.00	---	105	52-134%	0.5	30%	
Phorate	3.96	0.500	1.00	ug/L	2	4.00	---	99	23-139%	8	30%	
Ronnel (Fenchlorphos)	3.56	0.500	1.00	ug/L	2	4.00	---	89	42-133%	2	30%	
Sulfotep	3.34	0.500	1.00	ug/L	2	4.00	---	83	47-126%	6	30%	
Sulprofos (Bolstar)	3.07	0.500	1.00	ug/L	2	4.00	---	77	47-135%	2	30%	
TEPP	3.48	0.500	1.00	ug/L	2	4.00	---	87	10-208%	0.05	30%	B-02
Tetrachlorvinphos (Rabon)	4.48	0.500	1.00	ug/L	2	4.00	---	112	42-125%	0.4	30%	
Tokuthion (Prothiofos)	4.10	0.500	1.00	ug/L	2	4.00	---	103	43-132%	8	30%	
Trichloronate	3.61	0.500	1.00	ug/L	2	4.00	---	90	28-137%	8	30%	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 2x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>110 %</i>		<i>58-121 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0647 - EPA 3015A						Water						
Blank (23B0647-BLK1)						Prepared: 02/16/23 15:17 Analyzed: 02/18/23 04:19						
EPA 6020B												
Antimony	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Barium	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Beryllium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Cadmium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Chromium	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Copper	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Lead	ND	0.110	0.200	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Mercury	ND	0.0400	0.0800	ug/L	1	---	---	---	---	---	---	
Nickel	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Selenium	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Silver	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Thallium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Zinc	ND	2.00	4.00	ug/L	1	---	---	---	---	---	---	

LCS (23B0647-BS1)						Prepared: 02/16/23 15:17 Analyzed: 02/18/23 04:24						
EPA 6020B												
Antimony	27.2	0.500	1.00	ug/L	1	27.8	---	98	80-120%	---	---	
Arsenic	56.5	0.500	1.00	ug/L	1	55.6	---	102	80-120%	---	---	
Barium	58.8	1.00	2.00	ug/L	1	55.6	---	106	80-120%	---	---	
Beryllium	26.2	0.100	0.200	ug/L	1	27.8	---	94	80-120%	---	---	
Cadmium	56.7	0.100	0.200	ug/L	1	55.6	---	102	80-120%	---	---	
Chromium	57.2	1.00	2.00	ug/L	1	55.6	---	103	80-120%	---	---	
Copper	59.0	1.00	2.00	ug/L	1	55.6	---	106	80-120%	---	---	
Lead	57.0	0.110	0.200	ug/L	1	55.6	---	103	80-120%	---	---	
Manganese	57.5	0.500	1.00	ug/L	1	55.6	---	104	80-120%	---	---	
Mercury	1.09	0.0400	0.0800	ug/L	1	1.11	---	98	80-120%	---	---	
Nickel	58.7	1.00	2.00	ug/L	1	55.6	---	106	80-120%	---	---	
Selenium	27.0	0.500	1.00	ug/L	1	27.8	---	97	80-120%	---	---	
Silver	27.9	0.100	0.200	ug/L	1	27.8	---	100	80-120%	---	---	
Thallium	27.1	0.100	0.200	ug/L	1	27.8	---	98	80-120%	---	---	
Zinc	58.0	2.00	4.00	ug/L	1	55.6	---	104	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0522 - 05 02 23 1624

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for Batch 23B0647 - EPA 3015A Water and Duplicate (23B0647-DUP1).

Matrix Spike (23B0647-MS1)

Prepared: 02/16/23 15:17 Analyzed: 02/18/23 04:40

QC Source Sample: MW3-20230214-GW-35 (A3B0522-01)

EPA 6020B

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for Matrix Spike (23B0647-MS1).

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (Signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0647 - EPA 3015A						Water						
Matrix Spike (23B0647-MS1)						Prepared: 02/16/23 15:17 Analyzed: 02/18/23 04:40						
QC Source Sample: MW3-20230214-GW-35 (A3B0522-01)												
Silver	27.5	0.100	0.200	ug/L	1	27.8	ND	99	75-125%	---	---	
Thallium	26.5	0.100	0.200	ug/L	1	27.8	ND	95	75-125%	---	---	
Zinc	59.3	2.00	4.00	ug/L	1	55.6	ND	107	75-125%	---	---	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0522 - 05 02 23 1624

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B1728 - EPA 3510C						Water						
Blank (W3B1728-BLK1)						Prepared: 02/21/23 17:01 Analyzed: 03/02/23 04:23						
EPA 8151A												
2,4-D	ND	0.34	0.50	ug/l	1	---	---	---	---	---	---	---
2,4-DB	ND	0.99	2.5	ug/l	1	---	---	---	---	---	---	---
2,4,5-T	ND	0.14	0.25	ug/l	1	---	---	---	---	---	---	---
2,4,5-TP (Silvex)	ND	0.14	0.25	ug/l	1	---	---	---	---	---	---	---
3,5-Dichlorobenzoic acid	ND	0.28	1.2	ug/l	1	---	---	---	---	---	---	---
4-Nitrophenol	ND	0.50	1.2	ug/l	1	---	---	---	---	---	---	---
Acifluorfen	ND	0.24	0.50	ug/l	1	---	---	---	---	---	---	---
Bentazon	ND	0.55	2.5	ug/l	1	---	---	---	---	---	---	---
Dalapon	ND	0.16	0.50	ug/l	1	---	---	---	---	---	---	---
Dicamba	ND	0.19	0.75	ug/l	1	---	---	---	---	---	---	---
Dichloroprop	ND	0.24	1.0	ug/l	1	---	---	---	---	---	---	---
Dinoseb	ND	0.090	0.50	ug/l	1	---	---	---	---	---	---	---
DCPA	ND	0.20	0.25	ug/l	1	---	---	---	---	---	---	---
MCPA	ND	40	100	ug/l	1	---	---	---	---	---	---	---
MCPP	ND	27	100	ug/l	1	---	---	---	---	---	---	---
Pentachlorophenol	ND	0.18	0.25	ug/l	1	---	---	---	---	---	---	---
Picloram	ND	0.13	0.75	ug/l	1	---	---	---	---	---	---	---

Surr: 2,4-DCAA Recovery: 60% Limits: 56-156% Dilution: 1x

LCS (W3B1728-BS1) Prepared: 02/21/23 17:01 Analyzed: 03/02/23 05:26

EPA 8151A												
2,4-D	2.47	0.34	0.50	ug/l	1	3.00	---	82	56-164%	---	---	---
2,4-DB	4.71	0.99	2.5	ug/l	1	6.00	---	79	27-161%	---	---	---
2,4,5-T	1.15	0.14	0.25	ug/l	1	1.50	---	77	39-151%	---	---	---
2,4,5-TP (Silvex)	1.23	0.14	0.25	ug/l	1	1.50	---	82	46-142%	---	---	---
3,5-Dichlorobenzoic acid	2.65	0.28	1.2	ug/l	1	3.00	---	88	54-154%	---	---	---
4-Nitrophenol	3.70	0.50	1.2	ug/l	1	6.00	---	62	3-105%	---	---	---
Acifluorfen	1.61	0.24	0.50	ug/l	1	1.50	---	107	39-134%	---	---	---
Bentazon	5.35	0.55	2.5	ug/l	1	6.00	---	89	44-139%	---	---	---
Dalapon	2.27	0.16	0.50	ug/l	1	3.00	---	76	40-139%	---	---	---
Dicamba	2.51	0.19	0.75	ug/l	1	3.00	---	84	46-140%	---	---	---

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B1728 - EPA 3510C						Water						
LCS (W3B1728-BS1)						Prepared: 02/21/23 17:01 Analyzed: 03/02/23 05:26						
Dichloroprop	2.52	0.24	1.0	ug/l	1	3.00	---	84	43-158%	---	---	
Dinoseb	1.43	0.090	0.50	ug/l	1	1.50	---	95	42-146%	---	---	
DCPA	1.31	0.20	0.25	ug/l	1	1.50	---	87	34-135%	---	---	
MCPA	242	40	100	ug/l	1	300	---	81	28-144%	---	---	
MCPP	214	27	100	ug/l	1	300	---	71	31-153%	---	---	
Pentachlorophenol	1.22	0.18	0.25	ug/l	1	1.50	---	82	37-136%	---	---	
Picloram	1.22	0.13	0.75	ug/l	1	1.50	---	82	35-138%	---	---	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 98 %</i>		<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>						

LCS Dup (W3B1728-BSD1)						Prepared: 02/21/23 17:01 Analyzed: 03/02/23 04:54						
EPA 8151A												
2,4-D	3.07	0.34	0.50	ug/l	1	3.00	---	102	56-164%	22	25%	
2,4-DB	5.92	0.99	2.5	ug/l	1	6.00	---	99	27-161%	23	25%	
2,4,5-T	1.31	0.14	0.25	ug/l	1	1.50	---	87	39-151%	13	25%	
2,4,5-TP (Silvex)	1.55	0.14	0.25	ug/l	1	1.50	---	103	46-142%	23	25%	
3,5-Dichlorobenzoic acid	3.26	0.28	1.2	ug/l	1	3.00	---	109	54-154%	20	25%	
4-Nitrophenol	4.50	0.50	1.2	ug/l	1	6.00	---	75	3-105%	20	25%	
Acifluorfen	2.25	0.24	0.50	ug/l	1	1.50	---	150	39-134%	34	25%	Q-08
Bentazon	6.80	0.55	2.5	ug/l	1	6.00	---	113	44-139%	24	25%	
Dalapon	2.86	0.16	0.50	ug/l	1	3.00	---	95	40-139%	23	25%	
Dicamba	3.15	0.19	0.75	ug/l	1	3.00	---	105	46-140%	22	25%	
Dichloroprop	3.00	0.24	1.0	ug/l	1	3.00	---	100	43-158%	17	25%	
Dinoseb	1.57	0.090	0.50	ug/l	1	1.50	---	105	42-146%	10	25%	
DCPA	1.63	0.20	0.25	ug/l	1	1.50	---	109	34-135%	22	25%	
MCPA	298	40	100	ug/l	1	300	---	99	28-144%	21	25%	
MCPP	270	27	100	ug/l	1	300	---	90	31-153%	23	25%	
Pentachlorophenol	1.43	0.18	0.25	ug/l	1	1.50	---	95	37-136%	15	25%	
Picloram	1.56	0.13	0.75	ug/l	1	1.50	---	104	35-138%	24	25%	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 123 %</i>		<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Hexavalent Chromium by IC

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B1784 - _NONE (LC)						Water						
Blank (W3B1784-BLK1)						Prepared: 02/22/23 10:36 Analyzed: 02/22/23 13:29						
<u>EPA 218.6</u>												
Chromium 6+	ND	0.0079	0.020	ug/l	1	---	---	---	---	---	---	
LCS (W3B1784-BS1)						Prepared: 02/22/23 10:36 Analyzed: 02/22/23 15:59						
<u>EPA 218.6</u>												
Chromium 6+	5.44	0.0079	0.020	ug/l	1	5.00	---	109	90-110%	---	---	
Matrix Spike (W3B1784-MS1)						Prepared: 02/22/23 10:36 Analyzed: 02/23/23 11:59						
<u>QC Source Sample: Non-SDG (3A19008-01)</u>												
<u>EPA 218.6</u>												
Chromium 6+	4.90	0.0079	0.020	ug/l	1	5.00	0.0558	97	88-112%	---	---	
Matrix Spike (W3B1784-MS2)						Prepared: 02/22/23 10:36 Analyzed: 02/23/23 12:23						
<u>QC Source Sample: Non-SDG (3A19008-03)</u>												
<u>EPA 218.6</u>												
Chromium 6+	5.51	0.0079	0.020	ug/l	1	5.00	0.191	106	88-112%	---	---	
Matrix Spike Dup (W3B1784-MSD1)						Prepared: 02/22/23 10:36 Analyzed: 02/23/23 12:11						
<u>QC Source Sample: Non-SDG (3A19008-01)</u>												
Chromium 6+	4.91	0.0079	0.020	ug/l	1	5.00	0.0558	97	88-112%	0.2	10%	
Matrix Spike Dup (W3B1784-MSD2)						Prepared: 02/22/23 10:36 Analyzed: 02/23/23 12:35						
<u>QC Source Sample: Non-SDG (3A19008-03)</u>												
Chromium 6+	5.25	0.0079	0.020	ug/l	1	5.00	0.191	101	88-112%	5	10%	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Hexavalent Chromium by IC

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B2351 - _NONE (LC)						Water						
Blank (W3B2351-BLK1)						Prepared: 02/28/23 00:00 Analyzed: 02/28/23 16:56						
<u>EPA 218.6</u>												
Chromium 6+	ND	0.0079	0.020	ug/l	1	---	---	---	---	---	---	
LCS (W3B2351-BS1)						Prepared: 02/28/23 00:00 Analyzed: 02/28/23 17:28						
<u>EPA 218.6</u>												
Chromium 6+	4.90	0.0079	0.020	ug/l	1	5.00	---	98	90-110%	---	---	
Matrix Spike (W3B2351-MS1)						Prepared: 02/28/23 00:00 Analyzed: 02/28/23 18:58						
<u>QC Source Sample: Non-SDG (3A19009-01)</u>												
<u>EPA 218.6</u>												
Chromium 6+	11.6	0.0079	0.020	ug/l	1	5.00	6.53	101	88-112%	---	---	
Matrix Spike Dup (W3B2351-MSD1)						Prepared: 02/28/23 00:00 Analyzed: 02/28/23 19:10						
<u>QC Source Sample: Non-SDG (3A19009-01)</u>												
Chromium 6+	11.5	0.0079	0.020	ug/l	1	5.00	6.53	99	88-112%	0.9	10%	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0986							
A3B0522-01	Water	NWTPH-Dx	02/14/23 10:05	02/28/23 11:48	970mL/5mL	1000mL/5mL	1.03
A3B0522-02	Water	NWTPH-Dx	02/14/23 10:05	02/28/23 11:48	930mL/5mL	1000mL/5mL	1.08
A3B0522-03	Water	NWTPH-Dx	02/14/23 12:51	02/28/23 11:48	970mL/5mL	1000mL/5mL	1.03
A3B0522-04	Water	NWTPH-Dx	02/14/23 14:37	02/28/23 11:48	940mL/5mL	1000mL/5mL	1.06
A3B0522-05	Water	NWTPH-Dx	02/14/23 16:17	02/28/23 11:48	950mL/5mL	1000mL/5mL	1.05

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0828							
A3B0522-01	Water	NWTPH-Gx (MS)	02/14/23 10:05	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-02	Water	NWTPH-Gx (MS)	02/14/23 10:05	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-03	Water	NWTPH-Gx (MS)	02/14/23 12:51	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-04	Water	NWTPH-Gx (MS)	02/14/23 14:37	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-05	Water	NWTPH-Gx (MS)	02/14/23 16:17	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00

Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0828							
A3B0522-01	Water	EPA 8260D	02/14/23 10:05	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-02	Water	EPA 8260D	02/14/23 10:05	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-03	Water	EPA 8260D	02/14/23 12:51	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-04	Water	EPA 8260D	02/14/23 14:37	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-05	Water	EPA 8260D	02/14/23 16:17	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0522-07	Water	EPA 8260D	02/14/23 00:00	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00

Volatile Organic Compounds by EPA 8260D SIM

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0743							
A3B0522-01	Water	EPA 8260D SIM	02/14/23 10:05	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00
A3B0522-02	Water	EPA 8260D SIM	02/14/23 10:05	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

SAMPLE PREPARATION INFORMATION

Volatile Organic Compounds by EPA 8260D SIM

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A3B0522-03	Water	EPA 8260D SIM	02/14/23 12:51	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00
A3B0522-04	Water	EPA 8260D SIM	02/14/23 14:37	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00
A3B0522-05	Water	EPA 8260D SIM	02/14/23 16:17	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00
A3B0522-07	Water	EPA 8260D SIM	02/14/23 00:00	02/20/23 13:10	5mL/5mL	5mL/5mL	1.00

Semivolatile Organic Compounds by EPA 8270E

Prep: EPA 3510C (Acid/Base Neutral)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0761							
A3B0522-01	Water	EPA 8270E	02/14/23 10:05	02/21/23 06:52	1040mL/1mL	1000mL/1mL	0.96
A3B0522-02	Water	EPA 8270E	02/14/23 10:05	02/21/23 06:52	1060mL/1mL	1000mL/1mL	0.94
A3B0522-03	Water	EPA 8270E	02/14/23 12:51	02/21/23 06:52	850mL/1mL	1000mL/1mL	1.18
A3B0522-04	Water	EPA 8270E	02/14/23 14:37	02/21/23 06:52	810mL/1mL	1000mL/1mL	1.23
A3B0522-05	Water	EPA 8270E	02/14/23 16:17	02/21/23 06:52	900mL/1mL	1000mL/1mL	1.11

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Prep: EPA 3510C (Neutral pH)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0739							
A3B0522-01	Water	EPA 8270E OPPs	02/14/23 10:05	02/20/23 11:30	1010mL/2mL	1000mL/2mL	0.99
A3B0522-02	Water	EPA 8270E OPPs	02/14/23 10:05	02/20/23 11:30	1010mL/2mL	1000mL/2mL	0.99
A3B0522-03	Water	EPA 8270E OPPs	02/14/23 12:51	02/20/23 11:30	910mL/2mL	1000mL/2mL	1.10
A3B0522-04	Water	EPA 8270E OPPs	02/14/23 14:37	02/20/23 11:30	930mL/2mL	1000mL/2mL	1.08
A3B0522-05	Water	EPA 8270E OPPs	02/14/23 16:17	02/20/23 11:30	940mL/2mL	1000mL/2mL	1.06

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 23B0647							
A3B0522-01	Water	EPA 6020B	02/14/23 10:05	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-02	Water	EPA 6020B	02/14/23 10:05	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-03	Water	EPA 6020B	02/14/23 12:51	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-03RE1	Water	EPA 6020B	02/14/23 12:51	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-04	Water	EPA 6020B	02/14/23 14:37	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A3B0522-04RE1	Water	EPA 6020B	02/14/23 14:37	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-05	Water	EPA 6020B	02/14/23 16:17	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-05RE1	Water	EPA 6020B	02/14/23 16:17	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00
A3B0522-05RE2	Water	EPA 6020B	02/14/23 16:17	02/16/23 15:17	45mL/50mL	45mL/50mL	1.00

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

Weck Laboratories, Inc.

SAMPLE PREPARATION INFORMATION

Chlorinated Herbicides by GC/ECD

Prep: EPA 3510C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: W3B1728</u>							
A3B0522-01	Water	EPA 8151A	02/14/23 10:05	02/21/23 17:01	1051ml/10ml	1000ml/10ml	0.95
A3B0522-02	Water	EPA 8151A	02/14/23 10:05	02/21/23 17:01	1052ml/10ml	1000ml/10ml	0.95
A3B0522-03	Water	EPA 8151A	02/14/23 12:51	02/21/23 17:01	933ml/10ml	1000ml/10ml	1.07
A3B0522-04	Water	EPA 8151A	02/14/23 14:37	02/21/23 17:01	1030ml/10ml	1000ml/10ml	0.97
A3B0522-05	Water	EPA 8151A	02/14/23 16:17	02/21/23 17:01	1013ml/10ml	1000ml/10ml	0.99

Hexavalent Chromium by IC

Prep: NONE (LC)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: W3B1784</u>							
A3B0522-01	Water	EPA 218.6	02/14/23 10:05	02/22/23 10:36	5ml/5ml	5ml/5ml	1.00
A3B0522-02	Water	EPA 218.6	02/14/23 10:05	02/22/23 10:36	5ml/5ml	5ml/5ml	1.00
<u>Batch: W3B2351</u>							
A3B0522-03	Water	EPA 218.6	02/14/23 12:51	02/28/23 00:00	5ml/5ml	5ml/5ml	1.00
A3B0522-04	Water	EPA 218.6	02/14/23 14:37	02/28/23 00:00	5ml/5ml	5ml/5ml	1.00
A3B0522-05	Water	EPA 218.6	02/14/23 16:17	02/28/23 00:00	5ml/5ml	5ml/5ml	1.00

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- AMEND** The Result, Reporting Level, Recovery and/or RPD has changed. Note: Batch QC marked as AMENDED may or may not have been issued prior to the change. Case Narrative included if client data is affected.
- B-02** Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
- ICV-01** Estimated Result. Initial Calibration Verification (ICV) failed high. There is no effect on non-detect results.
- Ja** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- PRES** Incomplete field preservation. Additional preservative was added to adjust the pH within the appropriate range for this analysis.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-19** Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-30** Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
- Q-31** Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- Q-42** Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-52** Due to known erratic recoveries, the result and reporting levels for this analyte are reported as Estimated Values. This analyte may not have passed all QC requirements for this method.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +1%. The results are reported as Estimated Values.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +10%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -5%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- S-06** Surrogate recovery is outside of established control limits.

Weck Laboratories, Inc.

- M-04** Due to the nature of matrix interferences, sample extract was diluted prior to analysis. The MDL and MRL were raised due to the dilution.
- M-05** Due to the nature of matrix interferences, sample was diluted prior to analysis. The MDL and MRL were raised due to the dilution.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

- Q-08** High bias in the QC sample does not affect sample result since analyte was not detected or below the reporting limit.
- S-04** The surrogate recovery for this sample is outside of established control limits due to possible sample matrix effect.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.
- " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
- " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
- " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A3B0522 - 05 02 23 1624).

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Handwritten signature of Philip Nerenberg



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0522 - 05 02 23 1624
--	---	---

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
--------	----------	--------	---------	--------	---------------

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0522 - 05 02 23 1624

CHAIN OF CUSTODY

APEX LABS

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: Maul Foster Alongi
 Address: 3140 NE Broadway St, Portland, OR 97232
 Sampled by: *Colin S. Amos*
 Sampler signature: *Colin S. Amos*

Project Mgr: David Weatherby
 Project Name: St. Helens Lagoon
 Email: dweatherby@maulfoster.com, mbenzinger@maulfoster.com
 Phone: (971) 544-2139
 Project #: M0830.03.006
 Email: dweatherby@maulfoster.com, mbenzinger@maulfoster.com

Lab # *A3B0522* COC *1* of *1*

ANALYSIS REQUEST

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	Sample	Analysis
MW3-20230214-GW-35	02/14/23	1005	GW	20	GW	Composite** NMTPH-Gx 8260D VOCs LL VOCs 8260D-SIM Tot Metals 6020B*** Cr-VI 7196A/218.8 NMTPH-Dx SVOCs 8270E OP Pest 8270E Chlorinated Herb 8151A LL OC Pest 8270E/1699 Dioxins/Furans 1613B PCB Congeners 1683C PFAS EPA-537 Mod/537.1
MW3-20230214-GW-35-DAP		1005	GW	20	GW	
MW5-20230214-GW-40		1257	GW	20	GW	
MW4-20230214-GW-40		1457	GW	20	GW	
MW6-20230214-GW-4025		1617	GW	20	GW	
Field Blank-02	02/14/23	1610	W	2	W	
Trip Blank	02/14/23	-	W	3	W	

TAT Requested: STANDARD

SPECIAL INSTRUCTIONS:
 *Store a portion of each sediment sample at standard temperature (0-6 °C) until all 5 components have been received, then composite and analyze for Metals and Lig.
 Composite MECH-preserved VOCs and analyze for NMTPH-Gx, VOCs, and LL-VOCs.
 Store 250 mL PFAS sediment containers at 0-6 °C until all 5 components have been received, then subcontract to Bureau Veritas for composting and analysis.
 Store remainder of each sediment sample at -18 °C until all 5 components have been received, then composite and analyze for all remaining tests.
 ***Sh, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Se, Ag, Tl, Zn

RECEIVED BY:	RELINQUISHED BY:
Signature: <i>Colin S. Amos</i> Date: 02/15/23 Printed Name: Colin S. Amos Company: MFA	Signature: <i>David Weatherby</i> Date: 2/15/23 Printed Name: David Weatherby Company: Apex

Philip Nerenberg



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

Project: St. Helens Lagoon
Project Number: M0830.03.006
Project Manager: David Weatherby

Report ID:
A3B0522 - 05 02 23 1624

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster Alongi Element WO#: A3 B0522

Project/Project #: St. Helens Lagoon / M0830.03.006

Delivery Info:

Date/time received: 2/15/23 @ 0730 By: [Signature]
Delivered by: Apex Client [X] ESS FedEx UPS Radio Morgan SDS Evergreen Other

Cooler Inspection Date/time inspected: 2/15/23 @ 0736 By: [Signature]

Chain of Custody included? Yes [X] No
Signed/dated by client? Yes [X] No

Table with 7 columns: Cooler #1 to Cooler #7. Rows include Temperature (°C), Custody seals? (Y/N), Received on ice? (Y/N), Temp. blanks? (Y/N), Ice type: (Gel/Real/Other), Condition (In/Out).

Cooler out of temp? (Y/N) Possible reason why:
Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No
Sample Inspection: Date/time inspected: 2/15/23 @ 815 By: [Signature]

All samples intact? Yes [X] No Comments:

Bottle labels/COCs agree? Yes [X] No Comments:

COC/container discrepancies form initiated? Yes No [X]

Containers/volumes received appropriate for analysis? Yes [X] No Comments:

Do VOA vials have visible headspace? Yes No [X] NA

Comments:

Water samples: pH checked: Yes [X] No NA pH appropriate? Yes [X] No NA

Comments:

Additional information: TB# 3239.

Labeled by: JS Witness: DSS Cooler Inspected by: [Signature]

Form Y-003 R-00

Philip Nerenberg (Signature)



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Friday, April 21, 2023

David Weatherby
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A3B0674 - St. Helens Lagoon - M0830.03.006

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A3B0674, which was received by the laboratory on 2/20/2023 at 6:15:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: pnerenberg@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	5.6 degC	Cooler #2	5.4 degC
Cooler #3	4.7 degC		

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
---	--	---

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW1-20230220-GW-70	A3B0674-01	Water	02/20/23 10:26	02/20/23 18:15
MW2-20230220-GW-60	A3B0674-02	Water	02/20/23 14:41	02/20/23 18:15
Trip Blank	A3B0674-03	Water	02/20/23 00:00	02/20/23 18:15

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)				Matrix: Water		Batch: 23C0083		
Diesel	ND	0.0980	0.196	mg/L	1	03/02/23 23:24	NWTPH-Dx	
Oil	ND	0.196	0.392	mg/L	1	03/02/23 23:24	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/02/23 23:24</i>	<i>NWTPH-Dx</i>
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: 23C0083		
Diesel	ND	0.111	0.222	mg/L	1	03/02/23 23:44	NWTPH-Dx	
Oil	ND	0.222	0.444	mg/L	1	03/02/23 23:44	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>03/02/23 23:44</i>	<i>NWTPH-Dx</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)			Matrix: Water			Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 18:52	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 18:52</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 18:52</i>	<i>NWTPH-Gx (MS)</i>
MW2-20230220-GW-60 (A3B0674-02)			Matrix: Water			Batch: 23B0828		
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	02/22/23 19:15	NWTPH-Gx (MS)	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 97 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>02/22/23 19:15</i>	<i>NWTPH-Gx (MS)</i>
<i>1,4-Difluorobenzene (Sur)</i>		<i>106 %</i>		<i>50-150 %</i>		<i>1</i>	<i>02/22/23 19:15</i>	<i>NWTPH-Gx (MS)</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0674 - 04 21 23 1031

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)				Matrix: Water		Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 18:52	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:52	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 18:52	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 18:52	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 18:52	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:52	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 18:52	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:52	EPA 8260D	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:52	EPA 8260D	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:52	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 18:52	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 18:52	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 18:52	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/22/23 18:52	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)			Matrix: Water			Batch: 23B0828		
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 18:52	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 18:52	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 18:52	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:52	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 18:52	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 18:52	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 18:52	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 18:52	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 18:52</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>				<i>104 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/22/23 18:52</i>
<i>4-Bromofluorobenzene (Surr)</i>				<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>02/22/23 18:52</i>
MW2-20230220-GW-60 (A3B0674-02)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 19:15	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 19:15	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 19:15	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 19:15	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 19:15	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 19:15	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 19:15	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 19:15	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW2-20230220-GW-60 (A3B0674-02)			Matrix: Water			Batch: 23B0828		
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 19:15	EPA 8260D	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 19:15	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 19:15	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 19:15	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 19:15	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/22/23 19:15	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 19:15	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 19:15	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 19:15	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 19:15	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 19:15	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 19:15	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 19:15	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 19:15	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 96 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 19:15</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 19:15</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>02/22/23 19:15</i>	<i>EPA 8260D</i>

Trip Blank (A3B0674-03)			Matrix: Water			Batch: 23B0828		
Acetone	ND	10.0	20.0	ug/L	1	02/22/23 16:38	EPA 8260D	
Acrylonitrile	ND	1.00	2.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Bromobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:38	EPA 8260D	
Bromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Bromoform	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Bromomethane	ND	5.00	5.00	ug/L	1	02/22/23 16:38	EPA 8260D	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	02/22/23 16:38	EPA 8260D	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0674 - 04 21 23 1031

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0674-03)			Matrix: Water			Batch: 23B0828		
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Carbon disulfide	ND	5.00	10.0	ug/L	1	02/22/23 16:38	EPA 8260D	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Chlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:38	EPA 8260D	
Chloroethane	ND	5.00	5.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Chloromethane	ND	2.50	5.00	ug/L	1	02/22/23 16:38	EPA 8260D	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Dibromomethane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:38	EPA 8260D	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:38	EPA 8260D	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:38	EPA 8260D	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	02/22/23 16:38	EPA 8260D	
2-Hexanone	ND	10.0	10.0	ug/L	1	02/22/23 16:38	EPA 8260D	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
Methylene chloride	ND	5.00	10.0	ug/L	1	02/22/23 16:38	EPA 8260D	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	02/22/23 16:38	EPA 8260D	
Naphthalene	ND	2.00	2.00	ug/L	1	02/22/23 16:38	EPA 8260D	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	02/22/23 16:38	EPA 8260D	
Styrene	ND	0.500	1.00	ug/L	1	02/22/23 16:38	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	02/22/23 16:38	EPA 8260D	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 16:38	EPA 8260D	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	02/22/23 16:38	EPA 8260D	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	02/22/23 16:38	EPA 8260D	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	02/22/23 16:38	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>02/22/23 16:38</i>	<i>EPA 8260D</i>

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
---	--	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0674-03)				Matrix: Water		Batch: 23B0828		
<i>Surrogate: Toluene-d8 (Surr)</i>			<i>Recovery: 105 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>02/22/23 16:38</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>100 %</i>	<i>80-120 %</i>	<i>1</i>	<i>02/22/23 16:38</i>	<i>EPA 8260D</i>	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)			Matrix: Water			Batch: 23C0033		
Benzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Chloroform	0.0838	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	Ja
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:52	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/01/23 14:52</i>	<i>EPA 8260D SIM</i>	
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/01/23 14:52</i>	<i>EPA 8260D SIM</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/01/23 14:52</i>	<i>EPA 8260D SIM</i>	

MW2-20230220-GW-60 (A3B0674-02)			Matrix: Water			Batch: 23C0033		
Benzene	0.176	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	Q-42
Toluene	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

<p><u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232</p>	<p>Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby</p>	<p style="text-align: right;">Report ID: A3B0674 - 04 21 23 1031</p>
--	---	--

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: 23C0033		
o-Xylene	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
Chloroform	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0200	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 15:46	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>	1	03/01/23 15:46	EPA 8260D SIM	
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		80-120 %	1	03/01/23 15:46	EPA 8260D SIM	
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		80-120 %	1	03/01/23 15:46	EPA 8260D SIM	

Trip Blank (A3B0674-03)				Matrix: Water		Batch: 23C0033		
Benzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Toluene	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
m,p-Xylene	ND	0.100	0.200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
o-Xylene	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Chloroform	0.202	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A3B0674-03)			Matrix: Water			Batch: 23C0033		
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,1-Dichloroethene	ND	0.0200	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	03/01/23 14:25	EPA 8260D SIM	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/01/23 14:25</i>	<i>EPA 8260D SIM</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/01/23 14:25</i>	<i>EPA 8260D SIM</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/01/23 14:25</i>	<i>EPA 8260D SIM</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)				Matrix: Water		Batch: 23B0916		
Acenaphthene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Acenaphthylene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Anthracene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Benz(a)anthracene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Benzo(a)pyrene	ND	0.0152	0.0303	ug/L	1	02/27/23 19:39	EPA 8270E	
Benzo(b)fluoranthene	ND	0.0152	0.0303	ug/L	1	02/27/23 19:39	EPA 8270E	
Benzo(k)fluoranthene	ND	0.0152	0.0303	ug/L	1	02/27/23 19:39	EPA 8270E	
Benzo(g,h,i)perylene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Chrysene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Dibenz(a,h)anthracene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Fluoranthene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Fluorene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Indeno(1,2,3-cd)pyrene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
1-Methylnaphthalene	ND	0.0202	0.0404	ug/L	1	02/27/23 19:39	EPA 8270E	
2-Methylnaphthalene	ND	0.0202	0.0404	ug/L	1	02/27/23 19:39	EPA 8270E	
Naphthalene	ND	0.0202	0.0404	ug/L	1	02/27/23 19:39	EPA 8270E	
Phenanthrene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Pyrene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Carbazole	ND	0.0152	0.0303	ug/L	1	02/27/23 19:39	EPA 8270E	
Dibenzofuran	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
2-Chlorophenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
2,4-Dichlorophenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
2,4-Dimethylphenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
2,4-Dinitrophenol	ND	0.253	0.505	ug/L	1	02/27/23 19:39	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.253	0.505	ug/L	1	02/27/23 19:39	EPA 8270E	
2-Methylphenol	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
2-Nitrophenol	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
4-Nitrophenol	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
Pentachlorophenol (PCP)	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
Phenol	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)				Matrix: Water		Batch: 23B0916		
2,3,5,6-Tetrachlorophenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
Butyl benzyl phthalate	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
Diethylphthalate	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
Dimethylphthalate	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
Di-n-butylphthalate	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
Di-n-octyl phthalate	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
Bis(2-Chloroethyl) ether	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
Hexachlorobenzene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
Hexachlorobutadiene	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	Q-30
Hexachlorocyclopentadiene	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
Hexachloroethane	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	Q-30
2-Chloronaphthalene	ND	0.0101	0.0202	ug/L	1	02/27/23 19:39	EPA 8270E	
1,2,4-Trichlorobenzene	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	Q-30
4-Bromophenyl phenyl ether	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
4-Chlorophenyl phenyl ether	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
Aniline	ND	0.0505	0.101	ug/L	1	02/27/23 19:39	EPA 8270E	
4-Chloroaniline	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	
2-Nitroaniline	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
3-Nitroaniline	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
4-Nitroaniline	ND	0.202	0.404	ug/L	1	02/27/23 19:39	EPA 8270E	
Nitrobenzene	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
2,4-Dinitrotoluene	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
2,6-Dinitrotoluene	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	
Benzoic acid	1.28	1.26	2.53	ug/L	1	02/27/23 19:39	EPA 8270E	Ja
Benzyl alcohol	0.264	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes		
MW1-20230220-GW-70 (A3B0674-01)			Matrix: Water			Batch: 23B0916				
Isophorone	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E			
Azobenzene (1,2-DPH)	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E			
Bis(2-Ethylhexyl) adipate	ND	0.253	0.505	ug/L	1	02/27/23 19:39	EPA 8270E			
3,3'-Dichlorobenzidine	ND	0.505	1.01	ug/L	1	02/27/23 19:39	EPA 8270E	Q-52		
1,2-Dinitrobenzene	ND	0.253	0.505	ug/L	1	02/27/23 19:39	EPA 8270E			
1,3-Dinitrobenzene	ND	0.253	0.505	ug/L	1	02/27/23 19:39	EPA 8270E			
1,4-Dinitrobenzene	ND	0.253	0.505	ug/L	1	02/27/23 19:39	EPA 8270E			
Pyridine	ND	0.101	0.202	ug/L	1	02/27/23 19:39	EPA 8270E			
1,2-Dichlorobenzene	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	Q-30		
1,3-Dichlorobenzene	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	Q-30		
1,4-Dichlorobenzene	ND	0.0253	0.0505	ug/L	1	02/27/23 19:39	EPA 8270E	Q-30		
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery:</i>		<i>73 %</i>	<i>Limits:</i>	<i>44-120 %</i>	<i>1</i>	<i>02/27/23 19:39</i>	<i>EPA 8270E</i>	<i>Q-41</i>
<i>2-Fluorobiphenyl (Surr)</i>				<i>59 %</i>	<i>44-120 %</i>	<i>1</i>	<i>02/27/23 19:39</i>	<i>EPA 8270E</i>		
<i>Phenol-d6 (Surr)</i>				<i>24 %</i>	<i>10-133 %</i>	<i>1</i>	<i>02/27/23 19:39</i>	<i>EPA 8270E</i>		
<i>p-Terphenyl-d14 (Surr)</i>				<i>83 %</i>	<i>50-134 %</i>	<i>1</i>	<i>02/27/23 19:39</i>	<i>EPA 8270E</i>		
<i>2-Fluorophenol (Surr)</i>				<i>39 %</i>	<i>19-120 %</i>	<i>1</i>	<i>02/27/23 19:39</i>	<i>EPA 8270E</i>		
<i>2,4,6-Tribromophenol (Surr)</i>				<i>74 %</i>	<i>43-140 %</i>	<i>1</i>	<i>02/27/23 19:39</i>	<i>EPA 8270E</i>		
MW2-20230220-GW-60 (A3B0674-02)			Matrix: Water			Batch: 23B0916				
Acenaphthene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Acenaphthylene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Anthracene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Benz(a)anthracene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Benzo(a)pyrene	ND	0.0160	0.0319	ug/L	1	02/27/23 20:14	EPA 8270E			
Benzo(b)fluoranthene	ND	0.0160	0.0319	ug/L	1	02/27/23 20:14	EPA 8270E			
Benzo(k)fluoranthene	ND	0.0160	0.0319	ug/L	1	02/27/23 20:14	EPA 8270E			
Benzo(g,h,i)perylene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Chrysene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Dibenz(a,h)anthracene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Fluoranthene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Fluorene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
Indeno(1,2,3-cd)pyrene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E			
1-Methylnaphthalene	ND	0.0213	0.0426	ug/L	1	02/27/23 20:14	EPA 8270E			
2-Methylnaphthalene	ND	0.0213	0.0426	ug/L	1	02/27/23 20:14	EPA 8270E			

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: 23B0916		
Naphthalene	ND	0.0213	0.0426	ug/L	1	02/27/23 20:14	EPA 8270E	
Phenanthrene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E	
Pyrene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E	
Carbazole	ND	0.0160	0.0319	ug/L	1	02/27/23 20:14	EPA 8270E	
Dibenzofuran	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E	
2-Chlorophenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
4-Chloro-3-methylphenol	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E	
2,4-Dichlorophenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
2,4-Dimethylphenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
2,4-Dinitrophenol	ND	0.266	0.532	ug/L	1	02/27/23 20:14	EPA 8270E	
4,6-Dinitro-2-methylphenol	ND	0.266	0.532	ug/L	1	02/27/23 20:14	EPA 8270E	
2-Methylphenol	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
3+4-Methylphenol(s)	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
2-Nitrophenol	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E	
4-Nitrophenol	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E	
Pentachlorophenol (PCP)	0.107	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E	Ja
Phenol	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
2,3,4,6-Tetrachlorophenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
2,3,5,6-Tetrachlorophenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
2,4,5-Trichlorophenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
2,4,6-Trichlorophenol	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E	
Bis(2-ethylhexyl)phthalate	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
Butyl benzyl phthalate	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
Diethylphthalate	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
Dimethylphthalate	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
Di-n-butylphthalate	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
Di-n-octyl phthalate	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E	
N-Nitrosodimethylamine	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
N-Nitroso-di-n-propylamine	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
N-Nitrosodiphenylamine	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
Bis(2-Chloroethoxy) methane	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
Bis(2-Chloroethyl) ether	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	
2,2'-Oxybis(1-Chloropropane)	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
---	--	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: 23B0916			
Hexachlorobenzene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E		
Hexachlorobutadiene	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	Q-30	
Hexachlorocyclopentadiene	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E		
Hexachloroethane	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	Q-30	
2-Chloronaphthalene	ND	0.0106	0.0213	ug/L	1	02/27/23 20:14	EPA 8270E		
1,2,4-Trichlorobenzene	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	Q-30	
4-Bromophenyl phenyl ether	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E		
4-Chlorophenyl phenyl ether	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E		
Aniline	ND	0.0532	0.106	ug/L	1	02/27/23 20:14	EPA 8270E		
4-Chloroaniline	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E		
2-Nitroaniline	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E		
3-Nitroaniline	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E		
4-Nitroaniline	ND	0.213	0.426	ug/L	1	02/27/23 20:14	EPA 8270E		
Nitrobenzene	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E		
2,4-Dinitrotoluene	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E		
2,6-Dinitrotoluene	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E		
Benzoic acid	ND	1.33	2.66	ug/L	1	02/27/23 20:14	EPA 8270E		
Benzyl alcohol	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E		
Isophorone	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E		
Azobenzene (1,2-DPH)	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E		
Bis(2-Ethylhexyl) adipate	ND	0.266	0.532	ug/L	1	02/27/23 20:14	EPA 8270E		
3,3'-Dichlorobenzidine	ND	0.532	1.06	ug/L	1	02/27/23 20:14	EPA 8270E	Q-52	
1,2-Dinitrobenzene	ND	0.266	0.532	ug/L	1	02/27/23 20:14	EPA 8270E		
1,3-Dinitrobenzene	ND	0.266	0.532	ug/L	1	02/27/23 20:14	EPA 8270E		
1,4-Dinitrobenzene	ND	0.266	0.532	ug/L	1	02/27/23 20:14	EPA 8270E		
Pyridine	ND	0.106	0.213	ug/L	1	02/27/23 20:14	EPA 8270E		
1,2-Dichlorobenzene	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	Q-30	
1,3-Dichlorobenzene	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	Q-30	
1,4-Dichlorobenzene	ND	0.0266	0.0532	ug/L	1	02/27/23 20:14	EPA 8270E	Q-30	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 63 %</i>		<i>Limits: 44-120 %</i>		<i>1</i>	<i>02/27/23 20:14</i>	<i>EPA 8270E</i>	<i>Q-41</i>
<i>2-Fluorobiphenyl (Surr)</i>		<i>51 %</i>		<i>44-120 %</i>		<i>1</i>	<i>02/27/23 20:14</i>	<i>EPA 8270E</i>	
<i>Phenol-d6 (Surr)</i>		<i>23 %</i>		<i>10-133 %</i>		<i>1</i>	<i>02/27/23 20:14</i>	<i>EPA 8270E</i>	
<i>p-Terphenyl-d14 (Surr)</i>		<i>77 %</i>		<i>50-134 %</i>		<i>1</i>	<i>02/27/23 20:14</i>	<i>EPA 8270E</i>	
<i>2-Fluorophenol (Surr)</i>		<i>36 %</i>		<i>19-120 %</i>		<i>1</i>	<i>02/27/23 20:14</i>	<i>EPA 8270E</i>	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: 23B0916		
<i>Surrogate: 2,4,6-Tribromophenol (Surr)</i>		<i>Recovery: 69 %</i>	<i>Limits: 43-140 %</i>	<i>1</i>	<i>02/27/23 20:14</i>	<i>EPA 8270E</i>		

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)				Matrix: Water		Batch: 23B0917		
Azinphos methyl (Guthion)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Chlorpyrifos	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Coumaphos	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Demeton O	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Demeton S	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Diazinon	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Dichlorvos	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Dimethoate	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Disulfoton	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
EPN	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Ethoprop	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Fensulfothion	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Fenthion	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Malathion	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Merphos	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Methyl parathion	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Monocrotophos	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Parathion, ethyl	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Phorate	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Ronnel (Fenchlorphos)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Sulfotep	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
TEPP	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
Trichloronate	ND	0.260	0.521	ug/L	1	02/28/23 11:21	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 100 %</i>		<i>Limits: 56-124 %</i>	<i>1</i>	<i>02/28/23 11:21</i>	<i>EPA 8270E OPPs</i>	
<i>Triphenyl phosphate (Surr)</i>		<i>105 %</i>		<i>58-121 %</i>	<i>1</i>	<i>02/28/23 11:21</i>	<i>EPA 8270E OPPs</i>	

MW2-20230220-GW-60 (A3B0674-02) **Matrix: Water** **Batch: 23B0917**

Azinphos methyl (Guthion)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs
---------------------------	----	-------	-------	------	---	----------------	----------------

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: 23B0917		
Chlorpyrifos	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Coumaphos	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Demeton O	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Demeton S	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Diazinon	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Dichlorvos	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Dimethoate	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Disulfoton	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
EPN	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Ethoprop	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Fensulfothion	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Fenthion	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Malathion	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Merphos	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Methyl parathion	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Mevinphos (Phosdrin)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Monocrotophos	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Naled (Dibrom)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Parathion, ethyl	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Phorate	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Ronnel (Fenchlorphos)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Sulfotep	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Sulprofos (Bolstar)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
TEPP	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Tetrachlorvinphos (Rabon)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Tokuthion (Prothiofos)	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
Trichloronate	ND	0.260	0.521	ug/L	1	02/28/23 11:57	EPA 8270E OPPs	
<i>Surrogate: Tributyl phosphate (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 56-124 %</i>		<i>1</i>	<i>02/28/23 11:57</i>	<i>EPA 8270E OPPs</i>
<i>Triphenyl phosphate (Surr)</i>		<i>102 %</i>		<i>58-121 %</i>		<i>1</i>	<i>02/28/23 11:57</i>	<i>EPA 8270E OPPs</i>

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01) Matrix: Water								
Batch: 23B0841								
Antimony	ND	0.500	1.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Arsenic	0.519	0.500	1.00	ug/L	1	02/22/23 20:28	EPA 6020B	Ja
Barium	64.9	1.00	2.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/22/23 20:28	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/22/23 20:28	EPA 6020B	
Chromium	ND	1.00	2.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Copper	ND	1.00	2.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Lead	0.122	0.110	0.200	ug/L	1	02/22/23 20:28	EPA 6020B	Ja
Manganese	55.1	0.500	1.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/22/23 20:28	EPA 6020B	
Nickel	ND	1.00	2.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Selenium	ND	0.500	1.00	ug/L	1	02/22/23 20:28	EPA 6020B	
Silver	ND	0.100	0.200	ug/L	1	02/22/23 20:28	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/22/23 20:28	EPA 6020B	
Zinc	2.21	2.00	4.00	ug/L	1	02/22/23 20:28	EPA 6020B	Ja
MW2-20230220-GW-60 (A3B0674-02) Matrix: Water								
Batch: 23B0841								
Antimony	ND	0.500	1.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Arsenic	4.59	0.500	1.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Barium	19.6	1.00	2.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Beryllium	ND	0.100	0.200	ug/L	1	02/22/23 20:33	EPA 6020B	
Cadmium	ND	0.100	0.200	ug/L	1	02/22/23 20:33	EPA 6020B	
Chromium	ND	1.00	2.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Copper	3.12	1.00	2.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Lead	0.619	0.110	0.200	ug/L	1	02/22/23 20:33	EPA 6020B	
Manganese	19.0	0.500	1.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Mercury	ND	0.0400	0.0800	ug/L	1	02/22/23 20:33	EPA 6020B	
Nickel	ND	1.00	2.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Selenium	ND	0.500	1.00	ug/L	1	02/22/23 20:33	EPA 6020B	
Silver	ND	0.100	0.200	ug/L	1	02/22/23 20:33	EPA 6020B	
Thallium	ND	0.100	0.200	ug/L	1	02/22/23 20:33	EPA 6020B	
Zinc	2.50	2.00	4.00	ug/L	1	02/22/23 20:33	EPA 6020B	Ja

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0674 - 04 21 23 1031

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
---------	---------------	-----------------	-----------------	-------	----------	---------------	-------------	-------

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)			Matrix: Water		Batch: W3B2223			
Batch: W3B2223								
2,4-D	ND	0.34	0.50	ug/l	1	03/22/23 21:12	EPA 8151A	
2,4-DB	ND	0.99	2.5	ug/l	1	03/22/23 21:12	EPA 8151A	
2,4,5-T	ND	0.14	0.25	ug/l	1	03/22/23 21:12	EPA 8151A	
2,4,5-TP (Silvex)	ND	0.14	0.25	ug/l	1	03/22/23 21:12	EPA 8151A	
3,5-Dichlorobenzoic acid	ND	0.28	1.2	ug/l	1	03/22/23 21:12	EPA 8151A	
4-Nitrophenol	ND	0.50	1.2	ug/l	1	03/22/23 21:12	EPA 8151A	
Acifluorfen	ND	0.24	0.50	ug/l	1	03/22/23 21:12	EPA 8151A	
Bentazon	ND	0.55	2.5	ug/l	1	03/22/23 21:12	EPA 8151A	
Dalapon	ND	0.16	0.50	ug/l	1	03/22/23 21:12	EPA 8151A	
Dicamba	ND	0.19	0.75	ug/l	1	03/22/23 21:12	EPA 8151A	
Dichloroprop	ND	0.24	1.0	ug/l	1	03/22/23 21:12	EPA 8151A	
Dinoseb	ND	0.090	0.50	ug/l	1	03/22/23 21:12	EPA 8151A	
DCPA	ND	0.20	0.25	ug/l	1	03/22/23 21:12	EPA 8151A	
MCPA	ND	40	100	ug/l	1	03/22/23 21:12	EPA 8151A	
MCPP	ND	27	100	ug/l	1	03/22/23 21:12	EPA 8151A	
Pentachlorophenol	ND	0.18	0.25	ug/l	1	03/22/23 21:12	EPA 8151A	
Picloram	ND	0.13	0.75	ug/l	1	03/22/23 21:12	EPA 8151A	
Batch: W3B2223								
<i>Surrogate: 2,4-DCAA</i>		<i>Recovery: 91 %</i>		<i>Limits: 56-156 %</i>		<i>1</i>	<i>03/22/23 21:12</i>	<i>EPA 8151A</i>

MW2-20230220-GW-60 (A3B0674-02)			Matrix: Water		Batch: W3B2223			
Batch: W3B2223								
2,4-D	ND	0.34	0.50	ug/l	1	03/22/23 21:43	EPA 8151A	
2,4-DB	ND	0.99	2.5	ug/l	1	03/22/23 21:43	EPA 8151A	
2,4,5-T	ND	0.14	0.25	ug/l	1	03/22/23 21:43	EPA 8151A	
2,4,5-TP (Silvex)	ND	0.14	0.25	ug/l	1	03/22/23 21:43	EPA 8151A	
3,5-Dichlorobenzoic acid	ND	0.28	1.2	ug/l	1	03/22/23 21:43	EPA 8151A	
4-Nitrophenol	ND	0.50	1.2	ug/l	1	03/22/23 21:43	EPA 8151A	
Acifluorfen	ND	0.24	0.50	ug/l	1	03/22/23 21:43	EPA 8151A	
Bentazon	ND	0.55	2.5	ug/l	1	03/22/23 21:43	EPA 8151A	
Dalapon	ND	0.16	0.50	ug/l	1	03/22/23 21:43	EPA 8151A	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Chlorinated Herbicides by GC/ECD

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: W3B2223		
Dicamba	ND	0.19	0.75	ug/l	1	03/22/23 21:43	EPA 8151A	
Dichloroprop	ND	0.24	1.0	ug/l	1	03/22/23 21:43	EPA 8151A	
Dinoseb	ND	0.090	0.50	ug/l	1	03/22/23 21:43	EPA 8151A	
DCPA	ND	0.20	0.25	ug/l	1	03/22/23 21:43	EPA 8151A	
MCPA	ND	40	100	ug/l	1	03/22/23 21:43	EPA 8151A	
MCPP	ND	27	100	ug/l	1	03/22/23 21:43	EPA 8151A	
Pentachlorophenol	ND	0.18	0.25	ug/l	1	03/22/23 21:43	EPA 8151A	
Picloram	ND	0.13	0.75	ug/l	1	03/22/23 21:43	EPA 8151A	
Batch: W3B2223								
Surrogate: 2,4-DCAA		Recovery: 91 %		Limits: 56-156 %		1	03/22/23 21:43	EPA 8151A

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Maul Foster & Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>St. Helens Lagoon</u> Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
---	--	---

Weck Laboratories, Inc.

ANALYTICAL SAMPLE RESULTS (Subcontracted)

Hexavalent Chromium by IC

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW1-20230220-GW-70 (A3B0674-01)				Matrix: Water		Batch: W3C0242		
Batch: W3C0242								
Chromium 6+	ND	0.0079	0.020	ug/l	1	03/02/23 18:52	EPA 218.6	
MW2-20230220-GW-60 (A3B0674-02)				Matrix: Water		Batch: W3C0242		
Batch: W3C0242								
Chromium 6+	ND	0.0079	0.020	ug/l	1	03/02/23 19:04	EPA 218.6	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0083 - EPA 3510C (Fuels/Acid Ext.)						Water						
Blank (23C0083-BLK1)			Prepared: 03/02/23 11:25 Analyzed: 03/02/23 20:19									
<u>NWTPH-Dx</u>												
Diesel	ND	0.100	0.200	mg/L	1	---	---	---	---	---	---	
Oil	ND	0.200	0.400	mg/L	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS (23C0083-BS1)			Prepared: 03/02/23 11:25 Analyzed: 03/02/23 20:40									
<u>NWTPH-Dx</u>												
Diesel	0.806	0.100	0.200	mg/L	1	1.25	---	64	36-132%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 86 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
LCS Dup (23C0083-BS1)			Prepared: 03/02/23 11:25 Analyzed: 03/02/23 21:00									Q-19
<u>NWTPH-Dx</u>												
Diesel	0.812	0.100	0.200	mg/L	1	1.25	---	65	36-132%	0.7	30%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 88 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	---	---	---	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>106 %</i>		<i>50-150 %</i>		<i>"</i>						
LCS (23B0828-BS2)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 10:40									
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.545	0.0500	0.100	mg/L	1	0.500	---	109	80-120%	---	---	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
<u>QC Source Sample: Non-SDG (A3B0522-02)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 99 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>105 %</i>		<i>50-150 %</i>		<i>"</i>						
Duplicate (23B0828-DUP2)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:06									
<u>QC Source Sample: MW1-20230220-GW-70 (A3B0674-01)</u>												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	0.0500	0.100	mg/L	1	---	ND	---	---	---	30%	
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>107 %</i>		<i>50-150 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47									
EPA 8260D												
Acetone	ND	10.0	20.0	ug/L	1	---	---	---	---	---	---	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Benzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	5.00	5.00	ug/L	1	---	---	---	---	---	---	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	5.00	5.00	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47									
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	10.0	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	2.00	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	

Surr: 1,4-Difluorobenzene (Surr) Recovery: 98 % Limits: 80-120 % Dilution: 1x

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Blank (23B0828-BLK1)						Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:47						
<i>Surr: Toluene-d8 (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
LCS (23B0828-BS1)						Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:02						
EPA 8260D												
Acetone	34.2	10.0	20.0	ug/L	1	40.0	---	85	80-120%	---	---	ICV-01
Acrylonitrile	16.6	1.00	2.00	ug/L	1	20.0	---	83	80-120%	---	---	
Benzene	17.8	0.100	0.200	ug/L	1	20.0	---	89	80-120%	---	---	
Bromobenzene	17.6	0.250	0.500	ug/L	1	20.0	---	88	80-120%	---	---	
Bromochloromethane	20.3	0.500	1.00	ug/L	1	20.0	---	101	80-120%	---	---	
Bromodichloromethane	21.1	0.500	1.00	ug/L	1	20.0	---	106	80-120%	---	---	
Bromoform	21.8	0.500	1.00	ug/L	1	20.0	---	109	80-120%	---	---	
Bromomethane	26.5	5.00	5.00	ug/L	1	20.0	---	132	80-120%	---	---	Q-56
2-Butanone (MEK)	32.2	5.00	10.0	ug/L	1	40.0	---	80	80-120%	---	---	ICV-01
n-Butylbenzene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
sec-Butylbenzene	19.9	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
tert-Butylbenzene	18.0	0.500	1.00	ug/L	1	20.0	---	90	80-120%	---	---	
Carbon disulfide	20.0	5.00	10.0	ug/L	1	20.0	---	100	80-120%	---	---	
Carbon tetrachloride	24.2	0.500	1.00	ug/L	1	20.0	---	121	80-120%	---	---	Q-56
Chlorobenzene	19.7	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
Chloroethane	33.8	5.00	5.00	ug/L	1	20.0	---	169	80-120%	---	---	Q-56
Chloroform	20.0	0.500	1.00	ug/L	1	20.0	---	100	80-120%	---	---	
Chloromethane	18.0	2.50	5.00	ug/L	1	20.0	---	90	80-120%	---	---	
2-Chlorotoluene	18.8	0.500	1.00	ug/L	1	20.0	---	94	80-120%	---	---	
4-Chlorotoluene	17.9	0.500	1.00	ug/L	1	20.0	---	90	80-120%	---	---	
Dibromochloromethane	21.5	0.500	1.00	ug/L	1	20.0	---	107	80-120%	---	---	
1,2-Dibromo-3-chloropropane	16.8	2.50	5.00	ug/L	1	20.0	---	84	80-120%	---	---	
1,2-Dibromoethane (EDB)	20.0	0.250	0.500	ug/L	1	20.0	---	100	80-120%	---	---	
Dibromomethane	19.8	0.500	1.00	ug/L	1	20.0	---	99	80-120%	---	---	
1,2-Dichlorobenzene	19.7	0.250	0.500	ug/L	1	20.0	---	98	80-120%	---	---	
1,3-Dichlorobenzene	18.8	0.250	0.500	ug/L	1	20.0	---	94	80-120%	---	---	
1,4-Dichlorobenzene	18.6	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
Dichlorodifluoromethane	24.4	0.500	1.00	ug/L	1	20.0	---	122	80-120%	---	---	Q-56
1,1-Dichloroethane	18.7	0.200	0.400	ug/L	1	20.0	---	93	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes sub-headers for Batch 23B0828 - EPA 5030C and Water, and a list of analytes such as 1,2-Dichloroethane (EDC) through 1,3,5-Trimethylbenzene.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
LCS (23B0828-BS1)			Prepared: 02/22/23 08:30 Analyzed: 02/22/23 11:02									
Vinyl chloride	22.3	0.200	0.400	ug/L	1	20.0	---	111	80-120%	---	---	
m,p-Xylene	40.9	0.500	1.00	ug/L	1	40.0	---	102	80-120%	---	---	
o-Xylene	18.5	0.250	0.500	ug/L	1	20.0	---	93	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>88 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23B0828-DUP1)						Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44						
QC Source Sample: Non-SDG (A3B0522-02)												
Acetone	ND	10.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
<u>QC Source Sample: Non-SDG (A3B0522-02)</u>												
1,3-Dichlorobenzene	0.370	0.250	0.500	ug/L	1	---	0.440	---	---	17	30%	Ja
1,4-Dichlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Hexanone	ND	10.0	10.0	ug/L	1	---	ND	---	---	---	30%	
Isopropylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Isopropyltoluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
4-Methyl-2-pentanone (MiBK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	2.00	2.00	ug/L	1	---	ND	---	---	---	30%	
n-Propylbenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Styrene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1,2-Tetrachloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Duplicate (23B0828-DUP1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 20:44									
QC Source Sample: Non-SDG (A3B0522-02)												
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23B0828-DUP2)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:06									
QC Source Sample: MW1-20230220-GW-70 (A3B0674-01)												
EPA 8260D												
Acetone	ND	10.0	20.0	ug/L	1	---	ND	---	---	---	30%	
Acrylonitrile	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	5.00	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	5.00	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	2.50	5.00	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: St. Helens Lagoon

Project Number: M0830.03.006

Project Manager: David Weatherby

Report ID:

A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes data for Batch 23B0828 - EPA 5030C, Water, Duplicate (23B0828-DUP2), and QC Source Sample: MW1-20230220-GW-70 (A3B0674-01).

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Duplicate (23B0828-DUP2)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:06									
QC Source Sample: MW1-20230220-GW-70 (A3B0674-01)												
1,1,2,2-Tetrachloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.200	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						

Matrix Spike (23B0828-MS1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:28									
QC Source Sample: Non-SDG (A3B0730-01)												
EPA 8260D												
Acetone	41.6	10.0	20.0	ug/L	1	40.0	ND	104	39-160%	---	---	ICV-01
Acrylonitrile	16.8	1.00	2.00	ug/L	1	20.0	ND	84	63-135%	---	---	
Benzene	19.6	0.100	0.200	ug/L	1	20.0	ND	98	79-120%	---	---	
Bromobenzene	16.9	0.250	0.500	ug/L	1	20.0	ND	85	80-120%	---	---	
Bromochloromethane	20.8	0.500	1.00	ug/L	1	20.0	ND	104	78-123%	---	---	
Bromodichloromethane	22.8	0.500	1.00	ug/L	1	20.0	ND	114	79-125%	---	---	
Bromoform	23.0	0.500	1.00	ug/L	1	20.0	ND	115	66-130%	---	---	
Bromomethane	30.9	5.00	5.00	ug/L	1	20.0	ND	155	53-141%	---	---	Q-01
2-Butanone (MEK)	34.8	5.00	10.0	ug/L	1	40.0	ND	87	56-143%	---	---	ICV-01
n-Butylbenzene	12.4	0.500	1.00	ug/L	1	20.0	ND	62	75-128%	---	---	Q-01
sec-Butylbenzene	14.0	0.500	1.00	ug/L	1	20.0	ND	70	77-126%	---	---	Q-01

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Matrix Spike (23B0828-MS1)						Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:28						
QC Source Sample: Non-SDG (A3B0730-01)												
tert-Butylbenzene	13.8	0.500	1.00	ug/L	1	20.0	ND	69	78-124%	---	---	Q-01
Carbon disulfide	22.2	5.00	10.0	ug/L	1	20.0	ND	111	64-133%	---	---	
Carbon tetrachloride	26.1	0.500	1.00	ug/L	1	20.0	ND	130	72-136%	---	---	Q-54
Chlorobenzene	19.4	0.250	0.500	ug/L	1	20.0	ND	97	80-120%	---	---	
Chloroethane	41.1	5.00	5.00	ug/L	1	20.0	ND	205	60-138%	---	---	Q-42
Chloroform	22.4	0.500	1.00	ug/L	1	20.0	0.880	107	79-124%	---	---	
Chloromethane	19.4	2.50	5.00	ug/L	1	20.0	ND	97	50-139%	---	---	
2-Chlorotoluene	16.8	0.500	1.00	ug/L	1	20.0	ND	84	79-122%	---	---	
4-Chlorotoluene	15.8	0.500	1.00	ug/L	1	20.0	ND	79	78-122%	---	---	
Dibromochloromethane	21.8	0.500	1.00	ug/L	1	20.0	ND	109	74-126%	---	---	
1,2-Dibromo-3-chloropropane	15.9	2.50	5.00	ug/L	1	20.0	ND	80	62-128%	---	---	
1,2-Dibromoethane (EDB)	19.6	0.250	0.500	ug/L	1	20.0	ND	98	77-121%	---	---	
Dibromomethane	21.4	0.500	1.00	ug/L	1	20.0	ND	107	79-123%	---	---	
1,2-Dichlorobenzene	17.7	0.250	0.500	ug/L	1	20.0	ND	88	80-120%	---	---	
1,3-Dichlorobenzene	16.9	0.250	0.500	ug/L	1	20.0	ND	84	80-120%	---	---	
1,4-Dichlorobenzene	17.0	0.250	0.500	ug/L	1	20.0	ND	85	79-120%	---	---	
Dichlorodifluoromethane	26.8	0.500	1.00	ug/L	1	20.0	ND	134	32-152%	---	---	
1,1-Dichloroethane	20.6	0.200	0.400	ug/L	1	20.0	ND	103	77-125%	---	---	
1,2-Dichloroethane (EDC)	23.4	0.200	0.400	ug/L	1	20.0	ND	117	73-128%	---	---	
1,1-Dichloroethene	23.6	0.200	0.400	ug/L	1	20.0	ND	118	71-131%	---	---	
cis-1,2-Dichloroethene	18.1	0.200	0.400	ug/L	1	20.0	ND	90	78-123%	---	---	
trans-1,2-Dichloroethene	19.0	0.200	0.400	ug/L	1	20.0	ND	95	75-124%	---	---	
1,2-Dichloropropane	18.6	0.250	0.500	ug/L	1	20.0	ND	93	78-122%	---	---	
1,3-Dichloropropane	18.9	0.500	1.00	ug/L	1	20.0	ND	95	80-120%	---	---	
2,2-Dichloropropane	20.6	0.500	1.00	ug/L	1	20.0	ND	103	60-139%	---	---	
1,1-Dichloropropene	19.9	0.500	1.00	ug/L	1	20.0	ND	100	79-125%	---	---	
cis-1,3-Dichloropropene	19.1	0.500	1.00	ug/L	1	20.0	ND	95	75-124%	---	---	
trans-1,3-Dichloropropene	21.0	0.500	1.00	ug/L	1	20.0	ND	105	73-127%	---	---	
Ethylbenzene	19.5	0.250	0.500	ug/L	1	20.0	ND	98	79-121%	---	---	
Hexachlorobutadiene	10.7	2.50	5.00	ug/L	1	20.0	ND	54	66-134%	---	---	Q-01
2-Hexanone	29.2	10.0	10.0	ug/L	1	40.0	ND	73	57-139%	---	---	
Isopropylbenzene	17.7	0.500	1.00	ug/L	1	20.0	ND	89	72-131%	---	---	
4-Isopropyltoluene	13.5	0.500	1.00	ug/L	1	20.0	ND	68	77-127%	---	---	Q-01

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0828 - EPA 5030C						Water						
Matrix Spike (23B0828-MS1)			Prepared: 02/22/23 11:21 Analyzed: 02/22/23 21:28									
QC Source Sample: Non-SDG (A3B0730-01)												
Methylene chloride	19.1	5.00	10.0	ug/L	1	20.0	ND	95	74-124%	---	---	
4-Methyl-2-pentanone (MiBK)	34.6	5.00	10.0	ug/L	1	40.0	ND	87	67-130%	---	---	
Methyl tert-butyl ether (MTBE)	17.3	0.500	1.00	ug/L	1	20.0	ND	87	71-124%	---	---	
Naphthalene	13.4	2.00	2.00	ug/L	1	20.0	ND	67	61-128%	---	---	Q-54c
n-Propylbenzene	16.3	0.250	0.500	ug/L	1	20.0	ND	82	76-126%	---	---	
Styrene	18.6	0.500	1.00	ug/L	1	20.0	ND	93	78-123%	---	---	
1,1,1,2-Tetrachloroethane	19.4	0.200	0.400	ug/L	1	20.0	ND	97	78-124%	---	---	
1,1,1,2,2-Tetrachloroethane	14.2	0.250	0.500	ug/L	1	20.0	ND	71	71-121%	---	---	
Tetrachloroethene (PCE)	19.0	0.200	0.400	ug/L	1	20.0	ND	95	74-129%	---	---	
Toluene	20.0	0.500	1.00	ug/L	1	20.0	0.500	97	80-121%	---	---	
1,2,3-Trichlorobenzene	12.6	1.00	2.00	ug/L	1	20.0	ND	63	69-129%	---	---	Q-01
1,2,4-Trichlorobenzene	10.8	1.00	2.00	ug/L	1	20.0	ND	54	69-130%	---	---	Q-01
1,1,1-Trichloroethane	23.9	0.200	0.400	ug/L	1	20.0	ND	120	74-131%	---	---	
1,1,2-Trichloroethane	19.0	0.250	0.500	ug/L	1	20.0	ND	95	80-120%	---	---	
Trichloroethene (TCE)	21.5	0.200	0.400	ug/L	1	20.0	ND	107	79-123%	---	---	
Trichlorofluoromethane	30.1	1.00	2.00	ug/L	1	20.0	ND	151	65-141%	---	---	Q-54a
1,2,3-Trichloropropane	19.1	0.500	1.00	ug/L	1	20.0	ND	95	73-122%	---	---	
1,2,4-Trimethylbenzene	18.0	0.500	1.00	ug/L	1	20.0	0.580	87	76-124%	---	---	
1,3,5-Trimethylbenzene	16.3	0.500	1.00	ug/L	1	20.0	ND	82	75-124%	---	---	
Vinyl chloride	24.1	0.200	0.400	ug/L	1	20.0	ND	121	58-137%	---	---	
m,p-Xylene	39.7	0.500	1.00	ug/L	1	40.0	0.820	97	80-121%	---	---	
o-Xylene	17.8	0.250	0.500	ug/L	1	20.0	0.280	88	78-122%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>89 %</i>		<i>80-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0033 - EPA 5030C						Water						
Blank (23C0033-BLK1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 13:58									
EPA 8260D SIM												
Benzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Toluene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
o-Xylene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (23C0033-BS1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 13:04									
EPA 8260D SIM												
Benzene	0.215	0.0500	0.100	ug/L	1	0.200	---	108	80-120%	---	---	
Toluene	0.187	0.0500	0.100	ug/L	1	0.200	---	94	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0033 - EPA 5030C						Water						
LCS (23C0033-BS1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 13:04									
Ethylbenzene	0.184	0.0500	0.100	ug/L	1	0.200	---	92	80-120%	---	---	
m,p-Xylene	0.350	0.100	0.200	ug/L	1	0.400	---	88	80-120%	---	---	
o-Xylene	0.177	0.0500	0.100	ug/L	1	0.200	---	88	80-120%	---	---	
1,2,4-Trimethylbenzene	0.171	0.0500	0.100	ug/L	1	0.200	---	86	80-120%	---	---	
1,3,5-Trimethylbenzene	0.171	0.0500	0.100	ug/L	1	0.200	---	86	80-120%	---	---	
Chloroform	0.213	0.0500	0.100	ug/L	1	0.200	---	107	80-120%	---	---	
1,2-Dibromo-3-chloropropane	0.219	0.100	0.200	ug/L	1	0.200	---	110	80-120%	---	---	
1,2-Dibromoethane (EDB)	0.186	0.0100	0.0200	ug/L	1	0.200	---	93	80-120%	---	---	
1,1-Dichloroethane	0.215	0.0100	0.0200	ug/L	1	0.200	---	107	80-120%	---	---	
1,2-Dichloroethane (EDC)	0.210	0.0100	0.0200	ug/L	1	0.200	---	105	80-120%	---	---	
1,1-Dichloroethene	0.220	0.0100	0.0200	ug/L	1	0.200	---	110	80-120%	---	---	
cis-1,2-Dichloroethene	0.214	0.0100	0.0200	ug/L	1	0.200	---	107	80-120%	---	---	
trans-1,2-Dichloroethene	0.218	0.0100	0.0200	ug/L	1	0.200	---	109	80-120%	---	---	
1,2-Dichloropropane	0.214	0.0100	0.0200	ug/L	1	0.200	---	107	80-120%	---	---	
cis-1,3-Dichloropropene	0.193	0.0100	0.0200	ug/L	1	0.200	---	97	80-120%	---	---	
trans-1,3-Dichloropropene	0.194	0.0100	0.0200	ug/L	1	0.200	---	97	80-120%	---	---	
Methyl tert-butyl ether (MTBE)	0.191	0.0100	0.0200	ug/L	1	0.200	---	96	80-120%	---	---	
1,1,2,2-Tetrachloroethane	0.252	0.0100	0.0200	ug/L	1	0.200	---	126	80-120%	---	---	Q-56
Tetrachloroethene (PCE)	0.190	0.0100	0.0200	ug/L	1	0.200	---	95	80-120%	---	---	
Trichloroethene (TCE)	0.198	0.0100	0.0200	ug/L	1	0.200	---	99	80-120%	---	---	
1,2,3-Trichloropropane	0.211	0.0500	0.100	ug/L	1	0.200	---	106	80-120%	---	---	
Vinyl chloride	0.233	0.0100	0.0200	ug/L	1	0.200	---	117	80-120%	---	---	
1,1,2-Trichloroethane	0.194	0.0100	0.0200	ug/L	1	0.200	---	97	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>"</i>						

Duplicate (23C0033-DUP1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 15:19									
QC Source Sample: MW1-20230220-GW-70 (A3B0674-01)												
EPA 8260D SIM												
Benzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0033 - EPA 5030C						Water						
Duplicate (23C0033-DUP1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 15:19									
QC Source Sample: MW1-20230220-GW-70 (A3B0674-01)												
o-Xylene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Chloroform	0.0780	0.0500	0.100	ug/L	1	---	0.0838	---	---	7	30%	Ja
1,2-Dibromo-3-chloropropane	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	0.0200	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	0.0200	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	0.0500	0.100	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	0.0100	0.0200	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						

Matrix Spike (23C0033-MS1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 16:13									
QC Source Sample: MW2-20230220-GW-60 (A3B0674-02)												
EPA 8260D SIM												
Benzene	0.446	0.0500	0.100	ug/L	1	0.200	0.176	135	79-120%	---	---	Q-01
Toluene	0.241	0.0500	0.100	ug/L	1	0.200	ND	121	80-121%	---	---	
Ethylbenzene	0.206	0.0500	0.100	ug/L	1	0.200	ND	103	79-121%	---	---	
m,p-Xylene	0.387	0.100	0.200	ug/L	1	0.400	ND	97	80-121%	---	---	
o-Xylene	0.190	0.0500	0.100	ug/L	1	0.200	ND	95	78-122%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Volatile Organic Compounds by EPA 8260D SIM

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23C0033 - EPA 5030C						Water						
Matrix Spike (23C0033-MS1)			Prepared: 03/01/23 11:36 Analyzed: 03/01/23 16:13									
QC Source Sample: MW2-20230220-GW-60 (A3B0674-02)												
1,2,4-Trimethylbenzene	0.172	0.0500	0.100	ug/L	1	0.200	ND	86	76-124%	---	---	
1,3,5-Trimethylbenzene	0.179	0.0500	0.100	ug/L	1	0.200	ND	90	75-124%	---	---	
Chloroform	0.271	0.0500	0.100	ug/L	1	0.200	ND	136	79-124%	---	---	Q-01
1,2-Dibromo-3-chloropropane	0.184	0.100	0.200	ug/L	1	0.200	ND	92	62-128%	---	---	Ja
1,2-Dibromoethane (EDB)	0.209	0.0100	0.0200	ug/L	1	0.200	ND	104	77-121%	---	---	
1,1-Dichloroethane	0.273	0.0100	0.0200	ug/L	1	0.200	ND	136	77-125%	---	---	Q-01
1,2-Dichloroethane (EDC)	0.241	0.0100	0.0200	ug/L	1	0.200	ND	121	73-128%	---	---	
1,1-Dichloroethene	0.283	0.0100	0.0200	ug/L	1	0.200	ND	134	71-131%	---	---	Q-01
cis-1,2-Dichloroethene	0.259	0.0100	0.0200	ug/L	1	0.200	ND	129	78-123%	---	---	Q-01
trans-1,2-Dichloroethene	0.267	0.0100	0.0200	ug/L	1	0.200	ND	134	75-124%	---	---	Q-01
1,2-Dichloropropane	0.256	0.0100	0.0200	ug/L	1	0.200	ND	128	78-122%	---	---	Q-01
cis-1,3-Dichloropropene	0.217	0.0100	0.0200	ug/L	1	0.200	ND	108	75-124%	---	---	
trans-1,3-Dichloropropene	0.216	0.0100	0.0200	ug/L	1	0.200	ND	108	73-127%	---	---	
Methyl tert-butyl ether (MTBE)	0.214	0.0100	0.0200	ug/L	1	0.200	ND	107	71-124%	---	---	
1,1,2,2-Tetrachloroethane	0.228	0.0100	0.0200	ug/L	1	0.200	ND	114	71-121%	---	---	Q-54b
Tetrachloroethene (PCE)	0.227	0.0100	0.0200	ug/L	1	0.200	ND	113	74-129%	---	---	
Trichloroethene (TCE)	0.241	0.0100	0.0200	ug/L	1	0.200	ND	121	79-123%	---	---	
1,2,3-Trichloropropane	0.208	0.0500	0.100	ug/L	1	0.200	ND	104	73-122%	---	---	
Vinyl chloride	0.326	0.0100	0.0200	ug/L	1	0.200	ND	163	58-137%	---	---	Q-01
1,1,2-Trichloroethane	0.212	0.0100	0.0200	ug/L	1	0.200	ND	106	80-120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0916 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0916-BLK1)			Prepared: 02/27/23 07:33 Analyzed: 02/27/23 17:55									
<u>EPA 8270E</u>												
Acenaphthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Acenaphthylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benz(a)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Benzo(a)pyrene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Chrysene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluoranthene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Fluorene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	
2-Methylnaphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	0.0200	0.0400	ug/L	1	---	---	---	---	---	---	
Phenanthrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Pyrene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Carbazole	ND	0.0150	0.0300	ug/L	1	---	---	---	---	---	---	
Dibenzofuran	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
2-Chlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloro-3-methylphenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dimethylphenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrophenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
4,6-Dinitro-2-methylphenol	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
2-Methylphenol	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
3+4-Methylphenol(s)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
4-Nitrophenol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Pentachlorophenol (PCP)	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Phenol	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
2,3,4,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0916 - EPA 3510C (Acid/Base Neutral)						Water						
Blank (23B0916-BLK1)			Prepared: 02/27/23 07:33 Analyzed: 02/27/23 17:55									
2,3,5,6-Tetrachlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,5-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
2,4,6-Trichlorophenol	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Bis(2-ethylhexyl)phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Butyl benzyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Diethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Dimethylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-butylphthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Di-n-octyl phthalate	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
N-Nitrosodimethylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitroso-di-n-propylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
N-Nitrosodiphenylamine	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethoxy) methane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Bis(2-Chloroethyl) ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2,2'-Oxybis(1-Chloropropane)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Hexachlorobenzene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
Hexachlorocyclopentadiene	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
Hexachloroethane	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
2-Chloronaphthalene	ND	0.0100	0.0200	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30
4-Bromophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
4-Chlorophenyl phenyl ether	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
Aniline	ND	0.0500	0.100	ug/L	1	---	---	---	---	---	---	
4-Chloroaniline	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	
2-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
3-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
4-Nitroaniline	ND	0.200	0.400	ug/L	1	---	---	---	---	---	---	
Nitrobenzene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,4-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
2,6-Dinitrotoluene	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Benzoic acid	ND	1.25	2.50	ug/L	1	---	---	---	---	---	---	
Benzyl alcohol	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Isophorone	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0916 - EPA 3510C (Acid/Base Neutral)						Water							
Blank (23B0916-BLK1)			Prepared: 02/27/23 07:33 Analyzed: 02/27/23 17:55										
Azobenzene (1,2-DPH)	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---		
Bis(2-Ethylhexyl) adipate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---		
3,3'-Dichlorobenzidine	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	Q-52	
1,2-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---		
1,3-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---		
1,4-Dinitrobenzene	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---		
Pyridine	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---		
1,2-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30	
1,3-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30	
1,4-Dichlorobenzene	ND	0.0250	0.0500	ug/L	1	---	---	---	---	---	---	Q-30	
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 66 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 1x</i>							Q-41
<i>2-Fluorobiphenyl (Surr)</i>		<i>48 %</i>		<i>44-120 %</i>		<i>"</i>							
<i>Phenol-d6 (Surr)</i>		<i>22 %</i>		<i>10-133 %</i>		<i>"</i>							
<i>p-Terphenyl-d14 (Surr)</i>		<i>84 %</i>		<i>50-134 %</i>		<i>"</i>							
<i>2-Fluorophenol (Surr)</i>		<i>35 %</i>		<i>19-120 %</i>		<i>"</i>							
<i>2,4,6-Tribromophenol (Surr)</i>		<i>67 %</i>		<i>43-140 %</i>		<i>"</i>							

LCS (23B0916-BS1)			Prepared: 02/27/23 07:33 Analyzed: 02/27/23 18:30									
EPA 8270E												
Acenaphthene	2.53	0.0400	0.0800	ug/L	4	4.00	---	63	47-122%	---	---	
Acenaphthylene	2.85	0.0400	0.0800	ug/L	4	4.00	---	71	41-130%	---	---	
Anthracene	3.54	0.0400	0.0800	ug/L	4	4.00	---	88	57-123%	---	---	
Benz(a)anthracene	3.80	0.0400	0.0800	ug/L	4	4.00	---	95	58-125%	---	---	
Benzo(a)pyrene	3.86	0.0600	0.120	ug/L	4	4.00	---	97	54-128%	---	---	
Benzo(b)fluoranthene	3.94	0.0600	0.120	ug/L	4	4.00	---	99	53-131%	---	---	
Benzo(k)fluoranthene	3.96	0.0600	0.120	ug/L	4	4.00	---	99	57-129%	---	---	
Benzo(g,h,i)perylene	3.63	0.0400	0.0800	ug/L	4	4.00	---	91	50-134%	---	---	
Chrysene	3.65	0.0400	0.0800	ug/L	4	4.00	---	91	59-123%	---	---	
Dibenz(a,h)anthracene	3.80	0.0400	0.0800	ug/L	4	4.00	---	95	51-134%	---	---	
Fluoranthene	3.87	0.0400	0.0800	ug/L	4	4.00	---	97	57-128%	---	---	
Fluorene	3.09	0.0400	0.0800	ug/L	4	4.00	---	77	52-124%	---	---	
Indeno(1,2,3-cd)pyrene	3.83	0.0400	0.0800	ug/L	4	4.00	---	96	52-134%	---	---	
1-Methylnaphthalene	2.00	0.0800	0.160	ug/L	4	4.00	---	50	41-120%	---	---	
2-Methylnaphthalene	2.00	0.0800	0.160	ug/L	4	4.00	---	50	40-121%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC.

3140 NE Broadway Street

Portland, OR 97232

Project: **St. Helens Lagoon**

Project Number: **M0830.03.006**

Project Manager: **David Weatherby**

Report ID:

A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0916 - EPA 3510C (Acid/Base Neutral)						Water						
LCS (23B0916-BS1)			Prepared: 02/27/23 07:33 Analyzed: 02/27/23 18:30									
Naphthalene	1.93	0.0800	0.160	ug/L	4	4.00	---	48	40-121%	---	---	
Phenanthrene	3.28	0.0400	0.0800	ug/L	4	4.00	---	82	59-120%	---	---	
Pyrene	3.82	0.0400	0.0800	ug/L	4	4.00	---	95	57-126%	---	---	
Carbazole	3.99	0.0600	0.120	ug/L	4	4.00	---	100	60-122%	---	---	
Dibenzofuran	2.88	0.0400	0.0800	ug/L	4	4.00	---	72	53-120%	---	---	
2-Chlorophenol	2.92	0.200	0.400	ug/L	4	4.00	---	73	38-120%	---	---	
4-Chloro-3-methylphenol	3.55	0.400	0.800	ug/L	4	4.00	---	89	52-120%	---	---	
2,4-Dichlorophenol	3.33	0.200	0.400	ug/L	4	4.00	---	83	47-121%	---	---	
2,4-Dimethylphenol	3.04	0.200	0.400	ug/L	4	4.00	---	76	31-124%	---	---	
2,4-Dinitrophenol	3.81	1.00	2.00	ug/L	4	4.00	---	95	23-143%	---	---	Q-41
4,6-Dinitro-2-methylphenol	3.83	1.00	2.00	ug/L	4	4.00	---	96	44-137%	---	---	Q-41
2-Methylphenol	2.76	0.100	0.200	ug/L	4	4.00	---	69	30-120%	---	---	
3+4-Methylphenol(s)	2.60	0.100	0.200	ug/L	4	4.00	---	65	29-120%	---	---	
2-Nitrophenol	3.75	0.400	0.800	ug/L	4	4.00	---	94	47-123%	---	---	
4-Nitrophenol	1.65	0.400	0.800	ug/L	4	4.00	---	41	10-120%	---	---	
Pentachlorophenol (PCP)	2.56	0.400	0.800	ug/L	4	4.00	---	64	35-138%	---	---	
Phenol	1.54	0.800	0.0800	ug/L	4	4.00	---	38	10-120%	---	---	Q-41
2,3,4,6-Tetrachlorophenol	3.27	0.200	0.400	ug/L	4	4.00	---	82	50-128%	---	---	
2,3,5,6-Tetrachlorophenol	3.21	0.200	0.400	ug/L	4	4.00	---	80	50-121%	---	---	
2,4,5-Trichlorophenol	3.60	0.200	0.400	ug/L	4	4.00	---	90	53-123%	---	---	
2,4,6-Trichlorophenol	3.38	0.200	0.400	ug/L	4	4.00	---	85	50-125%	---	---	
Bis(2-ethylhexyl)phthalate	3.97	0.800	1.60	ug/L	4	4.00	---	99	55-135%	---	---	
Butyl benzyl phthalate	4.14	0.800	1.60	ug/L	4	4.00	---	104	53-134%	---	---	
Diethylphthalate	3.79	0.800	1.60	ug/L	4	4.00	---	95	56-125%	---	---	
Dimethylphthalate	3.64	0.800	1.60	ug/L	4	4.00	---	91	45-127%	---	---	
Di-n-butylphthalate	4.34	0.800	1.60	ug/L	4	4.00	---	109	59-127%	---	---	
Di-n-octyl phthalate	4.88	0.800	1.60	ug/L	4	4.00	---	122	51-140%	---	---	
N-Nitrosodimethylamine	1.20	0.100	0.200	ug/L	4	4.00	---	30	19-120%	---	---	
N-Nitroso-di-n-propylamine	3.58	0.100	0.200	ug/L	4	4.00	---	89	49-120%	---	---	Q-41
N-Nitrosodiphenylamine	3.35	0.100	0.200	ug/L	4	4.00	---	84	51-123%	---	---	
Bis(2-Chloroethoxy) methane	3.33	0.100	0.200	ug/L	4	4.00	---	83	48-120%	---	---	
Bis(2-Chloroethyl) ether	3.07	0.100	0.200	ug/L	4	4.00	---	77	43-120%	---	---	
2,2'-Oxybis(1-Chloropropane)	2.76	0.100	0.200	ug/L	4	4.00	---	69	41-120%	---	---	
Hexachlorobenzene	2.72	0.0400	0.0800	ug/L	4	4.00	---	68	53-125%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street

Tigard, OR 97223

503-718-2323

ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes	
Batch 23B0916 - EPA 3510C (Acid/Base Neutral)						Water							
LCS (23B0916-BS1)			Prepared: 02/27/23 07:33 Analyzed: 02/27/23 18:30										
Hexachlorobutadiene	0.875	0.100	0.200	ug/L	4	4.00	---	22	22-124%	---	---		
Hexachlorocyclopentadiene	0.818	0.200	0.400	ug/L	4	4.00	---	20	10-127%	---	---		
Hexachloroethane	0.970	0.100	0.200	ug/L	4	4.00	---	24	21-120%	---	---		
2-Chloronaphthalene	2.22	0.0400	0.0800	ug/L	4	4.00	---	56	40-120%	---	---		
1,2,4-Trichlorobenzene	1.36	0.100	0.200	ug/L	4	4.00	---	34	29-120%	---	---		
4-Bromophenyl phenyl ether	2.86	0.100	0.200	ug/L	4	4.00	---	72	55-124%	---	---		
4-Chlorophenyl phenyl ether	2.76	0.100	0.200	ug/L	4	4.00	---	69	53-121%	---	---		
Aniline	2.51	0.200	0.400	ug/L	4	4.00	---	63	10-120%	---	---		
4-Chloroaniline	3.17	0.100	0.200	ug/L	4	4.00	---	79	33-120%	---	---	Q-41	
2-Nitroaniline	4.04	0.800	1.60	ug/L	4	4.00	---	101	55-127%	---	---		
3-Nitroaniline	3.79	0.800	1.60	ug/L	4	4.00	---	95	41-128%	---	---		
4-Nitroaniline	3.77	0.800	1.60	ug/L	4	4.00	---	94	25-120%	---	---		
Nitrobenzene	3.30	0.400	0.800	ug/L	4	4.00	---	83	45-121%	---	---		
2,4-Dinitrotoluene	3.75	0.400	0.800	ug/L	4	4.00	---	94	57-128%	---	---		
2,6-Dinitrotoluene	3.41	0.400	0.800	ug/L	4	4.00	---	85	57-124%	---	---		
Benzoic acid	5.37	5.00	5.00	ug/L	4	8.00	---	67	10-120%	---	---		
Benzyl alcohol	2.67	0.400	0.800	ug/L	4	4.00	---	67	31-120%	---	---		
Isophorone	3.35	0.100	0.200	ug/L	4	4.00	---	84	42-124%	---	---		
Azobenzene (1,2-DPH)	3.40	0.100	0.200	ug/L	4	4.00	---	85	61-120%	---	---		
Bis(2-Ethylhexyl) adipate	4.27	1.00	2.00	ug/L	4	4.00	---	107	63-121%	---	---		
3,3'-Dichlorobenzidine	15.0	2.00	4.00	ug/L	4	8.00	---	187	27-129%	---	---	Q-29, Q-52	
1,2-Dinitrobenzene	3.62	1.00	2.00	ug/L	4	4.00	---	91	59-120%	---	---		
1,3-Dinitrobenzene	3.66	1.00	2.00	ug/L	4	4.00	---	92	49-128%	---	---		
1,4-Dinitrobenzene	3.88	1.00	2.00	ug/L	4	4.00	---	97	54-120%	---	---		
Pyridine	1.48	0.400	0.800	ug/L	4	4.00	---	37	10-120%	---	---		
1,2-Dichlorobenzene	1.27	0.100	0.200	ug/L	4	4.00	---	32	32-120%	---	---		
1,3-Dichlorobenzene	1.15	0.100	0.200	ug/L	4	4.00	---	29	28-120%	---	---		
1,4-Dichlorobenzene	1.19	0.100	0.200	ug/L	4	4.00	---	30	29-120%	---	---		
<i>Surr: Nitrobenzene-d5 (Surr)</i>		<i>Recovery: 87 %</i>		<i>Limits: 44-120 %</i>		<i>Dilution: 4x</i>							Q-41
<i>2-Fluorobiphenyl (Surr)</i>		<i>68 %</i>		<i>44-120 %</i>		<i>"</i>							
<i>Phenol-d6 (Surr)</i>		<i>30 %</i>		<i>10-133 %</i>		<i>"</i>							
<i>p-Terphenyl-d14 (Surr)</i>		<i>96 %</i>		<i>50-134 %</i>		<i>"</i>							
<i>2-Fluorophenol (Surr)</i>		<i>29 %</i>		<i>19-120 %</i>		<i>"</i>							
<i>2,4,6-Tribromophenol (Surr)</i>		<i>81 %</i>		<i>43-140 %</i>		<i>"</i>							

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with client information: Maul Foster & Alongi, INC., 3140 NE Broadway Street, Portland, OR 97232; Project: St. Helens Lagoon; Project Number: M0830.03.006; Project Manager: David Weatherby; Report ID: A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Main data table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes sub-sections for Batch 23B0916 - EPA 3510C (Acid/Base Neutral) Water and LCS Dup (23B0916-BSD1) Prepared: 02/27/23 07:33 Analyzed: 02/27/23 19:05.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Handwritten signature of Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232
Project: St. Helens Lagoon
Project Number: M0830.03.006
Project Manager: David Weatherby
Report ID: A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Table with columns: Analyte, Result, Detection Limit, Reporting Limit, Units, Dilution, Spike Amount, Source Result, % REC, % REC Limits, RPD, RPD Limit, Notes. Includes sub-headers for Batch 23B0916 - EPA 3510C (Acid/Base Neutral) and Water. Lists various chemical compounds and their corresponding results and limits.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg (handwritten signature)

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270E

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0916 - EPA 3510C (Acid/Base Neutral)						Water						
LCS Dup (23B0916-BSD1)						Prepared: 02/27/23 07:33 Analyzed: 02/27/23 19:05						Q-19
Azobenzene (1,2-DPH)	3.24	0.100	0.200	ug/L	4	4.00	---	81	61-120%	5	30%	
Bis(2-Ethylhexyl) adipate	4.11	1.00	2.00	ug/L	4	4.00	---	103	63-121%	4	30%	
3,3'-Dichlorobenzidine	15.0	2.00	4.00	ug/L	4	8.00	---	188	27-129%	0.3	30%	Q-52, Q-29
1,2-Dinitrobenzene	3.53	1.00	2.00	ug/L	4	4.00	---	88	59-120%	3	30%	
1,3-Dinitrobenzene	3.57	1.00	2.00	ug/L	4	4.00	---	89	49-128%	3	30%	
1,4-Dinitrobenzene	3.79	1.00	2.00	ug/L	4	4.00	---	95	54-120%	2	30%	
Pyridine	2.24	0.400	0.800	ug/L	4	4.00	---	56	10-120%	41	30%	Q-24
1,2-Dichlorobenzene	1.04	0.100	0.200	ug/L	4	4.00	---	26	32-120%	20	30%	Q-30
1,3-Dichlorobenzene	0.893	0.100	0.200	ug/L	4	4.00	---	22	28-120%	25	30%	Q-30
1,4-Dichlorobenzene	0.949	0.100	0.200	ug/L	4	4.00	---	24	29-120%	22	30%	Q-30
<i>Surr: Nitrobenzene-d5 (Surr) Recovery: 84 % Limits: 44-120 % Dilution: 4x Q-41</i>												
<i>2-Fluorobiphenyl (Surr) 68 % 44-120 % "</i>												
<i>Phenol-d6 (Surr) 32 % 10-133 % "</i>												
<i>p-Terphenyl-d14 (Surr) 93 % 50-134 % "</i>												
<i>2-Fluorophenol (Surr) 48 % 19-120 % "</i>												
<i>2,4,6-Tribromophenol (Surr) 76 % 43-140 % "</i>												

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0917 - EPA 3510C (Neutral pH)						Water						
Blank (23B0917-BLK1)			Prepared: 02/27/23 07:35 Analyzed: 02/28/23 09:35									
EPA 8270E OPPs												
Azinphos methyl (Guthion)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Chlorpyrifos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Coumaphos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Demeton O	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Demeton S	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Diazinon	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorvos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Dimethoate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Disulfoton	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
EPN	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Ethoprop	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Fensulfothion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Fenthion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Malathion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Merphos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Methyl parathion	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Mevinphos (Phosdrin)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Monocrotophos	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Naled (Dibrom)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Parathion, ethyl	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Phorate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Ronnel (Fenchlorphos)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Sulfotep	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Sulprofos (Bolstar)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
TEPP	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachlorvinphos (Rabon)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Tokuthion (Prothiofos)	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Trichloronate	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 85 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 1x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>92 %</i>		<i>58-121 %</i>		<i>"</i>						

LCS (23B0917-BS1)	Prepared: 02/27/23 07:35 Analyzed: 02/28/23 10:10
--------------------------	---

EPA 8270E OPPs

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0917 - EPA 3510C (Neutral pH)						Water						
LCS (23B0917-BS1)			Prepared: 02/27/23 07:35 Analyzed: 02/28/23 10:10									
Azinphos methyl (Guthion)	4.06	0.500	1.00	ug/L	2	4.00	---	102	43-135%	---	---	
Chlorpyrifos	2.85	0.500	1.00	ug/L	2	4.00	---	71	47-133%	---	---	
Coumaphos	3.74	0.500	1.00	ug/L	2	4.00	---	93	45-135%	---	---	
Demeton O	1.38	0.500	1.00	ug/L	2	1.84	---	75	10-125%	---	---	
Demeton S	1.47	0.500	1.00	ug/L	2	1.94	---	76	21-162%	---	---	
Diazinon	3.71	0.500	1.00	ug/L	2	4.00	---	93	43-129%	---	---	
Dichlorvos	3.86	0.500	1.00	ug/L	2	4.00	---	97	39-138%	---	---	
Dimethoate	3.23	0.500	1.00	ug/L	2	4.00	---	81	26-125%	---	---	
Disulfoton	3.39	0.500	1.00	ug/L	2	4.00	---	85	36-134%	---	---	
EPN	3.71	0.500	1.00	ug/L	2	4.00	---	93	47-133%	---	---	
Ethoprop	3.65	0.500	1.00	ug/L	2	4.00	---	91	52-125%	---	---	
Fensulfothion	4.16	0.500	1.00	ug/L	2	4.00	---	104	15-141%	---	---	
Fenthion	3.39	0.500	1.00	ug/L	2	4.00	---	85	42-137%	---	---	
Malathion	3.17	0.500	1.00	ug/L	2	4.00	---	79	44-132%	---	---	
Merphos	3.80	0.500	1.00	ug/L	2	4.00	---	95	26-133%	---	---	
Methyl parathion	3.92	0.500	1.00	ug/L	2	4.00	---	98	49-134%	---	---	
Mevinphos (Phosdrin)	3.73	0.500	1.00	ug/L	2	4.00	---	93	10-196%	---	---	
Monocrotophos	0.937	0.500	0.500	ug/L	2	4.00	---	23	10-159%	---	---	
Naled (Dibrom)	3.78	0.500	1.00	ug/L	2	4.00	---	95	10-146%	---	---	
Parathion, ethyl	3.68	0.500	1.00	ug/L	2	4.00	---	92	52-134%	---	---	
Phorate	3.75	0.500	1.00	ug/L	2	4.00	---	94	23-139%	---	---	Q-41
Ronnel (Fenchlorphos)	3.10	0.500	1.00	ug/L	2	4.00	---	77	42-133%	---	---	
Sulfotep	3.24	0.500	1.00	ug/L	2	4.00	---	81	47-126%	---	---	
Sulprofos (Bolstar)	2.73	0.500	1.00	ug/L	2	4.00	---	68	47-135%	---	---	
TEPP	3.61	0.500	1.00	ug/L	2	4.00	---	90	10-208%	---	---	
Tetrachlorvinphos (Rabon)	4.00	0.500	1.00	ug/L	2	4.00	---	100	42-125%	---	---	
Tokuthion (Prothiofos)	2.96	0.500	1.00	ug/L	2	4.00	---	74	43-132%	---	---	
Trichloronate	2.70	0.500	1.00	ug/L	2	4.00	---	68	28-137%	---	---	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 84 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 2x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>94 %</i>		<i>58-121 %</i>		<i>"</i>						

LCS Dup (23B0917-BSD1)			Prepared: 02/27/23 07:35 Analyzed: 02/28/23 10:46									Q-19
EPA 8270E OPPs												
Azinphos methyl (Guthion)	4.44	0.500	1.00	ug/L	2	4.00	---	111	43-135%	9	30%	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0917 - EPA 3510C (Neutral pH)						Water						
LCS Dup (23B0917-BSD1)						Prepared: 02/27/23 07:35 Analyzed: 02/28/23 10:46						Q-19
Chlorpyrifos	3.33	0.500	1.00	ug/L	2	4.00	---	83	47-133%	15	30%	
Coumaphos	4.14	0.500	1.00	ug/L	2	4.00	---	104	45-135%	10	30%	
Demeton O	1.66	0.500	1.00	ug/L	2	1.84	---	90	10-125%	18	30%	
Demeton S	1.62	0.500	1.00	ug/L	2	1.94	---	83	21-162%	10	30%	
Diazinon	4.07	0.500	1.00	ug/L	2	4.00	---	102	43-129%	9	30%	
Dichlorvos	4.19	0.500	1.00	ug/L	2	4.00	---	105	39-138%	8	30%	
Dimethoate	3.56	0.500	1.00	ug/L	2	4.00	---	89	26-125%	10	30%	
Disulfoton	3.78	0.500	1.00	ug/L	2	4.00	---	94	36-134%	11	30%	
EPN	4.30	0.500	1.00	ug/L	2	4.00	---	108	47-133%	15	30%	
Ethoprop	4.05	0.500	1.00	ug/L	2	4.00	---	101	52-125%	10	30%	
Fensulfothion	4.74	0.500	1.00	ug/L	2	4.00	---	119	15-141%	13	30%	
Fenthion	3.72	0.500	1.00	ug/L	2	4.00	---	93	42-137%	9	30%	
Malathion	3.52	0.500	1.00	ug/L	2	4.00	---	88	44-132%	10	30%	
Merphos	4.35	0.500	1.00	ug/L	2	4.00	---	109	26-133%	14	30%	
Methyl parathion	4.31	0.500	1.00	ug/L	2	4.00	---	108	49-134%	9	30%	
Mevinphos (Phosdrin)	4.12	0.500	1.00	ug/L	2	4.00	---	103	10-196%	10	30%	
Monocrotophos	1.11	0.500	1.00	ug/L	2	4.00	---	28	10-159%	17	30%	
Naled (Dibrom)	4.34	0.500	1.00	ug/L	2	4.00	---	109	10-146%	14	30%	
Parathion, ethyl	4.07	0.500	1.00	ug/L	2	4.00	---	102	52-134%	10	30%	
Phorate	4.24	0.500	1.00	ug/L	2	4.00	---	106	23-139%	12	30%	Q-41
Ronnel (Fenchlorphos)	3.45	0.500	1.00	ug/L	2	4.00	---	86	42-133%	11	30%	
Sulfotep	3.68	0.500	1.00	ug/L	2	4.00	---	92	47-126%	13	30%	
Sulprofos (Bolstar)	3.20	0.500	1.00	ug/L	2	4.00	---	80	47-135%	16	30%	
TEPP	4.25	0.500	1.00	ug/L	2	4.00	---	106	10-208%	16	30%	
Tetrachlorvinphos (Rabon)	4.45	0.500	1.00	ug/L	2	4.00	---	111	42-125%	11	30%	
Tokuthion (Prothiofos)	3.56	0.500	1.00	ug/L	2	4.00	---	89	43-132%	18	30%	
Trichloronate	3.18	0.500	1.00	ug/L	2	4.00	---	80	28-137%	16	30%	
<i>Surr: Tributyl phosphate (Surr)</i>		<i>Recovery: 93 %</i>		<i>Limits: 56-124 %</i>		<i>Dilution: 2x</i>						
<i>Triphenyl phosphate (Surr)</i>		<i>96 %</i>		<i>58-121 %</i>		<i>"</i>						

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0841 - EPA 3015A												
Water												
Blank (23B0841-BLK1)												
						Prepared: 02/22/23 10:27 Analyzed: 02/22/23 19:09						
EPA 6020B												
Antimony	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Arsenic	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Barium	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Beryllium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Cadmium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Chromium	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Copper	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Lead	ND	0.110	0.200	ug/L	1	---	---	---	---	---	---	
Manganese	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Mercury	ND	0.0400	0.0800	ug/L	1	---	---	---	---	---	---	
Nickel	ND	1.00	2.00	ug/L	1	---	---	---	---	---	---	
Selenium	ND	0.500	1.00	ug/L	1	---	---	---	---	---	---	
Silver	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Thallium	ND	0.100	0.200	ug/L	1	---	---	---	---	---	---	
Zinc	ND	2.00	4.00	ug/L	1	---	---	---	---	---	---	

LCS (23B0841-BS1)												
						Prepared: 02/22/23 10:27 Analyzed: 02/22/23 19:25						
EPA 6020B												
Antimony	27.2	0.500	1.00	ug/L	1	27.8	---	98	80-120%	---	---	
Arsenic	53.0	0.500	1.00	ug/L	1	55.6	---	95	80-120%	---	---	
Barium	58.5	1.00	2.00	ug/L	1	55.6	---	105	80-120%	---	---	
Beryllium	28.2	0.100	0.200	ug/L	1	27.8	---	101	80-120%	---	---	
Cadmium	52.9	0.100	0.200	ug/L	1	55.6	---	95	80-120%	---	---	
Chromium	55.2	1.00	2.00	ug/L	1	55.6	---	99	80-120%	---	---	
Copper	54.1	1.00	2.00	ug/L	1	55.6	---	97	80-120%	---	---	
Lead	53.2	0.110	0.200	ug/L	1	55.6	---	96	80-120%	---	---	
Manganese	54.8	0.500	1.00	ug/L	1	55.6	---	99	80-120%	---	---	
Mercury	1.03	0.0400	0.0800	ug/L	1	1.11	---	93	80-120%	---	---	
Nickel	56.0	1.00	2.00	ug/L	1	55.6	---	101	80-120%	---	---	
Selenium	27.4	0.500	1.00	ug/L	1	27.8	---	99	80-120%	---	---	
Silver	27.3	0.100	0.200	ug/L	1	27.8	---	98	80-120%	---	---	
Thallium	26.9	0.100	0.200	ug/L	1	27.8	---	97	80-120%	---	---	
Zinc	55.2	2.00	4.00	ug/L	1	55.6	---	99	80-120%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0841 - EPA 3015A												
Water												
<hr/>												
Duplicate (23B0841-DUP1)			Prepared: 02/22/23 10:27 Analyzed: 02/22/23 19:36									
<u>QC Source Sample: Non-SDG (A3B0520-02)</u>												
Antimony	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	20%	
Barium	49.5	1.00	2.00	ug/L	1	---	48.4	---	---	2	20%	
Beryllium	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
Cadmium	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
Lead	0.427	0.110	0.200	ug/L	1	---	0.426	---	---	0.3	20%	
Mercury	ND	0.0400	0.0800	ug/L	1	---	ND	---	---	---	20%	
Selenium	ND	0.500	1.00	ug/L	1	---	ND	---	---	---	20%	
Silver	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
Thallium	ND	0.100	0.200	ug/L	1	---	ND	---	---	---	20%	
<hr/>												
Duplicate (23B0841-DUP2)			Prepared: 02/22/23 10:27 Analyzed: 02/25/23 21:03									
<u>QC Source Sample: Non-SDG (A3B0520-02)</u>												
Arsenic	8.96	0.500	1.00	ug/L	1	---	8.42	---	---	6	20%	Q-16
Chromium	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	20%	Q-16
Copper	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	20%	Q-16
Nickel	ND	1.00	2.00	ug/L	1	---	ND	---	---	---	20%	Q-16
Zinc	16.0	2.00	4.00	ug/L	1	---	15.3	---	---	5	20%	Q-16
<hr/>												
Duplicate (23B0841-DUP3)			Prepared: 02/22/23 10:27 Analyzed: 02/25/23 21:14									
<u>QC Source Sample: Non-SDG (A3B0520-02RE1)</u>												
Manganese	4690	25.0	50.0	ug/L	50	---	4450	---	---	5	20%	Q-16
<hr/>												
Matrix Spike (23B0841-MS1)			Prepared: 02/22/23 10:27 Analyzed: 02/22/23 19:41									
<u>QC Source Sample: Non-SDG (A3B0520-02)</u>												
<u>EPA 6020B</u>												
Antimony	27.4	0.500	1.00	ug/L	1	27.8	ND	99	75-125%	---	---	
Arsenic	62.5	0.500	1.00	ug/L	1	55.6	8.42	97	75-125%	---	---	
Barium	107	1.00	2.00	ug/L	1	55.6	48.4	106	75-125%	---	---	
Beryllium	27.5	0.100	0.200	ug/L	1	27.8	ND	99	75-125%	---	---	
Cadmium	52.6	0.100	0.200	ug/L	1	55.6	ND	95	75-125%	---	---	
Chromium	56.1	1.00	2.00	ug/L	1	55.6	ND	101	75-125%	---	---	

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 23B0841 - EPA 3015A						Water						
Matrix Spike (23B0841-MS1)						Prepared: 02/22/23 10:27 Analyzed: 02/22/23 19:41						
QC Source Sample: Non-SDG (A3B0520-02)												
Copper	54.6	1.00	2.00	ug/L	1	55.6	ND	98	75-125%	---	---	
Lead	51.3	0.110	0.200	ug/L	1	55.6	0.426	92	75-125%	---	---	
Manganese	4750	0.500	1.00	ug/L	1	55.6	4430	578	75-125%	---	---	E, Q-65
Mercury	1.01	0.0400	0.0800	ug/L	1	1.11	ND	91	75-125%	---	---	
Nickel	55.6	1.00	2.00	ug/L	1	55.6	ND	100	75-125%	---	---	
Selenium	27.4	0.500	1.00	ug/L	1	27.8	ND	99	75-125%	---	---	
Silver	27.2	0.100	0.200	ug/L	1	27.8	ND	98	75-125%	---	---	
Thallium	25.3	0.100	0.200	ug/L	1	27.8	ND	91	75-125%	---	---	
Zinc	70.9	2.00	4.00	ug/L	1	55.6	15.3	100	75-125%	---	---	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC.	Project: St. Helens Lagoon	
3140 NE Broadway Street	Project Number: M0830.03.006	Report ID:
Portland, OR 97232	Project Manager: David Weatherby	A3B0674 - 04 21 23 1031

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B2223 - EPA 3510C						Water						
Blank (W3B2223-BLK1)						Prepared: 02/27/23 16:15 Analyzed: 03/22/23 19:38						
EPA 8151A												
2,4-D	ND	0.34	0.50	ug/l	1	---	---	---	---	---	---	---
2,4-DB	ND	0.99	2.5	ug/l	1	---	---	---	---	---	---	---
2,4,5-T	ND	0.14	0.25	ug/l	1	---	---	---	---	---	---	---
2,4,5-TP (Silvex)	ND	0.14	0.25	ug/l	1	---	---	---	---	---	---	---
3,5-Dichlorobenzoic acid	ND	0.28	1.2	ug/l	1	---	---	---	---	---	---	---
4-Nitrophenol	ND	0.50	1.2	ug/l	1	---	---	---	---	---	---	---
Acifluorfen	ND	0.24	0.50	ug/l	1	---	---	---	---	---	---	---
Bentazon	ND	0.55	2.5	ug/l	1	---	---	---	---	---	---	---
Dalapon	ND	0.16	0.50	ug/l	1	---	---	---	---	---	---	---
Dicamba	ND	0.19	0.75	ug/l	1	---	---	---	---	---	---	---
Dichloroprop	ND	0.24	1.0	ug/l	1	---	---	---	---	---	---	---
Dinoseb	ND	0.090	0.50	ug/l	1	---	---	---	---	---	---	---
DCPA	ND	0.20	0.25	ug/l	1	---	---	---	---	---	---	---
MCPA	ND	40	100	ug/l	1	---	---	---	---	---	---	---
MCPP	ND	27	100	ug/l	1	---	---	---	---	---	---	---
Pentachlorophenol	ND	0.18	0.25	ug/l	1	---	---	---	---	---	---	---
Picloram	ND	0.13	0.75	ug/l	1	---	---	---	---	---	---	---
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 74 %</i>		<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>						

LCS (W3B2223-BS1)						Prepared: 02/27/23 16:15 Analyzed: 03/22/23 20:10						
EPA 8151A												
2,4-D	2.71	0.34	0.50	ug/l	1	3.00	---	90	56-164%	---	---	---
2,4-DB	3.74	0.99	2.5	ug/l	1	6.00	---	62	27-161%	---	---	---
2,4,5-T	1.52	0.14	0.25	ug/l	1	1.50	---	102	39-151%	---	---	---
2,4,5-TP (Silvex)	1.36	0.14	0.25	ug/l	1	1.50	---	91	46-142%	---	---	---
3,5-Dichlorobenzoic acid	2.72	0.28	1.2	ug/l	1	3.00	---	91	54-154%	---	---	---
4-Nitrophenol	2.34	0.50	1.2	ug/l	1	6.00	---	39	3-105%	---	---	---
Acifluorfen	1.74	0.24	0.50	ug/l	1	1.50	---	116	39-134%	---	---	---
Bentazon	5.61	0.55	2.5	ug/l	1	6.00	---	94	44-139%	---	---	---
Dalapon	2.48	0.16	0.50	ug/l	1	3.00	---	83	40-139%	---	---	---
Dicamba	2.69	0.19	0.75	ug/l	1	3.00	---	90	46-140%	---	---	---

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Chlorinated Herbicides by GC/ECD

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3B2223 - EPA 3510C						Water						
LCS (W3B2223-BS1)						Prepared: 02/27/23 16:15 Analyzed: 03/22/23 20:10						
Dichloroprop	2.73	0.24	1.0	ug/l	1	3.00	---	91	43-158%	---	---	
Dinoseb	1.28	0.090	0.50	ug/l	1	1.50	---	85	42-146%	---	---	
DCPA	1.55	0.20	0.25	ug/l	1	1.50	---	103	34-135%	---	---	
MCPA	260	40	100	ug/l	1	300	---	87	28-144%	---	---	
MCPP	219	27	100	ug/l	1	300	---	73	31-153%	---	---	
Pentachlorophenol	1.30	0.18	0.25	ug/l	1	1.50	---	86	37-136%	---	---	
Picloram	1.30	0.13	0.75	ug/l	1	1.50	---	87	35-138%	---	---	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 92 %</i>			<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>					

LCS Dup (W3B2223-BS1)						Prepared: 02/27/23 16:15 Analyzed: 03/22/23 20:41						
EPA 8151A												
2,4-D	2.64	0.34	0.50	ug/l	1	3.00	---	88	56-164%	3	25%	
2,4-DB	4.49	0.99	2.5	ug/l	1	6.00	---	75	27-161%	18	25%	
2,4,5-T	1.48	0.14	0.25	ug/l	1	1.50	---	99	39-151%	3	25%	
2,4,5-TP (Silvex)	1.32	0.14	0.25	ug/l	1	1.50	---	88	46-142%	4	25%	
3,5-Dichlorobenzoic acid	2.65	0.28	1.2	ug/l	1	3.00	---	88	54-154%	3	25%	
4-Nitrophenol	2.93	0.50	1.2	ug/l	1	6.00	---	49	3-105%	22	25%	
Acifluorfen	1.69	0.24	0.50	ug/l	1	1.50	---	112	39-134%	3	25%	
Bentazon	5.53	0.55	2.5	ug/l	1	6.00	---	92	44-139%	2	25%	
Dalapon	2.50	0.16	0.50	ug/l	1	3.00	---	83	40-139%	0.7	25%	
Dicamba	2.59	0.19	0.75	ug/l	1	3.00	---	86	46-140%	3	25%	
Dichloroprop	2.64	0.24	1.0	ug/l	1	3.00	---	88	43-158%	3	25%	
Dinoseb	1.16	0.090	0.50	ug/l	1	1.50	---	77	42-146%	10	25%	
DCPA	1.51	0.20	0.25	ug/l	1	1.50	---	101	34-135%	2	25%	
MCPA	218	40	100	ug/l	1	300	---	73	28-144%	18	25%	
MCPP	210	27	100	ug/l	1	300	---	70	31-153%	4	25%	
Pentachlorophenol	1.18	0.18	0.25	ug/l	1	1.50	---	79	37-136%	9	25%	
Picloram	1.31	0.13	0.75	ug/l	1	1.50	---	88	35-138%	0.7	25%	
<i>Surr: 2,4-DCAA</i>		<i>Recovery: 93 %</i>			<i>Limits: 56-156 %</i>		<i>Dilution: 1x</i>					

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

Weck Laboratories, Inc.

QUALITY CONTROL (QC) SAMPLE RESULTS

Hexavalent Chromium by IC

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch W3C0242 - _NONE (LC)						Water						
Blank (W3C0242-BLK1)						Prepared: 03/02/23 00:00 Analyzed: 03/02/23 11:51						
<u>EPA 218.6</u>												
Chromium 6+	ND	0.0079	0.020	ug/l	1	---	---	---	---	---	---	
LCS (W3C0242-BS1)						Prepared: 03/02/23 00:00 Analyzed: 03/02/23 12:03						
<u>EPA 218.6</u>												
Chromium 6+	5.22	0.0079	0.020	ug/l	1	5.00	---	104	90-110%	---	---	
Matrix Spike (W3C0242-MS1)						Prepared: 03/02/23 00:00 Analyzed: 03/02/23 16:43						
<u>QC Source Sample: Non-SDG (3A19163-03)</u>												
<u>EPA 218.6</u>												
Chromium 6+	5.27	0.0079	0.020	ug/l	1	5.00	0.100	103	88-112%	---	---	
Matrix Spike (W3C0242-MS2)						Prepared: 03/02/23 00:00 Analyzed: 03/02/23 17:06						
<u>QC Source Sample: Non-SDG (3A19163-04)</u>												
<u>EPA 218.6</u>												
Chromium 6+	5.16	0.0079	0.020	ug/l	1	5.00	0.146	100	88-112%	---	---	
Matrix Spike Dup (W3C0242-MSD1)						Prepared: 03/02/23 00:00 Analyzed: 03/02/23 16:55						
<u>QC Source Sample: Non-SDG (3A19163-03)</u>												
Chromium 6+	5.22	0.0079	0.020	ug/l	1	5.00	0.100	102	88-112%	0.8	10%	
Matrix Spike Dup (W3C0242-MSD2)						Prepared: 03/02/23 00:00 Analyzed: 03/02/23 17:18						
<u>QC Source Sample: Non-SDG (3A19163-04)</u>												
Chromium 6+	5.29	0.0079	0.020	ug/l	1	5.00	0.146	103	88-112%	2	10%	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23C0083</u>							
A3B0674-01	Water	NWTPH-Dx	02/20/23 10:26	03/02/23 11:25	1020mL/5mL	1000mL/5mL	0.98
A3B0674-02	Water	NWTPH-Dx	02/20/23 14:41	03/02/23 11:25	900mL/5mL	1000mL/5mL	1.11

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0828</u>							
A3B0674-01	Water	NWTPH-Gx (MS)	02/20/23 10:26	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0674-02	Water	NWTPH-Gx (MS)	02/20/23 14:41	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00

Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0828</u>							
A3B0674-01	Water	EPA 8260D	02/20/23 10:26	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0674-02	Water	EPA 8260D	02/20/23 14:41	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00
A3B0674-03	Water	EPA 8260D	02/20/23 00:00	02/22/23 11:21	5mL/5mL	5mL/5mL	1.00

Volatile Organic Compounds by EPA 8260D SIM

Prep: EPA 5030C

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23C0033</u>							
A3B0674-01	Water	EPA 8260D SIM	02/20/23 10:26	03/01/23 11:36	5mL/5mL	5mL/5mL	1.00
A3B0674-02	Water	EPA 8260D SIM	02/20/23 14:41	03/01/23 11:36	5mL/5mL	5mL/5mL	1.00
A3B0674-03	Water	EPA 8260D SIM	02/20/23 00:00	03/01/23 11:36	5mL/5mL	5mL/5mL	1.00

Semivolatile Organic Compounds by EPA 8270E

Prep: EPA 3510C (Acid/Base Neutral)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 23B0916</u>							
A3B0674-01	Water	EPA 8270E	02/20/23 10:26	02/27/23 07:33	990mL/1mL	1000mL/1mL	1.01
A3B0674-02	Water	EPA 8270E	02/20/23 14:41	02/27/23 07:33	940mL/1mL	1000mL/1mL	1.06

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

SAMPLE PREPARATION INFORMATION

Semivolatile Organic Compounds by EPA 8270E

Prep: EPA 3510C (Acid/Base Neutral)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
------------	--------	--------	---------	----------	----------------------	-----------------------	----------------

Organophosphorus Pesticides (OPPs) by EPA 8270E (GC/MS)

Prep: EPA 3510C (Neutral pH)

Batch: 23B0917

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A3B0674-01	Water	EPA 8270E OPPs	02/20/23 10:26	02/27/23 07:35	960mL/2mL	1000mL/2mL	1.04
A3B0674-02	Water	EPA 8270E OPPs	02/20/23 14:41	02/27/23 07:35	960mL/2mL	1000mL/2mL	1.04

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3015A

Batch: 23B0841

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A3B0674-01	Water	EPA 6020B	02/20/23 10:26	02/22/23 10:27	45mL/50mL	45mL/50mL	1.00
A3B0674-02	Water	EPA 6020B	02/20/23 14:41	02/22/23 10:27	45mL/50mL	45mL/50mL	1.00

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

Weck Laboratories, Inc.

SAMPLE PREPARATION INFORMATION

Chlorinated Herbicides by GC/ECD

Prep: EPA 3510C						Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
Batch: W3B2223								
A3B0674-01	Water	EPA 8151A	02/20/23 10:26	02/27/23 16:15	988ml/10ml	1000ml/10ml	1.01	
A3B0674-02	Water	EPA 8151A	02/20/23 14:41	02/27/23 16:15	1034ml/10ml	1000ml/10ml	0.97	

Hexavalent Chromium by IC

Prep: NONE (LC)						Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
Batch: W3C0242								
A3B0674-01	Water	EPA 218.6	02/20/23 10:26	03/02/23 00:00	5ml/5ml	5ml/5ml	1.00	
A3B0674-02	Water	EPA 218.6	02/20/23 14:41	03/02/23 00:00	5ml/5ml	5ml/5ml	1.00	

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- E** Estimated Value. The result is above the calibration range of the instrument.
- ICV-01** Estimated Result. Initial Calibration Verification (ICV) failed high. There is no effect on non-detect results.
- Ja** Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-19** Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
- Q-24** The RPD for this spike and spike duplicate is above established control limits. Recoveries for both the spike and spike duplicate are within control limits.
- Q-29** Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-30** Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
- Q-41** Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
- Q-42** Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-52** Due to known erratic recoveries, the result and reporting levels for this analyte are reported as Estimated Values. This analyte may not have passed all QC requirements for this method.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +1%. The results are reported as Estimated Values.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +10%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +6%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -5%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- Q-65** Spike recovery is estimated due to the high analyte concentration of the source sample.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.
- " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
- " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
- " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (St. Helens Lagoon), and Report ID (A3B0674 - 04 21 23 1031)

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Philip Nerenberg (signature)



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
--------	----------	--------	---------	--------	---------------

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

CHAIN OF CUSTODY

COC 1 of 1
Lab # **A3B0674**

APEX LABS
12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: Maul Foster Alongi Project Name: St. Helens Lagoon Project # M0830.03.006
Address: 3140 NE Broadway St, Portland, OR 97232 Email: dweatherby@mfaulfo.com, mbenzinger@mfaulfo.com
Sampled by: *Colt S. Nerenberg*
Sampler signature: *Colt S. Nerenberg*

Phone: (971) 544-2139 Email: dweatherby@mfaulfo.com, mbenzinger@mfaulfo.com

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	Frozen Storage*	Composite**	NWTFH-GX	8260D VOCs	LL VOCs 8260D-SIM	Tot Metals 6020B***	Cr-VI 7196A/218.6	NWTFH-DX	SVOCS 8270E	OP Pest 8270E	Chlorinated Herb 8151A	LL OC Pest 820E/1489	Dioxins/Furans 1613B	PCB Congeners 1668C	PFAS EPA-537 Mod/537.1	
MJVI-2023020-613-70		02/10/23	1026	6AW	20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MJVI-2023020-613-60		02/10/23	1441	6AW	20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Top Blank		02/10/23	-	WZ																	

SPECIAL INSTRUCTIONS:
Normal Turn Around Time (TAT) = 5-10 Business Days

TAT Requested:
STANDARD

*Store a portion of each sediment sample at standard temperature (0-6 °C) until all 5 components have been received, then composite and analyze for Metals and Hg. Composite MeOH-preserved VOCs and analyze for NWTFH-GX, VOCs, and LL-VOCs.
Store 250 mL PFAS sediment containers at 0-6 °C until all 5 components have been received, then subcontract to Bureau Veritas for composting and analysis.
Store remainder of each sediment sample at -18 °C until all 5 components have been received, then composite and analyze for all remaining tests.
***Sb, As, Ba, Bb, Cd, Cr, Cu, Pb, Hg, Mn, Ni, Se, Ag, Ti, Zn
Detection limit report.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: <i>Colt S. Nerenberg</i> Printed Name: Colt S. Nerenberg Date: 02/10/23 Time: 1815 Company: MFA	Signature: <i>[Signature]</i> Printed Name: [Name] Date: 02/10/23 Time: 1815 Company: [Company]	Signature: <i>[Signature]</i> Printed Name: [Name] Date: 02/10/23 Time: 1815 Company: [Company]	Signature: <i>[Signature]</i> Printed Name: [Name] Date: 02/10/23 Time: 1815 Company: [Company]

SAMPLES ARE HELD FOR 30 DA Received via:

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg

Philip Nerenberg, Lab Director



ANALYTICAL REPORT

AMENDED REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Maul Foster & Alongi, INC. 3140 NE Broadway Street Portland, OR 97232	Project: St. Helens Lagoon Project Number: M0830.03.006 Project Manager: David Weatherby	Report ID: A3B0674 - 04 21 23 1031
--	---	---

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster Alongi Element WO#: A3B0674

Project/Project #: St. Helens Lagoon / M0830.03.006

Delivery Info:

Date/time received: 2/20/23 @ 18:15 By: ZAM

Delivered by: Apex Client ESS FedEx UPS Radio Morgan SDS Evergreen Other

Cooler Inspection Date/time inspected: 2/20/23 @ 18:15 By: ZAM

Chain of Custody included? Yes No

Signed/dated by client? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>5.6</u>	<u>5.4</u>	<u>4.7</u>				
Custody seals? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>				
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>				
Temp. blanks? (Y/N)	<u>Y</u>	<u>Y</u>	<u>Y</u>				
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>Real</u>	<u>Real</u>				
Condition (In/Out):	<u>In</u>	<u>In</u>	<u>In</u>				

Cooler out of temp? (Y/N) Possible reason why: _____

Green dots applied to out of temperature samples? Yes No

Out of temperature samples form initiated? Yes No

Sample Inspection: Date/time inspected: 2/20/23 @ 18:45 By: RHP

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: _____

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: TB# 3239

Labeled by: ZAM

Witness: RHP

Cooler Inspected by: RHP

Form Y-003 R-00

Philip Nerenberg



SUBCONTRACT ORDER

Apex Laboratories

OB 8/17/22 A2H0382

6

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

BV Labs / Maxxam
C/O FEDEX DEPOT 299 Cayuga Rd
Cheektowaga, NY 14225
Phone : (800) 668-0639
Fax: (905) 332-9169

Sample Name: DU1-20220810-ISM-COMP-1 Sediment After Processing
Sampled: 08/10/22 09:15 (A2H0382-02)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	08/24/22 17:00	08/10/23 09:15	
1668C PCB Congeners (SUB)	08/24/22 17:00	08/10/23 09:15	
1699 Insecticides/Pesticides (SUB)	08/24/22 17:00	08/24/22 09:15	
Subcontract Outside	08/24/22 17:00	02/06/23 09:15	PFAS EPA-1633
Containers Supplied:			
(C) 8 oz Glass Jar	9/16/22	9/22/22	
(D) 250 mL Poly (WM) - Non Preserved			

Standard JAT



23-Aug-22 12:11

Lori Dufour



C200154

KTN ENV-624

Onice

14.2/8.2/9.2

Now steady seal

12:11

Released By: Date: 8/22/22
 Received By: Date: 2022/08/23
 Fed Ex (Shipper)

Released By: Date: Received By: Date:

Temperatura blank 4.3 | 3.9 | 4.1 Page 1 of 1



Your P.O. #: A2H0382
Your Project #: A2H0382
Your C.O.C. #: n/a

Attention: Philip Nerenberg

Apex Laboratories
6700 SW Sandburg St.
Tigard, OR
USA 97223

Report Date: 2022/12/08
Report #: R7422015
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C200154

Received: 2022/08/23, 12:11

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dioxins/Furans in Soil (1613B) (1)	1	2022/09/03	2022/09/11	BRL SOP-00410	EPA 1613B m
2378TCDF Confirmation (M8290A/M1613)	1	2022/09/03	2022/09/20	BRL SOP-00406 BRL SOP-00410	EPA M8290Am/ M1613Bm
Moisture	1	N/A	2022/08/25	CAM SOP-00445	Carter 2nd ed 51.2 m
PCB Congeners in Soil (1668C) (2)	1	2022/09/22	2022/09/30	BRL SOP-00408	EPA 1668C m
PFAS in soil by SPE/LCMS (3)	1	2022/09/06	2022/09/08	CAM SOP-00894	ASTM D7968-17a m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

(2) Soils are reported on a dry weight basis unless otherwise specified.

(3) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Lori Dufour, Project Manager

Email: Lori.Dufour@bureauveritas.com

Phone# (905) 817-5700

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



Bureau Veritas Job #: C200154
 Report Date: 2022/12/08

Apex Laboratories
 Client Project #: A2H0382
 Your P.O. #: A2H0382

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		TNI532			
Sampling Date		2022/08/10 09:15			
COC Number		n/a			
	UNITS	DU1-20220810-ISM-COMP	RDL	MDL	QC Batch
Moisture	%	5.5	1.0	0.50	8186897
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					



PERFLUOROALKYL SUBSTANCES (SOIL)

Bureau Veritas ID		TN1532			
Sampling Date		2022/08/10 09:15			
COC Number		n/a			
	UNITS	DU1-20220810-ISM-COMP	RDL	MDL	QC Batch
Perfluorobutanoic acid (PFBA)	ug/kg	0.24 U	1.0	0.24	8208220
Perfluoropentanoic acid (PFPeA)	ug/kg	0.23 U	1.0	0.23	8208220
Perfluorohexanoic acid (PFHxA)	ug/kg	2.3	1.0	0.16	8208220
Perfluoroheptanoic acid (PFHpA)	ug/kg	1.2	1.0	0.17	8208220
Perfluorooctanoic acid (PFOA)	ug/kg	2.2	1.0	0.20	8208220
Perfluorononanoic acid (PFNA)	ug/kg	2.9	1.0	0.27	8208220
Perfluorodecanoic acid (PFDA)	ug/kg	3.9	1.0	0.24	8208220
Perfluoroundecanoic acid (PFUnA)	ug/kg	6.8	1.0	0.25	8208220
Perfluorododecanoic acid (PFDoA)	ug/kg	5.5	1.0	0.19	8208220
Perfluorotridecanoic acid (PFTRDA)	ug/kg	3.9	1.0	0.22	8213841
Perfluorotetradecanoic acid(PFTEDA)	ug/kg	2.2	1.0	0.30	8213841
Perfluorobutanesulfonic acid (PFBS)	ug/kg	0.17 U	1.0	0.17	8208220
Perfluoropentanesulfonic acid PFPes	ug/kg	0.26 U	1.0	0.26	8208220
Perfluorohexanesulfonic acid(PFHxS)	ug/kg	3.5 (1)	1.0	0.30	8208220
Perfluoroheptanesulfonic acid PFHpS	ug/kg	0.17 U	1.0	0.17	8208220
Perfluorooctanesulfonic acid (PFOS)	ug/kg	2.4	1.0	0.27	8208220
Perfluoronanesulfonic acid (PFNS)	ug/kg	0.24 U	1.0	0.24	8208220
Perfluorodecanesulfonic acid (PFDS)	ug/kg	1.8	1.0	0.27	8208220
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.20 U	1.0	0.20	8213841
EtFOSA	ug/kg	0.31 U	1.0	0.31	8213841
MeFOSA	ug/kg	0.39 U	1.0	0.39	8213841
EtFOSE	ug/kg	1.7	1.0	0.29	8213841
MeFOSE	ug/kg	3.6	1.0	0.22	8213841
EtFOSAA	ug/kg	8.8	1.0	0.40	8208220
MeFOSAA	ug/kg	10	1.0	0.32	8208220
4:2 Fluorotelomer sulfonic acid	ug/kg	0.25 U	1.0	0.25	8208220
6:2 Fluorotelomer sulfonic acid	ug/kg	0.46 J	1.0	0.30	8208220
8:2 Fluorotelomer sulfonic acid	ug/kg	1.5	1.0	0.30	8208220
Hexafluoropropyleneoxide dimer acid	ug/kg	0.19 U	1.0	0.19	8208220
4,8-Dioxa-3H-perfluorononanoic acid	ug/kg	0.28 U	1.0	0.28	8208220
9Cl-PF3ONS (F-53B Major)	ug/kg	0.21 U	1.0	0.21	8208220
11Cl-PF3OUdS (F-53B Minor)	ug/kg	0.22 U	1.0	0.22	8208220
Surrogate Recovery (%)					
13C2-4:2-Fluorotelomersulfonic Acid	%	103	N/A	N/A	8208220
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Result is estimated as analyte confirmation criteria were not met.					



PERFLUOROALKYL SUBSTANCES (SOIL)

Bureau Veritas ID		TN1532			
Sampling Date		2022/08/10 09:15			
COC Number		n/a			
	UNITS	DU1-20220810-ISM-COMP	RDL	MDL	QC Batch
13C2-6:2-Fluorotelomersulfonic Acid	%	90	N/A	N/A	8208220
13C2-8:2-Fluorotelomersulfonic Acid	%	76	N/A	N/A	8208220
13C2-Perfluorodecanoic acid	%	74	N/A	N/A	8208220
13C2-Perfluorododecanoic acid	%	62	N/A	N/A	8208220
13C2-Perfluorohexanoic acid	%	76	N/A	N/A	8208220
13C2-perfluorotetradecanoic acid	%	38 (1)	N/A	N/A	8213841
13C2-Perfluoroundecanoic acid	%	61	N/A	N/A	8208220
13C3-HFPO-DA	%	78	N/A	N/A	8208220
13C3-Perfluorobutanesulfonic acid	%	90	N/A	N/A	8208220
13C4-Perfluorobutanoic acid	%	91	N/A	N/A	8208220
13C4-Perfluoroheptanoic acid	%	83	N/A	N/A	8208220
13C4-Perfluorooctanesulfonic acid	%	77	N/A	N/A	8208220
13C4-Perfluorooctanoic acid	%	80	N/A	N/A	8208220
13C5-Perfluorononanoic acid	%	62	N/A	N/A	8208220
13C5-Perfluoropentanoic acid	%	87	N/A	N/A	8208220
13C8-Perfluorooctane Sulfonamide	%	27 (2)	N/A	N/A	8213841
18O2-Perfluorohexanesulfonic acid	%	86	N/A	N/A	8208220
D3-MeFOSA	%	23 (3)	N/A	N/A	8213841
D3-MeFOSAA	%	56	N/A	N/A	8208220
D5-EtFOSA	%	18 (4)	N/A	N/A	8213841

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (PFTeDA, PFTrDA). Results were confirmed through re-analysis.

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (PFOSA). Results were confirmed through re-analysis.

(3) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (MeFOSA). Results were confirmed through re-analysis.

(4) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (EtFOSA). Results were confirmed through re-analysis.



PERFLUOROALKYL SUBSTANCES (SOIL)

Bureau Veritas ID		TNI532			
Sampling Date		2022/08/10 09:15			
COC Number		n/a			
	UNITS	DU1-20220810-ISM-COMP	RDL	MDL	QC Batch
D5-EtFOSAA	%	56	N/A	N/A	8208220
D7-MeFOSE	%	27	N/A	N/A	8213841
D9-EtFOSE	%	17 (1)	N/A	N/A	8213841
<p>RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (EtFOSE). Results were confirmed through re-analysis.</p>					



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	10.2	0.232	1.00	0.400	1.00	10.2	1	8212445
1,2,3,7,8-Penta CDD *	pg/g	5.59	0.235	5.00	0.400	1.00	5.59	1	8212445
1,2,3,4,7,8-Hexa CDD *	pg/g	2.77 J	0.198	5.00	0.400	0.100	0.277	1	8212445
1,2,3,6,7,8-Hexa CDD *	pg/g	43.8	0.194	5.00	0.400	0.100	4.38	1	8212445
1,2,3,7,8,9-Hexa CDD *	pg/g	30.2	0.205	5.00	0.400	0.100	3.02	1	8212445
1,2,3,4,6,7,8-Hepta CDD *	pg/g	259	0.216	5.00	0.400	0.0100	2.59	1	8212445
Octa CDD *	pg/g	2460	0.197	10.0	0.800	0.000300	0.738	1	8212445
Total Tetra CDD *	pg/g	135	0.232	1.00	0.400	N/A	N/A	10	8212445
Total Penta CDD *	pg/g	38.7	0.235	5.00	0.400	N/A	N/A	9	8212445
Total Hexa CDD *	pg/g	281	0.199	5.00	0.400	N/A	N/A	6	8212445
Total Hepta CDD *	pg/g	492	0.216	5.00	0.400	N/A	N/A	2	8212445
2,3,7,8-Tetra CDF **	pg/g	58.3	0.174	1.00	0.400	0.100	5.83	1	8212445
1,2,3,7,8-Penta CDF **	pg/g	4.38 J	0.238	5.00	0.400	0.0300	0.131	1	8212445
2,3,4,7,8-Penta CDF **	pg/g	3.01 J	0.210	5.00	0.400	0.300	0.903	1	8212445
1,2,3,4,7,8-Hexa CDF **	pg/g	4.87 J	0.146	5.00	0.400	0.100	0.487	1	8212445
1,2,3,6,7,8-Hexa CDF **	pg/g	2.71 J	0.142	5.00	0.400	0.100	0.271	1	8212445
2,3,4,6,7,8-Hexa CDF **	pg/g	1.86 J	0.128	5.00	0.400	0.100	0.186	1	8212445
1,2,3,7,8,9-Hexa CDF **	pg/g	0.386 U	0.386	5.00	0.400	0.100	0.0386	0	8212445
1,2,3,4,6,7,8-Hepta CDF **	pg/g	56.5	0.161	5.00	0.400	0.0100	0.565	1	8212445
1,2,3,4,7,8,9-Hepta CDF **	pg/g	2.94 J	0.189	5.00	0.400	0.0100	0.0294	1	8212445
Octa CDF **	pg/g	100	0.225	10.0	0.800	0.000300	0.0300	1	8212445
Total Tetra CDF **	pg/g	191	0.174	1.00	0.400	N/A	N/A	15	8212445
Total Penta CDF **	pg/g	54.1	0.223	5.00	0.400	N/A	N/A	13	8212445
Total Hexa CDF **	pg/g	51.1	0.143	5.00	0.400	N/A	N/A	8	8212445
Total Hepta CDF **	pg/g	124	0.174	5.00	0.400	N/A	N/A	3	8212445
Confirmation 2,3,7,8-Tetra CDF **	pg/g	59.5	N/A	1.0	0.90	0.100	5.95	N/A	8237702
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	35.4	N/A	N/A

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-1234678 HeptaCDD *	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-1234678 HeptaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-123478 HexaCDD *	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-123478 HexaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-1234789 HeptaCDF **	%	80	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-123678 HexaCDD *	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-123678 HexaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-12378 PentaCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-12378 PentaCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-123789 HexaCDF **	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-234678 HexaCDF **	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-23478 PentaCDF **	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-2378 TetraCDD *	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-2378 TetraCDF **	%	80	N/A	N/A	N/A	N/A	N/A	N/A	8212445
C13-OCDD *	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8212445
Confirmation C13-2378 TetraCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8237702

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/g	0.163	0.069	0.099	0.0026	N/A	N/A	N/A	8239765
3-MonoCB-(2)	ng/g	0.092 J	0.060	0.099	0.0038	N/A	N/A	N/A	8239765
4-MonoCB-(3)	ng/g	0.179 J	0.068	0.25	0.0035	N/A	N/A	N/A	8239765
2,2'-DiCB-(4)	ng/g	0.36	0.17	0.25	0.0040	N/A	N/A	N/A	8239765
2,3-DiCB-(5)	ng/g	0.082 U	0.082	0.25	0.015	N/A	N/A	N/A	8239765
2,3'-DiCB-(6)	ng/g	0.267	0.086	0.099	0.0034	N/A	N/A	N/A	8239765
2,4-DiCB-(7)	ng/g	0.083 U	0.083	0.099	0.0064	N/A	N/A	N/A	8239765
2,4'-DiCB-(8)	ng/g	0.455	0.085	0.25	0.016	N/A	N/A	N/A	8239765
2,5-DiCB-(9)	ng/g	0.093 J	0.085	0.099	0.0019	N/A	N/A	N/A	8239765
2,6-DiCB-(10)	ng/g	0.14 U	0.14	0.25	0.0042	N/A	N/A	N/A	8239765
3,3'-DiCB-(11)	ng/g	7.10	0.086	0.50	0.034	N/A	N/A	N/A	8239765
DiCB-(12)+(13)	ng/g	0.221 J	0.084	0.25	0.011	N/A	N/A	N/A	8239765
3,5-DiCB-(14)	ng/g	0.085 U	0.085	0.099	0.0033	N/A	N/A	N/A	8239765
4,4'-DiCB-(15)	ng/g	0.81	0.11	0.25	0.0039	N/A	N/A	N/A	8239765
2,2',3-TriCB-(16)	ng/g	0.51	0.23	0.25	0.013	N/A	N/A	N/A	8239765
2,2',4-TriCB-(17)	ng/g	0.69	0.20	0.099	0.0040	N/A	N/A	N/A	8239765
TriCB-(18)+(30)	ng/g	1.10	0.16	0.25	0.0052	N/A	N/A	N/A	8239765
2,2',6-TriCB-(19)	ng/g	0.41	0.20	0.099	0.0052	N/A	N/A	N/A	8239765
TriCB-(20) + (28)	ng/g	2.30	0.12	0.25	0.0090	N/A	N/A	N/A	8239765
TriCB-(21)+(33)	ng/g	0.61	0.11	0.25	0.011	N/A	N/A	N/A	8239765
2,3,4'-TriCB-(22)	ng/g	0.84	0.13	0.099	0.0049	N/A	N/A	N/A	8239765
2,3,5-TriCB-(23)	ng/g	0.12 U	0.12	0.099	0.0046	N/A	N/A	N/A	8239765
2,3,6-TriCB-(24)	ng/g	0.14 U	0.14	0.099	0.0090	N/A	N/A	N/A	8239765
2,3',4-TriCB-(25)	ng/g	0.53	0.12	0.099	0.0064	N/A	N/A	N/A	8239765
TriCB-(26)+(29)	ng/g	0.58	0.12	0.25	0.0087	N/A	N/A	N/A	8239765
2,3',6-TriCB-(27)	ng/g	0.14 U	0.14	0.099	0.0065	N/A	N/A	N/A	8239765
2,4',5-TriCB-(31)	ng/g	2.20	0.12	0.25	0.0038	N/A	N/A	N/A	8239765
2,4',6-TriCB-(32)	ng/g	0.44	0.13	0.099	0.0024	N/A	N/A	N/A	8239765
2,3',5'-TriCB-(34)	ng/g	0.13 U	0.13	0.099	0.0060	N/A	N/A	N/A	8239765
3,3',4-TriCB-(35)	ng/g	0.26	0.12	0.099	0.0042	N/A	N/A	N/A	8239765

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
33'5-TriCB-(36)	ng/g	0.11 U	0.11	0.099	0.0029	N/A	N/A	N/A	8239765
344'-TriCB-(37)	ng/g	0.79	0.16	0.099	0.0029	N/A	N/A	N/A	8239765
345-TriCB-(38)	ng/g	0.12 U	0.12	0.099	0.0038	N/A	N/A	N/A	8239765
34'5-TriCB-(39)	ng/g	0.11 U	0.11	0.099	0.0052	N/A	N/A	N/A	8239765
TetraCB-(40)+(41)+(71)	ng/g	1.45	0.27	0.50	0.016	N/A	N/A	N/A	8239765
22'34'-TetraCB-(42)	ng/g	0.91	0.32	0.25	0.014	N/A	N/A	N/A	8239765
22'35'-TetraCB-(43)	ng/g	0.38 U	0.38	0.25	0.019	N/A	N/A	N/A	8239765
TetraCB-(44)+(47)+(65)	ng/g	3.77	0.26	0.50	0.041	N/A	N/A	N/A	8239765
TetraCB-(45)+(51)	ng/g	0.52	0.30	0.25	0.018	N/A	N/A	N/A	8239765
22'36'-TetraCB-(46)	ng/g	0.32 U	0.32	0.099	0.0090	N/A	N/A	N/A	8239765
22'45'-TetraCB-(48)	ng/g	0.60	0.29	0.25	0.0042	N/A	N/A	N/A	8239765
TetraCB-(49)+TetraCB-(69)	ng/g	2.56	0.24	0.50	0.010	N/A	N/A	N/A	8239765
TetraCB-(50)+(53)	ng/g	0.48 J	0.30	0.50	0.013	N/A	N/A	N/A	8239765
22'55'-TetraCB-(52)	ng/g	7.65	0.29	0.25	0.016	N/A	N/A	N/A	8239765
22'66'-TetraCB-(54)	ng/g	0.22 U	0.22	0.25	0.0096	N/A	N/A	N/A	8239765
233'4'-TetraCB-(55)	ng/g	0.27 U	0.27	0.25	0.011	N/A	N/A	N/A	8239765
233'4'-Tetra CB(56)	ng/g	1.25	0.25	0.25	0.0051	N/A	N/A	N/A	8239765
233'5'-TetraCB-(57)	ng/g	0.24 U	0.24	0.25	0.0056	N/A	N/A	N/A	8239765
233'5'-TetraCB-(58)	ng/g	0.26 U	0.26	0.25	0.011	N/A	N/A	N/A	8239765
TetraCB-(59)+(62)+(75)	ng/g	0.22 J	0.21	0.50	0.014	N/A	N/A	N/A	8239765
2344'-TetraCB -(60)	ng/g	0.54	0.23	0.25	0.0053	N/A	N/A	N/A	8239765
TetraCB-(61)+(70)+(74)+(76)	ng/g	6.91	0.23	0.99	0.022	N/A	N/A	N/A	8239765
234'5'-TetraCB-(63)	ng/g	0.23 U	0.23	0.25	0.0071	N/A	N/A	N/A	8239765
234'6'-TetraCB-(64)	ng/g	1.40	0.23	0.25	0.0047	N/A	N/A	N/A	8239765
23'44'-TetraCB-(66)	ng/g	2.53	0.23	0.25	0.099	N/A	N/A	N/A	8239765
23'45'-TetraCB-(67)	ng/g	0.23 J	0.21	0.25	0.011	N/A	N/A	N/A	8239765
23'45'-TetraCB-(68)	ng/g	0.23 U	0.23	0.25	0.0088	N/A	N/A	N/A	8239765
23'55'-TetraCB-(72)	ng/g	0.23 U	0.23	0.25	0.0086	N/A	N/A	N/A	8239765
23'5'6'-TetraCB-(73)	ng/g	0.20 U	0.20	0.25	0.019	N/A	N/A	N/A	8239765
33'44'-TetraCB-(77)	ng/g	0.57	0.27	0.25	0.0063	0.000100	0.0000570	N/A	8239765

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
33'45'-TetraCB-(78)	ng/g	0.24 U	0.24	0.25	0.0065	N/A	N/A	N/A	8239765
33'45'-TetraCB-(79)	ng/g	0.21 U	0.21	0.25	0.0058	N/A	N/A	N/A	8239765
33'55'-TetraCB-(80)	ng/g	0.21 U	0.21	0.25	0.0061	N/A	N/A	N/A	8239765
344'5'-TetraCB-(81)	ng/g	0.26 U	0.26	0.25	0.0058	0.000300	0.0000780	N/A	8239765
22'33'4'-PentaCB-(82)	ng/g	1.00	0.32	0.25	0.0048	N/A	N/A	N/A	8239765
PentaCB-(83)+(99)	ng/g	5.07	0.31	0.50	0.016	N/A	N/A	N/A	8239765
22'33'6'-PentaCB-(84)	ng/g	2.26	0.30	0.099	0.0077	N/A	N/A	N/A	8239765
PentaCB-(85)+(116)+(117)	ng/g	1.23	0.21	0.50	0.027	N/A	N/A	N/A	8239765
PentaCB-(86)(87)(97)(109)(119)(125)	ng/g	6.08	0.24	0.99	0.029	N/A	N/A	N/A	8239765
PentaCB-(88)+(91)	ng/g	1.21	0.29	0.25	0.013	N/A	N/A	N/A	8239765
22'346'-PentaCB-(89)	ng/g	0.31 U	0.31	0.25	0.0080	N/A	N/A	N/A	8239765
PentaCB-(90)+(101)+(113)	ng/g	9.38	0.24	0.99	0.011	N/A	N/A	N/A	8239765
22'355'-PentaCB-(92)	ng/g	1.76	0.30	0.25	0.0044	N/A	N/A	N/A	8239765
PentaCB-(93)+(98)+(100)+(102)	ng/g	0.29 U	0.29	0.99	0.024	N/A	N/A	N/A	8239765
22'356'-PentaCB-(94)	ng/g	0.30 U	0.30	0.25	0.0063	N/A	N/A	N/A	8239765
22'35'6'-PentaCB-(95)	ng/g	6.31	0.28	0.25	0.0088	N/A	N/A	N/A	8239765
22'366'-PentaCB-(96)	ng/g	0.14 U	0.14	0.25	0.010	N/A	N/A	N/A	8239765
22'45'6'-PentaCB-(103)	ng/g	0.27 U	0.27	0.25	0.0061	N/A	N/A	N/A	8239765
22'466'-PentaCB-(104)	ng/g	0.16 U	0.16	0.25	0.0056	N/A	N/A	N/A	8239765
233'44'-PentaCB-(105)	ng/g	3.88	0.24	0.25	0.0044	0.0000300	0.000116	N/A	8239765
233'45'-PentaCB-(106)	ng/g	0.21 U	0.21	0.25	0.0036	N/A	N/A	N/A	8239765
233'4'5'-PentaCB-(107)	ng/g	0.58	0.20	0.25	0.017	N/A	N/A	N/A	8239765
PentaCB-(108)+(124)	ng/g	0.37 J	0.21	0.50	0.011	N/A	N/A	N/A	8239765
PentaCB-(110)+(115)	ng/g	12.5	0.25	0.50	0.012	N/A	N/A	N/A	8239765
233'55'-PentaCB-(111)	ng/g	0.21 U	0.21	0.25	0.0056	N/A	N/A	N/A	8239765
233'56'-PentaCB-(112)	ng/g	0.19 U	0.19	0.25	0.0078	N/A	N/A	N/A	8239765
2344'5'-PentaCB-(114)	ng/g	0.38	0.24	0.25	0.0042	0.0000300	0.0000114	N/A	8239765
23'44'5'-PentaCB-(118)	ng/g	10.1	0.23	0.50	0.0066	0.0000300	0.000303	N/A	8239765
23'455'-PentaCB-(120)	ng/g	0.20 U	0.20	0.25	0.0064	N/A	N/A	N/A	8239765
23'45'6'-PentaCB-(121)	ng/g	0.21 U	0.21	0.25	0.0063	N/A	N/A	N/A	8239765

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
233'4'5'-PentaCB-(122)	ng/g	0.24 U	0.24	0.25	0.0066	N/A	N/A	N/A	8239765
23'44'5'-PentaCB-(123)	ng/g	0.28	0.26	0.25	0.014	0.0000300	0.00000840	N/A	8239765
33'44'5'-PentaCB-(126)	ng/g	0.23 U	0.23	0.25	0.0030	0.100	0.0230	N/A	8239765
33'45'5'-PentaCB-(127)	ng/g	0.24 U	0.24	0.25	0.0032	N/A	N/A	N/A	8239765
HexaCB-(128)+(166)	ng/g	1.84	0.43	0.50	0.021	N/A	N/A	N/A	8239765
HexaCB-(129)+(138)+(163)	ng/g	11.0	0.42	0.99	0.037	N/A	N/A	N/A	8239765
22'33'45'-HexaCB-(130)	ng/g	0.68	0.49	0.25	0.0051	N/A	N/A	N/A	8239765
22'33'46'-HexaCB-(131)	ng/g	0.47 U	0.47	0.25	0.0099	N/A	N/A	N/A	8239765
22'33'46'-HexaCB-(132)	ng/g	3.15	0.44	0.25	0.0087	N/A	N/A	N/A	8239765
22'33'55'-HexaCB-(133)	ng/g	0.43 U	0.43	0.25	0.010	N/A	N/A	N/A	8239765
HexaCB-(134)+(143)	ng/g	0.53	0.49	0.50	0.017	N/A	N/A	N/A	8239765
HexaCB-(135)+(151)	ng/g	1.98	0.19	0.99	0.014	N/A	N/A	N/A	8239765
22'33'66'-HexaCB-(136)	ng/g	0.93	0.14	0.25	0.0083	N/A	N/A	N/A	8239765
22'344'5'-HexaCB-(137)	ng/g	0.49 J	0.49	0.50	0.030	N/A	N/A	N/A	8239765
HexaCB-(139)+(140)	ng/g	0.37 U	0.37	0.50	0.016	N/A	N/A	N/A	8239765
22'345'5'-HexaCB-(141)	ng/g	1.50	0.38	0.25	0.012	N/A	N/A	N/A	8239765
22'3456'-HexaCB-(142)	ng/g	0.42 U	0.42	0.25	0.0088	N/A	N/A	N/A	8239765
22'345'6'-HexaCB-(144)	ng/g	0.21 U	0.21	0.25	0.0072	N/A	N/A	N/A	8239765
22'3466'-HexaCB-(145)	ng/g	0.15 U	0.15	0.25	0.0082	N/A	N/A	N/A	8239765
22'34'55'-HexaCB-(146)	ng/g	1.09	0.36	0.25	0.010	N/A	N/A	N/A	8239765
HexaCB-(147)+(149)	ng/g	5.83	0.38	0.50	0.019	N/A	N/A	N/A	8239765
22'34'56'-HexaCB-(148)	ng/g	0.19 U	0.19	0.25	0.0084	N/A	N/A	N/A	8239765
22'34'66'-HexaCB-(150)	ng/g	0.13 U	0.13	0.25	0.0061	N/A	N/A	N/A	8239765
22'3566'-HexaCB-(152)	ng/g	0.15 U	0.15	0.25	0.013	N/A	N/A	N/A	8239765
HexaCB-(153)+(168)	ng/g	6.59	0.33	0.50	0.013	N/A	N/A	N/A	8239765
22'44'56'-HexaCB-(154)	ng/g	0.15 U	0.15	0.25	0.012	N/A	N/A	N/A	8239765
22'44'66'-HexaCB-(155)	ng/g	0.22 J	0.20	0.25	0.0087	N/A	N/A	N/A	8239765
HexaCB-(156)+(157)	ng/g	1.99	0.36	0.50	0.0086	0.0000300	0.0000597	N/A	8239765
233'44'6'-HexaCB-(158)	ng/g	1.04	0.31	0.25	0.0072	N/A	N/A	N/A	8239765
233'45'5'-HexaCB-(159)	ng/g	0.43 U	0.43	0.25	0.0082	N/A	N/A	N/A	8239765

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
233'456-HexaCB-(160)	ng/g	0.35 U	0.35	0.25	0.017	N/A	N/A	N/A	8239765
233'45'6-HexaCB-(161)	ng/g	0.30 U	0.30	0.25	0.011	N/A	N/A	N/A	8239765
233'4'55'-HexaCB-(162)	ng/g	0.39 U	0.39	0.25	0.0083	N/A	N/A	N/A	8239765
233'4'5'6-HexaCB-(164)	ng/g	0.86	0.27	0.25	0.017	N/A	N/A	N/A	8239765
233'55'6-HexaCB-(165)	ng/g	0.34 U	0.34	0.25	0.010	N/A	N/A	N/A	8239765
23'44'55'-HexaCB-(167)	ng/g	0.73	0.36	0.25	0.0056	0.0000300	0.0000219	N/A	8239765
33'44'55'-HexaCB-(169)	ng/g	0.36 U	0.36	0.25	0.024	0.0300	0.0108	N/A	8239765
22'33'44'5-HeptaCB-(170)	ng/g	1.85	0.39	0.25	0.0042	N/A	N/A	N/A	8239765
HeptaCB-(171)+(173)	ng/g	0.57 U	0.57	0.50	0.011	N/A	N/A	N/A	8239765
22'33'455'-HeptaCB-(172)	ng/g	0.60 U	0.60	0.25	0.0080	N/A	N/A	N/A	8239765
22'33'456'-HeptaCB-(174)	ng/g	1.47	0.55	0.25	0.014	N/A	N/A	N/A	8239765
22'33'45'6-HeptaCB-(175)	ng/g	0.31 U	0.31	0.25	0.0092	N/A	N/A	N/A	8239765
22'33'466'-HeptaCB-(176)	ng/g	0.19 U	0.19	0.25	0.0098	N/A	N/A	N/A	8239765
22'33'45'6'-HeptaCB-(177)	ng/g	0.92	0.64	0.25	0.0078	N/A	N/A	N/A	8239765
22'33'55'6'-HeptaCB-(178)	ng/g	0.30 U	0.30	0.25	0.010	N/A	N/A	N/A	8239765
22'33'566'-HeptaCB-(179)	ng/g	0.48	0.19	0.25	0.0086	N/A	N/A	N/A	8239765
HeptaCB-(180)+(193)	ng/g	3.27	0.40	0.50	0.0085	N/A	N/A	N/A	8239765
22'344'56-HeptaCB-(181)	ng/g	0.56 U	0.56	0.25	0.0080	N/A	N/A	N/A	8239765
22'344'56'-HeptaCB-(182)	ng/g	0.34 U	0.34	0.25	0.0092	N/A	N/A	N/A	8239765
22'344'5'6-HeptaCB-(183)	ng/g	1.00	0.52	0.25	0.028	N/A	N/A	N/A	8239765
22'344'66'-HeptaCB-(184)	ng/g	0.18 U	0.18	0.25	0.010	N/A	N/A	N/A	8239765
22'3455'6-HeptaCB-(185)	ng/g	0.60 U	0.60	0.25	0.022	N/A	N/A	N/A	8239765
22'34566'-HeptaCB-(186)	ng/g	0.20 U	0.20	0.25	0.0086	N/A	N/A	N/A	8239765
22'34'55'6-HeptaCB-(187)	ng/g	1.95	0.33	0.25	0.011	N/A	N/A	N/A	8239765
22'34'566'-HeptaCB-(188)	ng/g	0.30 U	0.30	0.25	0.0047	N/A	N/A	N/A	8239765
233'44'55'-HeptaCB-(189)	ng/g	0.62 U	0.62	0.25	0.0041	0.0000300	0.0000186	N/A	8239765
233'44'56-HeptaCB-(190)	ng/g	0.43 U	0.43	0.25	0.0041	N/A	N/A	N/A	8239765
233'44'5'6-HeptaCB-(191)	ng/g	0.42 U	0.42	0.25	0.0045	N/A	N/A	N/A	8239765
233'455'6-HeptaCB-(192)	ng/g	0.46 U	0.46	0.25	0.0090	N/A	N/A	N/A	8239765
22'33'44'55'-OctaCB-(194)	ng/g	0.66 U	0.66	0.25	0.0095	N/A	N/A	N/A	8239765

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'56'-OctaCB-(195)	ng/g	0.75 U	0.75	0.25	0.0094	N/A	N/A	N/A	8239765
22'33'44'56'-OctaCB-(196)	ng/g	0.55 U	0.55	0.25	0.016	N/A	N/A	N/A	8239765
22'33'44'66'-OctaCB-(197)	ng/g	0.43 U	0.43	0.25	0.044	N/A	N/A	N/A	8239765
OctaCB-(198)+(199)	ng/g	0.83	0.51	0.50	0.014	N/A	N/A	N/A	8239765
22'33'4566'-OctaCB-(200)	ng/g	0.37 U	0.37	0.25	0.032	N/A	N/A	N/A	8239765
22'33'45'66'-OctaCB-(201)	ng/g	0.38 U	0.38	0.25	0.017	N/A	N/A	N/A	8239765
22'33'55'66'-OctaCB-(202)	ng/g	0.47 U	0.47	0.25	0.0081	N/A	N/A	N/A	8239765
22'344'55'6'-OctaCB-(203)	ng/g	0.50 U	0.50	0.25	0.011	N/A	N/A	N/A	8239765
22'344'566'-OctaCB-(204)	ng/g	0.41 U	0.41	0.25	0.021	N/A	N/A	N/A	8239765
233'44'55'6'-OctaCB-(205)	ng/g	0.53 U	0.53	0.25	0.0096	N/A	N/A	N/A	8239765
22'33'44'55'6'-NonaCB-(206)	ng/g	0.71 U	0.71	0.25	0.0077	N/A	N/A	N/A	8239765
22'33'44'566'-NonaCB-(207)	ng/g	0.63 U	0.63	0.25	0.0081	N/A	N/A	N/A	8239765
22'33'455'66'-NonaCB-(208)	ng/g	0.73 U	0.73	0.25	0.0073	N/A	N/A	N/A	8239765
DecaCB-(209)	ng/g	0.72 U	0.72	0.25	0.012	N/A	N/A	N/A	8239765
Total PCB	ng/g	229	2.8	N/A	N/A	N/A	N/A	N/A	8239765
TOTAL TOXIC EQUIVALENCY	ng/g	N/A	N/A	N/A	N/A	N/A	0.0345	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'33'44'55'6'-NonaCB-(206)	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'33'44'5'-HeptaCB-(170)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'33'455'66'-NonaCB-(208)	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'33'55'66'-OctaCB-(202)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'33'55'6'-HeptaCB-(178)	%	86	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'344'55'-HeptaCB-(180)	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'34'566'-HeptaCB-(188)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'44'66'-HexaCB-(155)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'466'-PentaCB-(104)	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'66'-TetraCB-(54)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'6'-TriCB-(19)	%	77	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-22'-DiCB-(4)	%	69	N/A	N/A	N/A	N/A	N/A	N/A	8239765
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch N/A = Not Applicable									



SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		TNI532							
Sampling Date		2022/08/10 09:15							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	DU1-20220810-ISM-COMP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-233'44'55'6-OctaCB-(205)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-233'44'55'5'-HeptaCB-(189)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-233'44'5'-PentaCB-(105)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-233'55'5'-PentaCB-(111)	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-23'44'55'5'-HexaCB-(167)	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-2344'5'-PentaCB-(114)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-23'44'5'-PentaCB-(118)	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-2'344'5'-PentaCB-(123)	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-2-MonoCB-(1)	%	79	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-33'44'55'5'-HexaCB-(169)	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-33'44'5'-PentaCB-(126)	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-33'44'5'-TetraCB-(77)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-344'5'-TetraCB-(81)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-344'5'-TriCB-(37)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-44'5'-DiCB-(15)	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-4-MonoCB-(3)	%	78	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-DecaCB-(209)	%	80	N/A	N/A	N/A	N/A	N/A	N/A	8239765
C13-HexaCB-(156)+(157)	%	104	N/A	N/A	N/A	N/A	N/A	N/A	8239765

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 N/A = Not Applicable



Bureau Veritas Job #: C200154
 Report Date: 2022/12/08

Apex Laboratories
 Client Project #: A2H0382
 Your P.O. #: A2H0382

TEST SUMMARY

Bureau Veritas ID: TNI532
Sample ID: DU1-20220810-ISM-COMP
Matrix: Soil

Collected: 2022/08/10
Shipped:
Received: 2022/08/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	8212445	2022/09/03	2022/09/11	Angel Guerrero
2378TCDF Confirmation (M8290A/M1613)	HRMS/MS	8237702	2022/09/03	2022/09/20	Angel Guerrero
Moisture	BAL	8186897	N/A	2022/08/25	Mathew Bowles
PCB Congeners in Soil (1668C)	HRMS/MS	8239765	2022/09/22	2022/09/30	Cathy Xu
PFAS in soil by SPE/LCMS	LCMS	8208220	2022/09/06	2022/09/08	Thanh Tam Tran



BUREAU
VERITAS

Bureau Veritas Job #: C200154

Report Date: 2022/12/08

Apex Laboratories

Client Project #: A2H0382

Your P.O. #: A2H0382

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	10.5°C
Package 2	15.2°C

Revised Report (2022/12/08): Removed comments regarding OCTQ-S analysis and updated hold time comments for PFAS.

Revised Report (2022/11/16): Updated sample ID as per client request.

Samples were received with an elevated average temperature of 10.5C on ice. A temperature blank was present and the measured temperatures were 4.3C, 3.9C, and 4.1C. Client consented to proceed with analysis.

Sample TNI532 [DU1-20220810-ISM-COMP] : Per- and polyfluoroalkyl substances (PFAS): Initial analyses of the sample was performed within the method defined hold time with batch 8208220. The sample was reanalysed outside the method defined hold time (28 days) for QC purposes with batch 8213841. Due to their chemical structure, PFAS are chemically and biologically stable in the environment and resist typical environmental degradation processes. Reanalyses outside the method defined hold time should not have a significant impact on the data.

PCB1668C-S analysis: sample was re-extracted using a smaller portion due to matrix interference (see Bench Level Planned DeviationForm). Result reported is based on 10x run. Detection limits were adjusted accordingly

Sample TNI532, PFAS in soil by SPE/LCMS: Test repeated.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
	8186897	MBW	RPD - Sample/Sample Dup	Moisture	2022/08/25	0		%	20
	8208220	TTM	Matrix Spike	13C2-4:2-Fluorotelomersulfonic Acid	2022/09/08		91	%	50 - 150
				13C2-6:2-Fluorotelomersulfonic Acid	2022/09/08		95	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2022/09/08		97	%	50 - 150
				13C2-Perfluorodecanoic acid	2022/09/08		93	%	50 - 150
				13C2-Perfluorododecanoic acid	2022/09/08		90	%	50 - 150
				13C2-Perfluorohexanoic acid	2022/09/08		95	%	50 - 150
				13C2-Perfluoroundecanoic acid	2022/09/08		94	%	50 - 150
				13C3-HFPO-DA	2022/09/08		92	%	50 - 150
				13C3-Perfluorobutanesulfonic acid	2022/09/08		91	%	50 - 150
				13C4-Perfluorobutanoic acid	2022/09/08		95	%	50 - 150
				13C4-Perfluoroheptanoic acid	2022/09/08		94	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2022/09/08		90	%	50 - 150
				13C4-Perfluorooctanoic acid	2022/09/08		95	%	50 - 150
				13C5-Perfluorononanoic acid	2022/09/08		89	%	50 - 150
				13C5-Perfluoropentanoic acid	2022/09/08		92	%	50 - 150
				18O2-Perfluorohexanesulfonic acid	2022/09/08		89	%	50 - 150
				D3-MeFOSAA	2022/09/08		93	%	50 - 150
				D5-EtFOSAA	2022/09/08		95	%	50 - 150
				Perfluorobutanoic acid (PFBA)	2022/09/08		97	%	70 - 130
				Perfluoropentanoic acid (PFPeA)	2022/09/08		98	%	70 - 130
				Perfluorohexanoic acid (PFHxA)	2022/09/08		95	%	70 - 130
				Perfluoroheptanoic acid (PFHpA)	2022/09/08		96	%	70 - 130
				Perfluorooctanoic acid (PFOA)	2022/09/08		99	%	70 - 130
				Perfluorononanoic acid (PFNA)	2022/09/08		99	%	70 - 130
				Perfluorodecanoic acid (PFDA)	2022/09/08		95	%	70 - 130
				Perfluoroundecanoic acid (PFUnA)	2022/09/08		95	%	70 - 130
				Perfluorododecanoic acid (PFDoA)	2022/09/08		96	%	70 - 130
				Perfluorobutanesulfonic acid (PFBS)	2022/09/08		96	%	70 - 130
				Perfluoropentanesulfonic acid PFPes	2022/09/08		97	%	70 - 130
				Perfluorohexanesulfonic acid(PFHxS)	2022/09/08		97	%	70 - 130
				Perfluoroheptanesulfonic acid PFHpS	2022/09/08		91	%	70 - 130
				Perfluorooctanesulfonic acid (PFOS)	2022/09/08		97	%	70 - 130
				Perfluorononanesulfonic acid (PFNS)	2022/09/08		92	%	70 - 130
				Perfluorodecanesulfonic acid (PFDS)	2022/09/08		92	%	70 - 130
				EtFOSAA	2022/09/08		94	%	70 - 130
				MeFOSAA	2022/09/08		98	%	70 - 130
				4:2 Fluorotelomer sulfonic acid	2022/09/08		95	%	70 - 130
				6:2 Fluorotelomer sulfonic acid	2022/09/08		94	%	70 - 130
				8:2 Fluorotelomer sulfonic acid	2022/09/08		98	%	70 - 130
				Hexafluoropropyleneoxide dimer acid	2022/09/08		92	%	70 - 130
				4,8-Dioxa-3H-perfluorononanoic acid	2022/09/08		95	%	70 - 130
				9Cl-PF3ONS (F-53B Major)	2022/09/08		96	%	70 - 130
				11Cl-PF3OUdS (F-53B Minor)	2022/09/08		91	%	70 - 130
	8208220	TTM	Spiked Blank	13C2-4:2-Fluorotelomersulfonic Acid	2022/09/08		84	%	50 - 150
				13C2-6:2-Fluorotelomersulfonic Acid	2022/09/08		87	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2022/09/08		84	%	50 - 150
				13C2-Perfluorodecanoic acid	2022/09/08		84	%	50 - 150
				13C2-Perfluorododecanoic acid	2022/09/08		79	%	50 - 150
				13C2-Perfluorohexanoic acid	2022/09/08		86	%	50 - 150
				13C2-Perfluoroundecanoic acid	2022/09/08		83	%	50 - 150
				13C3-HFPO-DA	2022/09/08		76	%	50 - 150



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				13C3-Perfluorobutanesulfonic acid	2022/09/08		84	%	50 - 150
				13C4-Perfluorobutanoic acid	2022/09/08		86	%	50 - 150
				13C4-Perfluoroheptanoic acid	2022/09/08		85	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2022/09/08		82	%	50 - 150
				13C4-Perfluorooctanoic acid	2022/09/08		85	%	50 - 150
				13C5-Perfluorononanoic acid	2022/09/08		84	%	50 - 150
				13C5-Perfluoropentanoic acid	2022/09/08		83	%	50 - 150
				18O2-Perfluorohexanesulfonic acid	2022/09/08		82	%	50 - 150
				D3-MeFOSAA	2022/09/08		84	%	50 - 150
				D5-EtFOSAA	2022/09/08		80	%	50 - 150
				Perfluorobutanoic acid (PFBA)	2022/09/08		99	%	70 - 130
				Perfluoropentanoic acid (PFPeA)	2022/09/08		101	%	70 - 130
				Perfluorohexanoic acid (PFHxA)	2022/09/08		99	%	70 - 130
				Perfluoroheptanoic acid (PFHpA)	2022/09/08		99	%	70 - 130
				Perfluorooctanoic acid (PFOA)	2022/09/08		104	%	70 - 130
				Perfluorononanoic acid (PFNA)	2022/09/08		100	%	70 - 130
				Perfluorodecanoic acid (PFDA)	2022/09/08		98	%	70 - 130
				Perfluoroundecanoic acid (PFUnA)	2022/09/08		99	%	70 - 130
				Perfluorododecanoic acid (PFDoA)	2022/09/08		99	%	70 - 130
				Perfluorobutanesulfonic acid (PFBS)	2022/09/08		99	%	70 - 130
				Perfluoropentanesulfonic acid PFPes	2022/09/08		98	%	70 - 130
				Perfluorohexanesulfonic acid(PFHxS)	2022/09/08		100	%	70 - 130
				Perfluoroheptanesulfonic acid PFHpS	2022/09/08		95	%	70 - 130
				Perfluorooctanesulfonic acid (PFOS)	2022/09/08		100	%	70 - 130
				Perfluorononanesulfonic acid (PFNS)	2022/09/08		89	%	70 - 130
				Perfluorodecanesulfonic acid (PFDS)	2022/09/08		94	%	70 - 130
				EtFOSAA	2022/09/08		103	%	70 - 130
				MeFOSAA	2022/09/08		97	%	70 - 130
				4:2 Fluorotelomer sulfonic acid	2022/09/08		98	%	70 - 130
				6:2 Fluorotelomer sulfonic acid	2022/09/08		99	%	70 - 130
				8:2 Fluorotelomer sulfonic acid	2022/09/08		99	%	70 - 130
				Hexafluoropropyleneoxide dimer acid	2022/09/08		104	%	70 - 130
				4,8-Dioxa-3H-perfluorononanoic acid	2022/09/08		100	%	70 - 130
				9Cl-PF3ONS (F-53B Major)	2022/09/08		97	%	70 - 130
				11Cl-PF3OUdS (F-53B Minor)	2022/09/08		95	%	70 - 130
8208220		TTM	Method Blank	13C2-4:2-Fluorotelomersulfonic Acid	2022/09/08		98	%	50 - 150
				13C2-6:2-Fluorotelomersulfonic Acid	2022/09/08		97	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2022/09/08		95	%	50 - 150
				13C2-Perfluorodecanoic acid	2022/09/08		90	%	50 - 150
				13C2-Perfluorododecanoic acid	2022/09/08		85	%	50 - 150
				13C2-Perfluorohexanoic acid	2022/09/08		93	%	50 - 150
				13C2-Perfluoroundecanoic acid	2022/09/08		92	%	50 - 150
				13C3-HFPO-DA	2022/09/08		78	%	50 - 150
				13C3-Perfluorobutanesulfonic acid	2022/09/08		91	%	50 - 150
				13C4-Perfluorobutanoic acid	2022/09/08		93	%	50 - 150
				13C4-Perfluoroheptanoic acid	2022/09/08		97	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2022/09/08		90	%	50 - 150
				13C4-Perfluorooctanoic acid	2022/09/08		94	%	50 - 150
				13C5-Perfluorononanoic acid	2022/09/08		95	%	50 - 150
				13C5-Perfluoropentanoic acid	2022/09/08		91	%	50 - 150
				18O2-Perfluorohexanesulfonic acid	2022/09/08		89	%	50 - 150
				D3-MeFOSAA	2022/09/08		89	%	50 - 150



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			D5-EtFOSAA	2022/09/08		91	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2022/09/08	0.24 U, MDL=0.24		ug/kg	
			Perfluoropentanoic acid (PFPeA)	2022/09/08	0.23 U, MDL=0.23		ug/kg	
			Perfluorohexanoic acid (PFHxA)	2022/09/08	0.16 U, MDL=0.16		ug/kg	
			Perfluoroheptanoic acid (PFHpA)	2022/09/08	0.17 U, MDL=0.17		ug/kg	
			Perfluorooctanoic acid (PFOA)	2022/09/08	0.20 U, MDL=0.20		ug/kg	
			Perfluorononanoic acid (PFNA)	2022/09/08	0.27 U, MDL=0.27		ug/kg	
			Perfluorodecanoic acid (PFDA)	2022/09/08	0.24 U, MDL=0.24		ug/kg	
			Perfluoroundecanoic acid (PFUnA)	2022/09/08	0.25 U, MDL=0.25		ug/kg	
			Perfluorododecanoic acid (PFDoA)	2022/09/08	0.19 U, MDL=0.19		ug/kg	
			Perfluorobutanesulfonic acid (PFBS)	2022/09/08	0.17 U, MDL=0.17		ug/kg	
			Perfluoropentanesulfonic acid PFPes	2022/09/08	0.26 U, MDL=0.26		ug/kg	
			Perfluorohexanesulfonic acid(PFHxS)	2022/09/08	0.30 U, MDL=0.30		ug/kg	
			Perfluoroheptanesulfonic acid PFHpS	2022/09/08	0.17 U, MDL=0.17		ug/kg	
			Perfluorooctanesulfonic acid (PFOS)	2022/09/08	0.27 U, MDL=0.27		ug/kg	
			Perfluorononanesulfonic acid (PFNS)	2022/09/08	0.24 U, MDL=0.24		ug/kg	
			Perfluorodecanesulfonic acid (PFDS)	2022/09/08	0.27 U, MDL=0.27		ug/kg	
			EtFOSAA	2022/09/08	0.40 U, MDL=0.40		ug/kg	
			MeFOSAA	2022/09/08	0.32 U, MDL=0.32		ug/kg	
			4:2 Fluorotelomer sulfonic acid	2022/09/08	0.25 U, MDL=0.25		ug/kg	
			6:2 Fluorotelomer sulfonic acid	2022/09/08	0.30 U, MDL=0.30		ug/kg	
			8:2 Fluorotelomer sulfonic acid	2022/09/08	0.30 U, MDL=0.30		ug/kg	
			Hexafluoropropyleneoxide dimer acid	2022/09/08	0.19 U, MDL=0.19		ug/kg	
			4,8-Dioxa-3H-perfluorononanoic acid	2022/09/08	0.28 U, MDL=0.28		ug/kg	
			9Cl-PF3ONS (F-53B Major)	2022/09/08	0.21 U, MDL=0.21		ug/kg	
			11Cl-PF3OUds (F-53B Minor)	2022/09/08	0.22 U, MDL=0.22		ug/kg	
8208220	TTM	RPD - Sample/Sample Dup	Perfluorobutanoic acid (PFBA)	2022/09/08	NC		%	30
			Perfluoropentanoic acid (PFPeA)	2022/09/08	NC		%	30
			Perfluorohexanoic acid (PFHxA)	2022/09/08	NC		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				Perfluoroheptanoic acid (PFHpA)	2022/09/08	NC		%	30
				Perfluorooctanoic acid (PFOA)	2022/09/08	NC		%	30
				Perfluorononanoic acid (PFNA)	2022/09/08	NC		%	30
				Perfluorodecanoic acid (PFDA)	2022/09/08	NC		%	30
				Perfluoroundecanoic acid (PFUnA)	2022/09/08	NC		%	30
				Perfluorododecanoic acid (PFDoA)	2022/09/08	NC		%	30
				Perfluorobutanesulfonic acid (PFBS)	2022/09/08	NC		%	30
				Perfluoropentanesulfonic acid PFPes	2022/09/08	NC		%	30
				Perfluorohexanesulfonic acid(PFHxS)	2022/09/08	NC		%	30
				Perfluoroheptanesulfonic acid PFHpS	2022/09/08	NC		%	30
				Perfluorooctanesulfonic acid (PFOS)	2022/09/08	NC		%	30
				Perfluorononanesulfonic acid (PFNS)	2022/09/08	NC		%	30
				Perfluorodecanesulfonic acid (PFDS)	2022/09/08	NC		%	30
				EtFOSAA	2022/09/08	NC		%	30
				MeFOSAA	2022/09/08	NC		%	30
				4:2 Fluorotelomer sulfonic acid	2022/09/08	NC		%	30
				6:2 Fluorotelomer sulfonic acid	2022/09/08	NC		%	30
				8:2 Fluorotelomer sulfonic acid	2022/09/08	NC		%	30
				Hexafluoropropyleneoxide dimer acid	2022/09/08	NC		%	30
				4,8-Dioxa-3H-perfluorononanoic acid	2022/09/08	NC		%	30
				9Cl-PF3ONS (F-53B Major)	2022/09/08	NC		%	30
				11Cl-PF3OUdS (F-53B Minor)	2022/09/08	NC		%	30
8212445	AGU		Matrix Spike	37Cl4 2378 Tetra CDD	2022/09/08		77	%	35 - 197
				C13-1234678 HeptaCDD	2022/09/08		78	%	23 - 140
				C13-1234678 HeptaCDF	2022/09/08		84	%	28 - 143
				C13-123478 HexaCDD	2022/09/08		97	%	32 - 141
				C13-123478 HexaCDF	2022/09/08		76	%	26 - 152
				C13-1234789 HeptaCDF	2022/09/08		77	%	26 - 138
				C13-123678 HexaCDD	2022/09/08		107	%	28 - 130
				C13-123678 HexaCDF	2022/09/08		76	%	26 - 123
				C13-12378 PentaCDD	2022/09/08		71	%	25 - 181
				C13-12378 PentaCDF	2022/09/08		70	%	24 - 185
				C13-123789 HexaCDF	2022/09/08		98	%	29 - 147
				C13-234678 HexaCDF	2022/09/08		99	%	28 - 136
				C13-23478 PentaCDF	2022/09/08		74	%	21 - 178
				C13-2378 TetraCDD	2022/09/08		80	%	25 - 164
				C13-2378 TetraCDF	2022/09/08		80	%	24 - 169
				C13-OCDD	2022/09/08		52	%	17 - 157
				2,3,7,8-Tetra CDD	2022/09/08		99	%	67 - 158
				1,2,3,7,8-Penta CDD	2022/09/08		99	%	25 - 181
				1,2,3,4,7,8-Hexa CDD	2022/09/08		97	%	70 - 164
				1,2,3,6,7,8-Hexa CDD	2022/09/08		108	%	76 - 134
				1,2,3,7,8,9-Hexa CDD	2022/09/08		101	%	64 - 162
				1,2,3,4,6,7,8-Hepta CDD	2022/09/08		94	%	70 - 140
				Octa CDD	2022/09/08		105	%	78 - 144
				Total Tetra CDD	2022/09/08		N/A*****	%	N/A
				Total Penta CDD	2022/09/08		N/A*****	%	N/A
				Total Hexa CDD	2022/09/08		N/A*****	%	N/A
				Total Hepta CDD	2022/09/08		N/A*****	%	N/A
				2,3,7,8-Tetra CDF	2022/09/08		100	%	75 - 158
				1,2,3,7,8-Penta CDF	2022/09/08		101	%	80 - 134
				2,3,4,7,8-Penta CDF	2022/09/08		100	%	68 - 160



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				1,2,3,4,7,8-Hexa CDF	2022/09/08		98	%	72 - 134
				1,2,3,6,7,8-Hexa CDF	2022/09/08		101	%	84 - 130
				2,3,4,6,7,8-Hexa CDF	2022/09/08		95	%	70 - 156
				1,2,3,7,8,9-Hexa CDF	2022/09/08		99	%	78 - 130
				1,2,3,4,6,7,8-Hepta CDF	2022/09/08		98	%	82 - 122
				1,2,3,4,7,8,9-Hepta CDF	2022/09/08		98	%	78 - 138
				Octa CDF	2022/09/08		102	%	63 - 170
				Total Tetra CDF	2022/09/08		N/A*****	%	N/A
				Total Penta CDF	2022/09/08		N/A*****	%	N/A
				Total Hexa CDF	2022/09/08		N/A*****	%	N/A
				Total Hepta CDF	2022/09/08		N/A*****	%	N/A
	8212445	AGU	Spiked Blank	37CL4 2378 Tetra CDD	2022/09/08		90	%	35 - 197
				C13-1234678 HeptaCDD	2022/09/08		76	%	23 - 140
				C13-1234678 HeptaCDF	2022/09/08		85	%	28 - 143
				C13-123478 HexaCDD	2022/09/08		92	%	32 - 141
				C13-123478 HexaCDF	2022/09/08		75	%	26 - 152
				C13-1234789 HeptaCDF	2022/09/08		74	%	26 - 138
				C13-123678 HexaCDD	2022/09/08		104	%	28 - 130
				C13-123678 HexaCDF	2022/09/08		72	%	26 - 123
				C13-12378 PentaCDD	2022/09/08		75	%	25 - 181
				C13-12378 PentaCDF	2022/09/08		78	%	24 - 185
				C13-123789 HexaCDF	2022/09/08		89	%	29 - 147
				C13-234678 HexaCDF	2022/09/08		94	%	28 - 136
				C13-23478 PentaCDF	2022/09/08		77	%	21 - 178
				C13-2378 TetraCDD	2022/09/08		84	%	25 - 164
				C13-2378 TetraCDF	2022/09/08		85	%	24 - 169
				C13-OCDD	2022/09/08		51	%	17 - 157
				2,3,7,8-Tetra CDD	2022/09/08		102	%	67 - 158
				1,2,3,7,8-Penta CDD	2022/09/08		102	%	25 - 181
				1,2,3,4,7,8-Hexa CDD	2022/09/08		102	%	70 - 164
				1,2,3,6,7,8-Hexa CDD	2022/09/08		106	%	76 - 134
				1,2,3,7,8,9-Hexa CDD	2022/09/08		109	%	64 - 162
				1,2,3,4,6,7,8-Hepta CDD	2022/09/08		100	%	70 - 140
				Octa CDD	2022/09/08		101	%	78 - 144
				2,3,7,8-Tetra CDF	2022/09/08		100	%	75 - 158
				1,2,3,7,8-Penta CDF	2022/09/08		97	%	80 - 134
				2,3,4,7,8-Penta CDF	2022/09/08		101	%	68 - 160
				1,2,3,4,7,8-Hexa CDF	2022/09/08		99	%	72 - 134
				1,2,3,6,7,8-Hexa CDF	2022/09/08		105	%	84 - 130
				2,3,4,6,7,8-Hexa CDF	2022/09/08		93	%	70 - 156
				1,2,3,7,8,9-Hexa CDF	2022/09/08		104	%	78 - 130
				1,2,3,4,6,7,8-Hepta CDF	2022/09/08		99	%	82 - 122
				1,2,3,4,7,8,9-Hepta CDF	2022/09/08		105	%	78 - 138
				Octa CDF	2022/09/08		101	%	63 - 170
	8212445	AGU	Method Blank	37CL4 2378 Tetra CDD	2022/09/08		86	%	35 - 197
				C13-1234678 HeptaCDD	2022/09/08		75	%	23 - 140
				C13-1234678 HeptaCDF	2022/09/08		92	%	28 - 143
				C13-123478 HexaCDD	2022/09/08		100	%	32 - 141
				C13-123478 HexaCDF	2022/09/08		76	%	26 - 152
				C13-1234789 HeptaCDF	2022/09/08		74	%	26 - 138
				C13-123678 HexaCDD	2022/09/08		109	%	28 - 130
				C13-123678 HexaCDF	2022/09/08		76	%	26 - 123



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-12378 PentaCDD	2022/09/08		68	%	25 - 181
			C13-12378 PentaCDF	2022/09/08		71	%	24 - 185
			C13-123789 HexaCDF	2022/09/08		102	%	29 - 147
			C13-234678 HexaCDF	2022/09/08		116	%	28 - 136
			C13-23478 PentaCDF	2022/09/08		72	%	21 - 178
			C13-2378 TetraCDD	2022/09/08		81	%	25 - 164
			C13-2378 TetraCDF	2022/09/08		79	%	24 - 169
			C13-OCDD	2022/09/08		50	%	17 - 157
			2,3,7,8-Tetra CDD	2022/09/08	0.120 U, EDL=0.120		pg/g	
			1,2,3,7,8-Penta CDD	2022/09/08	0.149 U, EDL=0.149		pg/g	
			1,2,3,4,7,8-Hexa CDD	2022/09/08	0.159 U, EDL=0.159		pg/g	
			1,2,3,6,7,8-Hexa CDD	2022/09/08	0.164 U, EDL=0.164		pg/g	
			1,2,3,7,8,9-Hexa CDD	2022/09/08	0.178 U, EDL=0.178		pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2022/09/08	0.144 U, EDL=0.144		pg/g	
			Octa CDD	2022/09/08	0.132 U, EDL=0.132		pg/g	
			Total Tetra CDD	2022/09/08	0.120 U, EDL=0.120		pg/g	
			Total Penta CDD	2022/09/08	0.149 U, EDL=0.149		pg/g	
			Total Hexa CDD	2022/09/08	0.424 U, EDL=0.424 (1)		pg/g	
			Total Hepta CDD	2022/09/08	0.144 U, EDL=0.144		pg/g	
			2,3,7,8-Tetra CDF	2022/09/08	0.104 U, EDL=0.104		pg/g	
			1,2,3,7,8-Penta CDF	2022/09/08	0.151 U, EDL=0.151		pg/g	
			2,3,4,7,8-Penta CDF	2022/09/08	0.135 U, EDL=0.135		pg/g	
			1,2,3,4,7,8-Hexa CDF	2022/09/08	0.162 U, EDL=0.162		pg/g	
			1,2,3,6,7,8-Hexa CDF	2022/09/08	0.176 U, EDL=0.176		pg/g	
			2,3,4,6,7,8-Hexa CDF	2022/09/08	0.162 U, EDL=0.162		pg/g	
			1,2,3,7,8,9-Hexa CDF	2022/09/08	0.175 U, EDL=0.175		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2022/09/08	0.153 U, EDL=0.153		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2022/09/08	0.158 U, EDL=0.158		pg/g	
			Octa CDF	2022/09/08	0.137 U, EDL=0.137		pg/g	
			Total Tetra CDF	2022/09/08	0.104 U, EDL=0.104		pg/g	



BUREAU
VERITAS

Bureau Veritas Job #: C200154

Report Date: 2022/12/08

Apex Laboratories

Client Project #: A2H0382

Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Total Penta CDF	2022/09/08	0.142 U, EDL=0.142		pg/g	
			Total Hexa CDF	2022/09/08	0.169 U, EDL=0.169		pg/g	
			Total Hepta CDF	2022/09/08	0.156 U, EDL=0.156		pg/g	
8212445	AGU	RPD - Sample/Sample Dup	2,3,7,8-Tetra CDD	2022/09/08	NC		%	25
			1,2,3,7,8-Penta CDD	2022/09/08	NC		%	25
			1,2,3,4,7,8-Hexa CDD	2022/09/08	NC		%	25
			1,2,3,6,7,8-Hexa CDD	2022/09/08	NC		%	25
			1,2,3,7,8,9-Hexa CDD	2022/09/08	NC (1)		%	25
			1,2,3,4,6,7,8-Hepta CDD	2022/09/08	NC		%	25
			Octa CDD	2022/09/08	8.4		%	25
			Total Tetra CDD	2022/09/08	4.1		%	25
			Total Penta CDD	2022/09/08	NC		%	25
			Total Hexa CDD	2022/09/08	NC		%	25
			Total Hepta CDD	2022/09/08	NC		%	25
			2,3,7,8-Tetra CDF	2022/09/08	NC		%	25
			1,2,3,7,8-Penta CDF	2022/09/08	NC		%	25
			2,3,4,7,8-Penta CDF	2022/09/08	NC		%	25
			1,2,3,4,7,8-Hexa CDF	2022/09/08	NC		%	25
			1,2,3,6,7,8-Hexa CDF	2022/09/08	NC		%	25
			2,3,4,6,7,8-Hexa CDF	2022/09/08	NC		%	25
			1,2,3,7,8,9-Hexa CDF	2022/09/08	NC		%	25
			1,2,3,4,6,7,8-Hepta CDF	2022/09/08	NC		%	25
			1,2,3,4,7,8,9-Hepta CDF	2022/09/08	NC		%	25
			Octa CDF	2022/09/08	NC		%	25
			Total Tetra CDF	2022/09/08	NC		%	25
			Total Penta CDF	2022/09/08	NC		%	25
			Total Hexa CDF	2022/09/08	NC		%	25
			Total Hepta CDF	2022/09/08	NC		%	25
8213841	XIN	Matrix Spike	13C2-perfluorotetradecanoic acid	2022/09/09		121	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2022/09/09		98	%	50 - 150
			D3-MeFOSA	2022/09/09		78	%	25 - 150
			D5-EtFOSA	2022/09/09		71	%	25 - 150
			D7-MeFOSE	2022/09/09		80	%	25 - 150
			D9-EtFOSE	2022/09/09		70	%	25 - 150
			Perfluorotridecanoic acid (PFTRDA)	2022/09/09		93	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2022/09/09		96	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2022/09/09		93	%	70 - 130
			EtFOSA	2022/09/09		100	%	70 - 130
			MeFOSA	2022/09/09		96	%	70 - 130
			EtFOSE	2022/09/09		102	%	70 - 130
			MeFOSE	2022/09/09		103	%	70 - 130
8213841	XIN	Spiked Blank	13C2-perfluorotetradecanoic acid	2022/09/09		84	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2022/09/09		95	%	50 - 150
			D3-MeFOSA	2022/09/09		61	%	25 - 150
			D5-EtFOSA	2022/09/09		56	%	25 - 150
			D7-MeFOSE	2022/09/09		76	%	25 - 150
			D9-EtFOSE	2022/09/09		68	%	25 - 150
			Perfluorotridecanoic acid (PFTRDA)	2022/09/09		112	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2022/09/09		100	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C200154

Report Date: 2022/12/08

Apex Laboratories

Client Project #: A2H0382

Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				Perfluorooctane Sulfonamide (PFOSA)	2022/09/09		93	%	70 - 130
				EtFOSA	2022/09/09		98	%	70 - 130
				MeFOSA	2022/09/09		93	%	70 - 130
				EtFOSE	2022/09/09		97	%	70 - 130
				MeFOSE	2022/09/09		100	%	70 - 130
8213841	XIN		Method Blank	13C2-perfluorotetradecanoic acid	2022/09/09		90	%	50 - 150
				13C8-Perfluorooctane Sulfonamide	2022/09/09		92	%	50 - 150
				D3-MeFOSA	2022/09/09		77	%	25 - 150
				D5-EtFOSA	2022/09/09		71	%	25 - 150
				D7-MeFOSE	2022/09/09		86	%	25 - 150
				D9-EtFOSE	2022/09/09		75	%	25 - 150
				Perfluorotridecanoic acid (PFTRDA)	2022/09/09	0.22 U, MDL=0.22		ug/kg	
				Perfluorotetradecanoic acid(PFTEDA)	2022/09/09	0.30 U, MDL=0.30		ug/kg	
				Perfluorooctane Sulfonamide (PFOSA)	2022/09/09	0.20 U, MDL=0.20		ug/kg	
				EtFOSA	2022/09/09	0.31 U, MDL=0.31		ug/kg	
				MeFOSA	2022/09/09	0.39 U, MDL=0.39		ug/kg	
				EtFOSE	2022/09/09	0.29 U, MDL=0.29		ug/kg	
				MeFOSE	2022/09/09	0.22 U, MDL=0.22		ug/kg	
8213841	XIN	RPD - Sample/Sample Dup		Perfluorotridecanoic acid (PFTRDA)	2022/09/09	NC		%	30
				Perfluorotetradecanoic acid(PFTEDA)	2022/09/09	NC		%	30
				Perfluorooctane Sulfonamide (PFOSA)	2022/09/09	NC		%	30
				EtFOSA	2022/09/09	NC		%	30
				MeFOSA	2022/09/09	NC		%	30
				EtFOSE	2022/09/09	NC		%	30
				MeFOSE	2022/09/09	NC		%	30
8237702	AGU		Method Blank	Confirmation 2,3,7,8-Tetra CDF	2022/09/20	0.12 U, EDL=0.12		pg/g	
8239765	CXU		Matrix Spike(TNI532)	Confirmation C13-2378 TetraCDF	2022/09/20		75	%	40 - 135
				C13-2,44'-TriCB-(28)	2022/09/30		110	%	15 - 145
				C13-22'33'44'55'6'-NonaCB-(206)	2022/09/30		76	%	40 - 145
				C13-22'33'44'5'-HeptaCB-(170)	2022/09/30		89	%	40 - 145
				C13-22'33'455'66'-NonaCB-(208)	2022/09/30		82	%	40 - 145
				C13-22'33'55'66'-OctaCB-(202)	2022/09/30		77	%	40 - 145
				C13-22'33'55'6'-HeptaCB-(178)	2022/09/30		71	%	40 - 145
				C13-22'344'55'-HeptaCB-(180)	2022/09/30		85	%	40 - 145
				C13-22'34'566'-HeptaCB-(188)	2022/09/30		66	%	40 - 145
				C13-22'44'66'-HexaCB-(155)	2022/09/30		74	%	40 - 145
				C13-22'466'-PentaCB-(104)	2022/09/30		76	%	40 - 145
				C13-22'66'-TetraCB-(54)	2022/09/30		70	%	15 - 145
				C13-22'6-TriCB-(19)	2022/09/30		68	%	15 - 145
				C13-22'-DiCB-(4)	2022/09/30		61	%	15 - 145
				C13-233'44'55'6'-OctaCB-(205)	2022/09/30		73	%	40 - 145
				C13-233'44'55'-HeptaCB-(189)	2022/09/30		79	%	40 - 145
				C13-233'44'-PentaCB-(105)	2022/09/30		94	%	40 - 145
				C13-233'55'-PentaCB-(111)	2022/09/30		79	%	40 - 145
				C13-23'44'55'-HexaCB-(167)	2022/09/30		87	%	40 - 145



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				C13-2344'5-PentaCB-(114)	2022/09/30		89	%	40 - 145
				C13-23'44'5-PentaCB-(118)	2022/09/30		97	%	40 - 145
				C13-2'344'5-PentaCB-(123)	2022/09/30		98	%	40 - 145
				C13-2-MonoCB-(1)	2022/09/30		77	%	15 - 145
				C13-33'44'55'-HexaCB-(169)	2022/09/30		75	%	40 - 145
				C13-33'44'5-PentaCB-(126)	2022/09/30		91	%	40 - 145
				C13-33'44'-TetraCB-(77)	2022/09/30		86	%	40 - 145
				C13-344'5-TetraCB-(81)	2022/09/30		89	%	40 - 145
				C13-344'-TriCB-(37)	2022/09/30		95	%	15 - 145
				C13-44'-DiCB-(15)	2022/09/30		76	%	15 - 145
				C13-4-MonoCB-(3)	2022/09/30		74	%	15 - 145
				C13-DecaCB-(209)	2022/09/30		74	%	40 - 145
				C13-HexaCB-(156)+(157)	2022/09/30		85	%	40 - 145
				2-MonoCB-(1)	2022/09/30		109	%	60 - 145
				22'-DiCB-(4)	2022/09/30		114	%	60 - 145
				4,4'-DiCB-(15)	2022/09/30		114	%	60 - 145
				22'6-TriCB-(19)	2022/09/30		107	%	60 - 145
				344'-TriCB-(37)	2022/09/30		100	%	60 - 145
				22'66'-TetraCB-(54)	2022/09/30		101	%	60 - 145
				33'44'-TetraCB-(77)	2022/09/30		104	%	60 - 145
				344'5-TetraCB-(81)	2022/09/30		115	%	60 - 145
				22'466'-PentaCB-(104)	2022/09/30		111	%	60 - 145
				233'44'-PentaCB-(105)	2022/09/30		104	%	60 - 145
				2344'5-PentaCB-(114)	2022/09/30		105	%	60 - 145
				23'44'5-PentaCB-(118)	2022/09/30		104	%	60 - 145
				23'44'5'-PentaCB-(123)	2022/09/30		122	%	60 - 145
				33'44'5-PentaCB-(126)	2022/09/30		109	%	60 - 145
				22'44'66'-HexaCB-(155)	2022/09/30		106	%	60 - 145
				HexaCB-(156)+(157)	2022/09/30		97	%	N/A
				23'44'55'-HexaCB-(167)	2022/09/30		94	%	60 - 145
				33'44'55'-HexaCB-(169)	2022/09/30		113	%	60 - 145
				22'33'44'5-HeptaCB-(170)	2022/09/30		95	%	60 - 145
				HeptaCB-(180)+(193)	2022/09/30		90	%	N/A
				22'34'566'-HeptaCB-(188)	2022/09/30		116	%	60 - 145
				233'44'55'-HeptaCB-(189)	2022/09/30		116	%	60 - 145
				22'33'55'66'-OctaCB-(202)	2022/09/30		123	%	60 - 145
				233'44'55'6-OctaCB-(205)	2022/09/30		119	%	60 - 145
				22'33'44'55'6-NonaCB-(206)	2022/09/30		125	%	60 - 145
				22'33'455'66'-NonaCB-(208)	2022/09/30		120	%	60 - 145
				DecaCB-(209)	2022/09/30		111	%	60 - 145
8239765	CXU		Spiked Blank	C13-2,44'-TriCB-(28)	2022/10/03		55	%	15 - 145
				C13-22'33'44'55'6-NonaCB-(206)	2022/10/03		79	%	40 - 145
				C13-22'33'44'5-HeptaCB-(170)	2022/10/03		70	%	40 - 145
				C13-22'33'455'66'-NonaCB-(208)	2022/10/03		75	%	40 - 145
				C13-22'33'55'66'-OctaCB-(202)	2022/10/03		52	%	40 - 145
				C13-22'33'55'6-HeptaCB-(178)	2022/10/03		60	%	40 - 145
				C13-22'344'55'-HeptaCB-(180)	2022/10/03		60	%	40 - 145
				C13-22'34'566'-HeptaCB-(188)	2022/10/03		62	%	40 - 145
				C13-22'44'66'-HexaCB-(155)	2022/10/03		66	%	40 - 145
				C13-22'466'-PentaCB-(104)	2022/10/03		61	%	40 - 145
				C13-22'66'-TetraCB-(54)	2022/10/03		50	%	15 - 145
				C13-22'6-TriCB-(19)	2022/10/03		47	%	15 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-22'-DiCB-(4)	2022/10/03		41	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2022/10/03		83	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2022/10/03		76	%	40 - 145
			C13-233'44'-PentaCB-(105)	2022/10/03		72	%	40 - 145
			C13-233'55'-PentaCB-(111)	2022/10/03		50	%	40 - 145
			C13-23'44'55'-HexaCB-(167)	2022/10/03		90	%	40 - 145
			C13-2344'5-PentaCB-(114)	2022/10/03		66	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2022/10/03		66	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2022/10/03		65	%	40 - 145
			C13-2-MonoCB-(1)	2022/10/03		44	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2022/10/03		102	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2022/10/03		80	%	40 - 145
			C13-33'44'-TetraCB-(77)	2022/10/03		54	%	40 - 145
			C13-344'5-TetraCB-(81)	2022/10/03		55	%	40 - 145
			C13-344'-TriCB-(37)	2022/10/03		61	%	15 - 145
			C13-44'-DiCB-(15)	2022/10/03		52	%	15 - 145
			C13-4-MonoCB-(3)	2022/10/03		40	%	15 - 145
			C13-DecaCB-(209)	2022/10/03		84	%	40 - 145
			C13-HexaCB-(156)+(157)	2022/10/03		99	%	40 - 145
			2-MonoCB-(1)	2022/10/03		111	%	60 - 145
			4-MonoCB-(3)	2022/10/03		117	%	60 - 145
			22'-DiCB-(4)	2022/10/03		109	%	60 - 145
			4,4'-DiCB-(15)	2022/10/03		110	%	60 - 145
			22'6-TriCB-(19)	2022/10/03		109	%	60 - 145
			344'-TriCB-(37)	2022/10/03		105	%	60 - 145
			22'66'-TetraCB-(54)	2022/10/03		110	%	60 - 145
			33'44'-TetraCB-(77)	2022/10/03		115	%	60 - 145
			344'5-TetraCB-(81)	2022/10/03		112	%	60 - 145
			22'466'-PentaCB-(104)	2022/10/03		114	%	60 - 145
			233'44'-PentaCB-(105)	2022/10/03		109	%	60 - 145
			2344'5-PentaCB-(114)	2022/10/03		111	%	60 - 145
			23'44'5-PentaCB-(118)	2022/10/03		108	%	60 - 145
			23'44'5'-PentaCB-(123)	2022/10/03		111	%	60 - 145
			33'44'5-PentaCB-(126)	2022/10/03		110	%	60 - 145
			22'44'66'-HexaCB-(155)	2022/10/03		111	%	60 - 145
			HexaCB-(156)+(157)	2022/10/03		108	%	N/A
			23'44'55'-HexaCB-(167)	2022/10/03		103	%	60 - 145
			33'44'55'-HexaCB-(169)	2022/10/03		106	%	60 - 145
			22'33'44'5-HeptaCB-(170)	2022/10/03		106	%	60 - 145
			HeptaCB-(180)+(193)	2022/10/03		85	%	N/A
			22'34'566'-HeptaCB-(188)	2022/10/03		110	%	60 - 145
			233'44'55'-HeptaCB-(189)	2022/10/03		106	%	60 - 145
			22'33'55'66'-OctaCB-(202)	2022/10/03		106	%	60 - 145
			233'44'55'6-OctaCB-(205)	2022/10/03		102	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2022/10/03		100	%	60 - 145
			22'33'455'66'-NonaCB-(208)	2022/10/03		105	%	60 - 145
			DecaCB-(209)	2022/10/03		99	%	60 - 145
8239765	CXU	Spiked Blank DUP	C13-2,44'-TriCB-(28)	2022/10/03		60	%	15 - 145
			C13-22'33'44'55'6-NonaCB-(206)	2022/10/03		77	%	40 - 145
			C13-22'33'44'5-HeptaCB-(170)	2022/10/03		70	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2022/10/03		70	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2022/10/03		59	%	40 - 145



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-22'33'55'6-HeptaCB-(178)	2022/10/03		75	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2022/10/03		65	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2022/10/03		75	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2022/10/03		80	%	40 - 145
			C13-22'466'-PentaCB-(104)	2022/10/03		60	%	40 - 145
			C13-22'66'-TetraCB-(54)	2022/10/03		51	%	15 - 145
			C13-22'6-TriCB-(19)	2022/10/03		50	%	15 - 145
			C13-22'-DiCB-(4)	2022/10/03		34	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2022/10/03		85	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2022/10/03		70	%	40 - 145
			C13-233'44'-PentaCB-(105)	2022/10/03		66	%	40 - 145
			C13-233'55'-PentaCB-(111)	2022/10/03		60	%	40 - 145
			C13-23'44'55'-HexaCB-(167)	2022/10/03		86	%	40 - 145
			C13-2344'5-PentaCB-(114)	2022/10/03		65	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2022/10/03		66	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2022/10/03		66	%	40 - 145
			C13-2-MonoCB-(1)	2022/10/03		41	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2022/10/03		84	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2022/10/03		68	%	40 - 145
			C13-33'44'-TetraCB-(77)	2022/10/03		62	%	40 - 145
			C13-344'5-TetraCB-(81)	2022/10/03		62	%	40 - 145
			C13-344'-TriCB-(37)	2022/10/03		63	%	15 - 145
			C13-44'-DiCB-(15)	2022/10/03		57	%	15 - 145
			C13-4-MonoCB-(3)	2022/10/03		25	%	15 - 145
			C13-DecaCB-(209)	2022/10/03		81	%	40 - 145
			C13-HexaCB-(156)+(157)	2022/10/03		100	%	40 - 145
			2-MonoCB-(1)	2022/10/03		108	%	60 - 145
			4-MonoCB-(3)	2022/10/03		118	%	60 - 145
			22'-DiCB-(4)	2022/10/03		104	%	60 - 145
			4,4'-DiCB-(15)	2022/10/03		109	%	60 - 145
			22'6-TriCB-(19)	2022/10/03		108	%	60 - 145
			344'-TriCB-(37)	2022/10/03		104	%	60 - 145
			22'66'-TetraCB-(54)	2022/10/03		106	%	60 - 145
			33'44'-TetraCB-(77)	2022/10/03		112	%	60 - 145
			344'5-TetraCB-(81)	2022/10/03		109	%	60 - 145
			22'466'-PentaCB-(104)	2022/10/03		110	%	60 - 145
			233'44'-PentaCB-(105)	2022/10/03		105	%	60 - 145
			2344'5-PentaCB-(114)	2022/10/03		108	%	60 - 145
			23'44'5-PentaCB-(118)	2022/10/03		105	%	60 - 145
			23'44'5'-PentaCB-(123)	2022/10/03		108	%	60 - 145
			33'44'5-PentaCB-(126)	2022/10/03		109	%	60 - 145
			22'44'66'-HexaCB-(155)	2022/10/03		107	%	60 - 145
			HexaCB-(156)+(157)	2022/10/03		107	%	N/A
			23'44'55'-HexaCB-(167)	2022/10/03		102	%	60 - 145
			33'44'55'-HexaCB-(169)	2022/10/03		104	%	60 - 145
			22'33'44'5-HeptaCB-(170)	2022/10/03		103	%	60 - 145
			HeptaCB-(180)+(193)	2022/10/03		83	%	N/A
			22'34'566'-HeptaCB-(188)	2022/10/03		106	%	60 - 145
			233'44'55'-HeptaCB-(189)	2022/10/03		105	%	60 - 145
			22'33'55'66'-OctaCB-(202)	2022/10/03		104	%	60 - 145
			233'44'55'6-OctaCB-(205)	2022/10/03		98	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2022/10/03		98	%	60 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C200154

Report Date: 2022/12/08

Apex Laboratories

Client Project #: A2H0382

Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				22'33'455'66'-NonaCB-(208)	2022/10/03		104	%	60 - 145
				DecaCB-(209)	2022/10/03		95	%	60 - 145
8239765		CXU	RPD	2-MonoCB-(1)	2022/10/03	2.7		%	30
				4-MonoCB-(3)	2022/10/03	0.85		%	30
				22'-DiCB-(4)	2022/10/03	4.7		%	30
				4,4'-DiCB-(15)	2022/10/03	0.91		%	30
				22'6'-TriCB-(19)	2022/10/03	0.92		%	30
				344'-TriCB-(37)	2022/10/03	0.96		%	30
				22'66'-TetraCB-(54)	2022/10/03	3.7		%	30
				33'44'-TetraCB-(77)	2022/10/03	2.6		%	30
				344'5'-TetraCB-(81)	2022/10/03	2.7		%	30
				22'466'-PentaCB-(104)	2022/10/03	3.6		%	30
				233'44'-PentaCB-(105)	2022/10/03	3.7		%	30
				2344'5'-PentaCB-(114)	2022/10/03	2.7		%	30
				23'44'5'-PentaCB-(118)	2022/10/03	2.8		%	30
				23'44'5'-PentaCB-(123)	2022/10/03	2.7		%	30
				33'44'5'-PentaCB-(126)	2022/10/03	0.91		%	30
				22'44'66'-HexaCB-(155)	2022/10/03	3.7		%	30
				HexaCB-(156)+(157)	2022/10/03	0.93		%	30
				23'44'55'-HexaCB-(167)	2022/10/03	0.98		%	30
				33'44'55'-HexaCB-(169)	2022/10/03	1.9		%	30
				22'33'44'5'-HeptaCB-(170)	2022/10/03	2.9		%	30
				HeptaCB-(180)+(193)	2022/10/03	2.4		%	30
				22'34'566'-HeptaCB-(188)	2022/10/03	3.7		%	30
				233'44'55'-HeptaCB-(189)	2022/10/03	0.95		%	30
				22'33'55'66'-OctaCB-(202)	2022/10/03	1.9		%	30
				233'44'55'6'-OctaCB-(205)	2022/10/03	4.0		%	30
				22'33'44'55'6'-NonaCB-(206)	2022/10/03	2.0		%	30
				22'33'455'66'-NonaCB-(208)	2022/10/03	0.96		%	30
				DecaCB-(209)	2022/10/03	4.1		%	30
8239765		CXU	Method Blank	C13-2,44'-TriCB-(28)	2022/09/30		39	%	15 - 145
				C13-22'33'44'55'6'-NonaCB-(206)	2022/09/30		76	%	40 - 145
				C13-22'33'44'5'-HeptaCB-(170)	2022/09/30		105	%	40 - 145
				C13-22'33'455'66'-NonaCB-(208)	2022/09/30		87	%	40 - 145
				C13-22'33'55'66'-OctaCB-(202)	2022/09/30		86	%	40 - 145
				C13-22'33'55'6'-HeptaCB-(178)	2022/09/30		66	%	40 - 145
				C13-22'344'55'-HeptaCB-(180)	2022/09/30		97	%	40 - 145
				C13-22'34'566'-HeptaCB-(188)	2022/09/30		58	%	40 - 145
				C13-22'44'66'-HexaCB-(155)	2022/09/30		43	%	40 - 145
				C13-22'466'-PentaCB-(104)	2022/09/30		35	%	40 - 145
				C13-22'66'-TetraCB-(54)	2022/09/30		24 (2)	%	15 - 145
				C13-22'6'-TriCB-(19)	2022/09/30		30	%	15 - 145
				C13-22'-DiCB-(4)	2022/09/30		21 (2)	%	15 - 145
				C13-233'44'55'6'-OctaCB-(205)	2022/09/30		77	%	40 - 145
				C13-233'44'55'-HeptaCB-(189)	2022/09/30		88	%	40 - 145
				C13-233'44'-PentaCB-(105)	2022/09/30		86	%	40 - 145
				C13-233'55'-PentaCB-(111)	2022/09/30		58	%	40 - 145
				C13-23'44'55'-HexaCB-(167)	2022/09/30		84	%	40 - 145
				C13-2344'5'-PentaCB-(114)	2022/09/30		72	%	40 - 145
				C13-23'44'5'-PentaCB-(118)	2022/09/30		78	%	40 - 145
				C13-2'344'5'-PentaCB-(123)	2022/09/30		77	%	40 - 145
				C13-2-MonoCB-(1)	2022/09/30		22	%	15 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C200154
Report Date: 2022/12/08

Apex Laboratories
Client Project #: A2H0382
Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-33'44'55'-HexaCB-(169)	2022/09/30		77	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2022/09/30		91	%	40 - 145
			C13-33'44'-TetraCB-(77)	2022/09/30		78	%	40 - 145
			C13-344'5-TetraCB-(81)	2022/09/30		73	%	40 - 145
			C13-344'-TriCB-(37)	2022/09/30		54	%	15 - 145
			C13-44'-DiCB-(15)	2022/09/30		36	%	15 - 145
			C13-4-MonoCB-(3)	2022/09/30		21	%	15 - 145
			C13-DecaCB-(209)	2022/09/30		74	%	40 - 145
			C13-HexaCB-(156)+(157)	2022/09/30		85	%	40 - 145
			2-MonoCB-(1)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			3-MonoCB-(2)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			4-MonoCB-(3)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			22'-DiCB-(4)	2022/09/30	0.00056 U, EDL=0.00056		ng/g	
			2,3-DiCB-(5)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			2,3'-DiCB-(6)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			2,4-DiCB-(7)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			2,4'-DiCB-(8)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			2,5-DiCB-(9)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			2,6-DiCB-(10)	2022/09/30	0.00046 U, EDL=0.00046		ng/g	
			3,3'-DiCB-(11)	2022/09/30	0.00323 J, EDL=0.00020		ng/g	
			DiCB-(12)+(13)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			3,5-DiCB-(14)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			4,4'-DiCB-(15)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			22'3-TriCB-(16)	2022/09/30	0.00052 U, EDL=0.00052		ng/g	
			22'4-TriCB-(17)	2022/09/30	0.00044 U, EDL=0.00044		ng/g	
			TriCB-(18)+(30)	2022/09/30	0.00037 U, EDL=0.00037		ng/g	
			22'6-TriCB-(19)	2022/09/30	0.00045 U, EDL=0.00045		ng/g	
			TriCB-(20) + (28)	2022/09/30	0.00027 J, EDL=0.00023		ng/g	
			TriCB-(21)+(33)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			234'-TriCB-(22)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			235-TriCB-(23)	2022/09/30	0.00024 U, EDL=0.00024		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			236-TriCB-(24)	2022/09/30	0.00030 U, EDL=0.00030		ng/g	
			23'4-TriCB-(25)	2022/09/30	0.00023 U, EDL=0.00023		ng/g	
			TriCB-(26)+(29)	2022/09/30	0.00023 U, EDL=0.00023		ng/g	
			23'6-TriCB-(27)	2022/09/30	0.00031 U, EDL=0.00031		ng/g	
			24'5-TriCB-(31)	2022/09/30	0.00023 U, EDL=0.00023		ng/g	
			24'6-TriCB-(32)	2022/09/30	0.00030 U, EDL=0.00030		ng/g	
			23'5'-TriCB-(34)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			33'4-TriCB-(35)	2022/09/30	0.00024 U, EDL=0.00024		ng/g	
			33'5-TriCB-(36)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			344'-TriCB-(37)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			345-TriCB-(38)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			34'5-TriCB-(39)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			TetraCB-(40)+(41)+(71)	2022/09/30	0.00034 U, EDL=0.00034		ng/g	
			22'34'-TetraCB-(42)	2022/09/30	0.00040 U, EDL=0.00040		ng/g	
			22'35-TetraCB-(43)	2022/09/30	0.00048 U, EDL=0.00048		ng/g	
			TetraCB-(44)+(47)+(65)	2022/09/30	0.00045 J, EDL=0.00032		ng/g	
			TetraCB-(45)+(51)	2022/09/30	0.00038 U, EDL=0.00038		ng/g	
			22'36'-TetraCB-(46)	2022/09/30	0.00041 U, EDL=0.00041		ng/g	
			22'45-TetraCB-(48)	2022/09/30	0.00037 U, EDL=0.00037		ng/g	
			TetraCB-(49)+TetraCB-(69)	2022/09/30	0.00030 U, EDL=0.00030		ng/g	
			TetraCB-(50)+(53)	2022/09/30	0.00037 U, EDL=0.00037		ng/g	
			22'55'-TetraCB-(52)	2022/09/30	0.00036 U, EDL=0.00036		ng/g	
			22'66'-TetraCB-(54)	2022/09/30	0.00055 U, EDL=0.00055		ng/g	
			233'4-TetraCB-(55)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			233'4'-Tetra CB(56)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			233'5-TetraCB-(57)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			233'5'-TetraCB-(58)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			TetraCB-(59)+(62)+(75)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			2344'-TetraCB -(60)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			TetraCB-(61)+(70)+(74)+(76)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			234'5-TetraCB-(63)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			234'6-TetraCB-(64)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			23'44'-TetraCB-(66)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			23'45-TetraCB-(67)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			23'45'-TetraCB-(68)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			23'55'-TetraCB-(72)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			23'5'6-TetraCB-(73)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			33'44'-TetraCB-(77)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			33'45-TetraCB-(78)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			33'45'-TetraCB(79)	2022/09/30	0.00023 U, EDL=0.00023		ng/g	
			33'55'-TetraCB-(80)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			344'5-TetraCB-(81)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			22'33'4-PentaCB-(82)	2022/09/30	0.00031 U, EDL=0.00031		ng/g	
			PentaCB-(83)+(99)	2022/09/30	0.00030 U, EDL=0.00030		ng/g	
			22'33'6-PentaCB-(84)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			PentaCB-(85)+(116)+(117)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			PentaCB-(86)(87)(97)(109)(119)(125)	2022/09/30	0.00023 U, EDL=0.00023		ng/g	
			PentaCB-(88)+(91)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			22'346'-PentaCB-(89)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			PentaCB-(90)+(101)+(113)	2022/09/30	0.00039 J, EDL=0.00023		ng/g	
			22'355'-PentaCB-(92)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			PentaCB-(93)+(98)+(100)+(102)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			22'356'-PentaCB-(94)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			22'35'6-PentaCB-(95)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	



BUREAU
VERITAS

Bureau Veritas Job #: C200154

Report Date: 2022/12/08

Apex Laboratories

Client Project #: A2H0382

Your P.O. #: A2H0382

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'366'-PentaCB-(96)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			22'45'6'-PentaCB-(103)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			22'466'-PentaCB-(104)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			233'44'-PentaCB-(105)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			233'45'-PentaCB-(106)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			233'4'5'-PentaCB-(107)	2022/09/30	0.00018 U, EDL=0.00018		ng/g	
			PentaCB-(108)+(124)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			PentaCB-(110)+(115)	2022/09/30	0.00032 J, EDL=0.00023		ng/g	
			233'55'-PentaCB-(111)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			233'56'-PentaCB-(112)	2022/09/30	0.00018 U, EDL=0.00018		ng/g	
			2344'5'-PentaCB-(114)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			23'44'5'-PentaCB-(118)	2022/09/30	0.00033 J, EDL=0.00021		ng/g	
			23'455'-PentaCB-(120)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			23'45'6'-PentaCB-(121)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			233'4'5'-PentaCB-(122)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			23'44'5'-PentaCB-(123)	2022/09/30	0.00024 U, EDL=0.00024		ng/g	
			33'44'5'-PentaCB-(126)	2022/09/30	0.00021 U, EDL=0.00021		ng/g	
			33'455'-PentaCB-(127)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			HexaCB-(128)+(166)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			HexaCB-(129)+(138)+(163)	2022/09/30	0.00053 J, EDL=0.00031		ng/g	
			22'33'45'-HexaCB-(130)	2022/09/30	0.00036 U, EDL=0.00036		ng/g	
			22'33'46'-HexaCB-(131)	2022/09/30	0.00034 U, EDL=0.00034		ng/g	
			22'33'46'-HexaCB-(132)	2022/09/30	0.00033 U, EDL=0.00033		ng/g	
			22'33'55'-HexaCB-(133)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			HexaCB-(134)+(143)	2022/09/30	0.00036 U, EDL=0.00036		ng/g	
			HexaCB-(135)+(151)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			22'33'66'-HexaCB-(136)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'344'5-HexaCB-(137)	2022/09/30	0.00036 U, EDL=0.00036		ng/g	
			HexaCB-(139)+(140)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			22'3455'-HexaCB-(141)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			22'3456-HexaCB-(142)	2022/09/30	0.00031 U, EDL=0.00031		ng/g	
			22'345'6-HexaCB-(144)	2022/09/30	0.00028 U, EDL=0.00028		ng/g	
			22'3466'-HexaCB-(145)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			22'34'55'-HexaCB-(146)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			HexaCB-(147)+(149)	2022/09/30	0.00031 J, EDL=0.00028		ng/g	
			22'34'56'-HexaCB-(148)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			22'34'66'-HexaCB-(150)	2022/09/30	0.00018 U, EDL=0.00018		ng/g	
			22'3566'-HexaCB-(152)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			HexaCB-(153)+(168)	2022/09/30	0.00040 J, EDL=0.00025		ng/g	
			22'44'56'-HexaCB-(154)	2022/09/30	0.00021 U, EDL=0.00021		ng/g	
			22'44'66'-HexaCB-(155)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			HexaCB-(156)+(157)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			233'44'6-HexaCB-(158)	2022/09/30	0.00023 U, EDL=0.00023		ng/g	
			233'455'-HexaCB-(159)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			233'456-HexaCB-(160)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			233'45'6-HexaCB-(161)	2022/09/30	0.00022 U, EDL=0.00022		ng/g	
			233'4'55'-HexaCB-(162)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			233'4'5'6-HexaCB-(164)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			233'55'6-HexaCB-(165)	2022/09/30	0.00025 U, EDL=0.00025		ng/g	
			23'44'55'-HexaCB-(167)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			33'44'55'-HexaCB-(169)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			22'33'44'5-HeptaCB-(170)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			HeptaCB-(171)+(173)	2022/09/30	0.00046 U, EDL=0.00046		ng/g	
			22'33'455'-HeptaCB-(172)	2022/09/30	0.00049 U, EDL=0.00049		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'456'-HeptaCB-(174)	2022/09/30	0.00045 U, EDL=0.00045		ng/g	
			22'33'45'6'-HeptaCB-(175)	2022/09/30	0.00030 U, EDL=0.00030		ng/g	
			22'33'466'-HeptaCB-(176)	2022/09/30	0.00019 U, EDL=0.00019		ng/g	
			22'33'45'6'-HeptaCB-(177)	2022/09/30	0.00052 U, EDL=0.00052		ng/g	
			22'33'55'6'-HeptaCB-(178)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			22'33'566'-HeptaCB-(179)	2022/09/30	0.00018 U, EDL=0.00018		ng/g	
			HeptaCB-(180)+(193)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			22'344'56'-HeptaCB-(181)	2022/09/30	0.00046 U, EDL=0.00046		ng/g	
			22'344'56'-HeptaCB-(182)	2022/09/30	0.00034 U, EDL=0.00034		ng/g	
			22'344'5'6'-HeptaCB-(183)	2022/09/30	0.00042 U, EDL=0.00042		ng/g	
			22'344'66'-HeptaCB-(184)	2022/09/30	0.00018 U, EDL=0.00018		ng/g	
			22'3455'6'-HeptaCB-(185)	2022/09/30	0.00049 U, EDL=0.00049		ng/g	
			22'34566'-HeptaCB-(186)	2022/09/30	0.00020 U, EDL=0.00020		ng/g	
			22'34'55'6'-HeptaCB-(187)	2022/09/30	0.00032 U, EDL=0.00032		ng/g	
			22'34'566'-HeptaCB-(188)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			233'44'55'-HeptaCB-(189)	2022/09/30	0.00038 U, EDL=0.00038		ng/g	
			233'44'56'-HeptaCB-(190)	2022/09/30	0.00035 U, EDL=0.00035		ng/g	
			233'44'5'6'-HeptaCB-(191)	2022/09/30	0.00034 U, EDL=0.00034		ng/g	
			233'455'6'-HeptaCB-(192)	2022/09/30	0.00038 U, EDL=0.00038		ng/g	
			22'33'44'55'-OctaCB-(194)	2022/09/30	0.00051 U, EDL=0.00051		ng/g	
			22'33'44'56'-OctaCB-(195)	2022/09/30	0.00058 U, EDL=0.00058		ng/g	
			22'33'44'56'-OctaCB-(196)	2022/09/30	0.00039 U, EDL=0.00039		ng/g	
			22'33'44'66'-OctaCB-(197)	2022/09/30	0.00030 U, EDL=0.00030		ng/g	
			OctaCB-(198)+(199)	2022/09/30	0.00037 U, EDL=0.00037		ng/g	
			22'33'4566'-OctaCB-(200)	2022/09/30	0.00026 U, EDL=0.00026		ng/g	
			22'33'45'66'-OctaCB-(201)	2022/09/30	0.00027 U, EDL=0.00027		ng/g	
			22'33'55'66'-OctaCB-(202)	2022/09/30	0.00033 U, EDL=0.00033		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'344'55'6-OctaCB-(203)	2022/09/30	0.00035 U, EDL=0.00035		ng/g	
			22'344'566'-OctaCB-(204)	2022/09/30	0.00029 U, EDL=0.00029		ng/g	
			233'44'55'6-OctaCB-(205)	2022/09/30	0.00041 U, EDL=0.00041		ng/g	
			22'33'44'55'6-NonaCB-(206)	2022/09/30	0.00050 U, EDL=0.00050		ng/g	
			22'33'44'566'-NonaCB-(207)	2022/09/30	0.00045 U, EDL=0.00045		ng/g	
			22'33'455'66'-NonaCB-(208)	2022/09/30	0.00052 U, EDL=0.00052		ng/g	
			DecaCB-(209)	2022/09/30	0.00054 U, EDL=0.00054		ng/g	
			Total PCB	2022/09/30	2.8 U, EDL=2.8		ng/g	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(2) within method criteria.



VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Angel Guerrero, Supervisor, Ultra Trace Analysis, HRMS

Colm McNamara, Senior Analyst, Liquid Chromatography

Cristina Carriere, Senior Scientific Specialist

Cathy Xu, Scientific Specialist, Ultra Trace Analysis, HRMS

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Your Project #: A3B0217

Attention: Philip Nerenberg

Apex Laboratories
6700 SW Sandburg St.
Tigard, OR
USA 97223

Report Date: 2023/04/24
Report #: R7599894
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C338911

Received: 2023/02/09, 12:55

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dioxins/Furans in Water (1613B) (1)	1	2023/02/12	2023/02/21	BRL SOP-00410	EPA 1613B m
2378TCDF Confirmation (M8290A/M1613)	1	2023/02/12	2023/03/02	BRL SOP-00406 BRL SOP-00410	EPA M8290Am/ M1613Bm
OC Pesticides in Water by GCTQ	1	2023/02/14	2023/02/17	BRL SOP-00014	EPA Method 1699m
PCB Congeners in Water (1668C)	1	2023/02/23	2023/03/06	BRL SOP-00408	EPA 1668C m
PFAS in water by SPE/LCMS (2)	2	2023/02/21	2023/02/22	CAM SOP-00894	EPA 537.1 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

(2) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Lori Dufour, Project Manager
Email: Lori.Dufour@bureauveritas.com
Phone# (905) 817-5700

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VAE871			
Sampling Date		2023/02/07 08:30			
	UNITS	MFA-B3A-20230207- GW-36.0	RDL	MDL	QC Batch
Aldrin	ng/L	0.19 U (1)	1.8	0.19	8503096
alpha-BHC	ng/L	0.073 J	0.20	0.024	8503096
delta-BHC	ng/L	0.147 J	0.20	0.029	8503096
beta-BHC	ng/L	0.13 U (1)	1.8	0.13	8503096
Lindane	ng/L	0.20	0.20	0.033	8503096
a-Chlordane	ng/L	0.103 J	0.20	0.029	8503096
g-Chlordane	ng/L	0.119 J	0.20	0.029	8503096
Oxychlordane	ng/L	0.028 U	0.20	0.028	8503096
o,p-DDD	ng/L	0.77	0.20	0.020	8503096
p,p-DDD	ng/L	1.96	0.20	0.014	8503096
o,p-DDE	ng/L	0.197 J	0.20	0.016	8503096
p,p-DDE	ng/L	1.08	0.20	0.012	8503096
o,p-DDT	ng/L	1.56	0.20	0.040	8503096
p,p-DDT	ng/L	5.71	0.20	0.050	8503096
Dieldrin	ng/L	0.090 U (1)	0.36	0.090	8503096
Endosulfan I	ng/L	2.44	0.40	0.067	8503096
Endosulfan II	ng/L	0.296 J	0.40	0.074	8503096
Endosulfan sulfate	ng/L	0.091 U (1)	0.26	0.091	8503096
Endrin	ng/L	1.93	0.20	0.045	8503096
Endrin aldehyde	ng/L	0.157 J	0.20	0.071	8503096
Endrin ketone	ng/L	0.041 J	0.20	0.034	8503096
Heptachlor	ng/L	0.029 U	0.20	0.029	8503096
Heptachlor epoxide	ng/L	0.019 J	0.20	0.015	8503096
Hexachlorobenzene	ng/L	0.10 U	0.20	0.10	8503096
Methoxychlor	ng/L	1.8 U (1)	8.9	1.8	8503096
Mirex	ng/L	0.056 J	0.20	0.021	8503096
cis-Nonachlor	ng/L	0.037 U	0.20	0.037	8503096
trans-Nonachlor	ng/L	0.055 J	0.20	0.044	8503096
Surrogate Recovery (%)					
13C10-cis Nonachlor	%	61	N/A	N/A	8503096
13C10-Heptachlor	%	113	N/A	N/A	8503096
13C10-Heptachlor Epoxide	%	81	N/A	N/A	8503096
13C10-Oxychlordane	%	84	N/A	N/A	8503096
13C10-trans Nonachlor	%	66	N/A	N/A	8503096
13C12-Endrin	%	124	N/A	N/A	8503096
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.					



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VAE871			
Sampling Date		2023/02/07 08:30			
	UNITS	MFA-B3A-20230207- GW-36.0	RDL	MDL	QC Batch
13C12-Endrin Ketone	%	75	N/A	N/A	8503096
13C6-beta BHC	%	58	N/A	N/A	8503096
13C6-d6-gamma BHC (Lindane)	%	85	N/A	N/A	8503096
13C-Methoxychlor	%	119	N/A	N/A	8503096
13C-pp-DDD	%	110	N/A	N/A	8503096
13C-pp-DDE	%	56	N/A	N/A	8503096
13C-pp-DDT	%	79	N/A	N/A	8503096
C13-Hexachlorobenzene	%	52	N/A	N/A	8503096
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					



PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VAE871	VAE872			
Sampling Date		2023/02/07 08:30	2023/02/07 08:20			
	UNITS	MFA-B3A-20230207- GW-36.0	FIELD BLANK	RDL	MDL	QC Batch
Perfluorobutanoic acid (PFBA)	ug/L	0.017 J	0.0015 U	0.020	0.0015	8514543
Perfluoropentanoic acid (PFPeA)	ug/L	0.0061 J	0.0025 U	0.020	0.0025	8514543
Perfluorohexanoic acid (PFHxA)	ug/L	0.0086 J	0.0038 U	0.020	0.0038	8514543
Perfluoroheptanoic acid (PFHpA)	ug/L	0.0036 J	0.0018 U	0.020	0.0018	8514543
Perfluorooctanoic acid (PFOA)	ug/L	0.0082 J	0.0030 U	0.020	0.0030	8514543
Perfluorononanoic acid (PFNA)	ug/L	0.0021 U	0.0021 U	0.020	0.0021	8514543
Perfluorodecanoic acid (PFDA)	ug/L	0.0016 U	0.0016 U	0.020	0.0016	8514543
Perfluoroundecanoic acid (PFUnA)	ug/L	0.0024 U	0.0024 U	0.020	0.0024	8514543
Perfluorododecanoic acid (PFDoA)	ug/L	0.0029 U	0.0029 U	0.020	0.0029	8514543
Perfluorotridecanoic acid (PFTRDA)	ug/L	0.0026 U	0.0026 U	0.020	0.0026	8514543
Perfluorotetradecanoic acid (PFTEDA)	ug/L	0.0016 U	0.0016 U	0.020	0.0016	8514543
Perfluorobutanesulfonic acid (PFBS)	ug/L	0.0021 U	0.0021 U	0.020	0.0021	8514543
Perfluoropentanesulfonic acid PFPes	ug/L	0.0023 U	0.0023 U	0.020	0.0023	8514543
Perfluorohexanesulfonic acid(PFHxS)	ug/L	0.0022 J	0.0022 U	0.020	0.0022	8514543
Perfluoroheptanesulfonic acid PFHpS	ug/L	0.0039 U	0.0039 U	0.020	0.0039	8514543
Perfluorooctanesulfonic acid (PFOS)	ug/L	0.0066 J	0.0035 U	0.020	0.0035	8514543
Perfluorononanesulfonic acid (PFNS)	ug/L	0.0037 U	0.0037 U	0.020	0.0037	8514543
Perfluorodecanesulfonic acid (PFDS)	ug/L	0.0048 U	0.0048 U	0.020	0.0048	8514543
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0034 U	0.0034 U	0.020	0.0034	8514543
EtFOSA	ug/L	0.0095 U	0.0095 U	0.020	0.0095	8514543
MeFOSA	ug/L	0.0084 U	0.0084 U	0.020	0.0084	8514543
EtFOSE	ug/L	0.0070 U	0.0070 U	0.020	0.0070	8514543
MeFOSE	ug/L	0.0073 U	0.0073 U	0.020	0.0073	8514543
EtFOSAA	ug/L	0.0046 U	0.0046 U	0.020	0.0046	8514543
MeFOSAA	ug/L	0.0045 U	0.0045 U	0.020	0.0045	8514543
4:2 Fluorotelomer sulfonic acid	ug/L	0.0033 U	0.0033 U	0.020	0.0033	8514543
6:2 Fluorotelomer sulfonic acid	ug/L	0.0015 U	0.0015 U	0.020	0.0015	8514543
8:2 Fluorotelomer sulfonic acid	ug/L	0.0031 U	0.0031 U	0.020	0.0031	8514543
Hexafluoropropyleneoxide dimer acid	ug/L	0.0052 U	0.0052 U	0.020	0.0052	8514543
4,8-Dioxa-3H-perfluorononanoic acid	ug/L	0.0027 U	0.0027 U	0.020	0.0027	8514543
9Cl-PF3ONS (F-53B Major)	ug/L	0.0043 U	0.0043 U	0.020	0.0043	8514543
11Cl-PF3OUds (F-53B Minor)	ug/L	0.0035 U	0.0035 U	0.020	0.0035	8514543
Surrogate Recovery (%)						
13C2-4:2-Fluorotelomersulfonic Acid	%	105	102	N/A	N/A	8514543
13C2-6:2-Fluorotelomersulfonic Acid	%	108	103	N/A	N/A	8514543
13C2-8:2-Fluorotelomersulfonic Acid	%	95	99	N/A	N/A	8514543
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable						



PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VAE871	VAE872			
Sampling Date		2023/02/07 08:30	2023/02/07 08:20			
	UNITS	MFA-B3A-20230207- GW-36.0	FIELD BLANK	RDL	MDL	QC Batch
13C2-Perfluorodecanoic acid	%	85	91	N/A	N/A	8514543
13C2-Perfluorododecanoic acid	%	71	83	N/A	N/A	8514543
13C2-Perfluorohexanoic acid	%	96	97	N/A	N/A	8514543
13C2-perfluorotetradecanoic acid	%	46 (1)	65	N/A	N/A	8514543
13C2-Perfluoroundecanoic acid	%	80	87	N/A	N/A	8514543
13C3-HFPO-DA	%	94	99	N/A	N/A	8514543
13C3-Perfluorobutanesulfonic acid	%	92	94	N/A	N/A	8514543
13C4-Perfluorobutanoic acid	%	95	97	N/A	N/A	8514543
13C4-Perfluoroheptanoic acid	%	97	100	N/A	N/A	8514543
13C4-Perfluorooctanesulfonic acid	%	88	92	N/A	N/A	8514543
13C4-Perfluorooctanoic acid	%	94	96	N/A	N/A	8514543
13C5-Perfluorononanoic acid	%	94	96	N/A	N/A	8514543
13C5-Perfluoropentanoic acid	%	94	96	N/A	N/A	8514543
13C8-Perfluorooctane Sulfonamide	%	73	84	N/A	N/A	8514543
18O2-Perfluorohexanesulfonic acid	%	94	94	N/A	N/A	8514543
D3-MeFOSA	%	59	60	N/A	N/A	8514543
D3-MeFOSAA	%	80	83	N/A	N/A	8514543
D5-EtFOSA	%	53	54	N/A	N/A	8514543
D5-EtFOSAA	%	77	81	N/A	N/A	8514543
D7-MeFOSE	%	62	78	N/A	N/A	8514543
D9-EtFOSE	%	59	74	N/A	N/A	8514543
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (PFTeDA, PFTrDA).						



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	7.79 J	1.16	10.3	1.45	1.00	7.79	1	8511386
1,2,3,7,8-Penta CDD *	pg/L	4.31 J	1.23	51.5	1.86	1.00	4.31	1	8511386
1,2,3,4,7,8-Hexa CDD *	pg/L	1.55 U	1.55	51.5	2.25	0.100	0.155	0	8511386
1,2,3,6,7,8-Hexa CDD *	pg/L	69.9	1.49	51.5	1.40	0.100	6.99	1	8511386
1,2,3,7,8,9-Hexa CDD *	pg/L	40.4 J	1.43	51.5	1.13	0.100	4.04	1	8511386
1,2,3,4,6,7,8-Hepta CDD *	pg/L	79.0	1.71	51.5	1.90	0.0100	0.790	1	8511386
Octa CDD *	pg/L	545	1.42	103	3.13	0.000300	0.164	1	8511386
Total Tetra CDD *	pg/L	11.9	1.16	10.3	4.00	N/A	N/A	2	8511386
Total Penta CDD *	pg/L	31.0 J	1.23	51.5	4.00	N/A	N/A	5	8511386
Total Hexa CDD *	pg/L	436	1.49	51.5	4.00	N/A	N/A	4	8511386
Total Hepta CDD *	pg/L	142	1.71	51.5	4.00	N/A	N/A	2	8511386
2,3,7,8-Tetra CDF **	pg/L	48.6	1.02	10.3	1.68	0.100	4.86	1	8511386
1,2,3,7,8-Penta CDF **	pg/L	1.76 U	1.76	51.5	1.33	0.0300	0.0528	0	8511386
2,3,4,7,8-Penta CDF **	pg/L	1.49 U	1.49	51.5	1.23	0.300	0.447	0	8511386
1,2,3,4,7,8-Hexa CDF **	pg/L	1.05 U	1.05	51.5	1.85	0.100	0.105	0	8511386
1,2,3,6,7,8-Hexa CDF **	pg/L	1.27 U	1.27	51.5	1.52	0.100	0.127	0	8511386
2,3,4,6,7,8-Hexa CDF **	pg/L	0.948 U	0.948	51.5	1.97	0.100	0.0948	0	8511386
1,2,3,7,8,9-Hexa CDF **	pg/L	1.15 U	1.15	51.5	1.66	0.100	0.115	0	8511386
1,2,3,4,6,7,8-Hepta CDF **	pg/L	7.90 U	7.90	51.5	2.00	0.0100	0.0790	0	8511386
1,2,3,4,7,8,9-Hepta CDF **	pg/L	1.37 U	1.37	51.5	1.87	0.0100	0.0137	0	8511386
Octa CDF **	pg/L	17.7 J	1.58	103	3.99	0.000300	0.00531	1	8511386
Total Tetra CDF **	pg/L	98.3	1.02	10.3	4.00	N/A	N/A	8	8511386
Total Penta CDF **	pg/L	9.86 J	1.62	51.5	4.00	N/A	N/A	2	8511386
Total Hexa CDF **	pg/L	3.98 J	1.03	51.5	4.00	N/A	N/A	1	8511386
Total Hepta CDF **	pg/L	11.7 J	1.11	51.5	4.00	N/A	N/A	1	8511386
Confirmation 2,3,7,8-Tetra CDF **	pg/L	51.5	2.0	10	N/A	0.100	5.15	N/A	8531877
TOTAL TOXIC EQUIVALENCY	pg/L	N/A	N/A	N/A	N/A	N/A	30.4	N/A	N/A
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-1234678 HeptaCDD *	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8511386

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDF **	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-123478 HexaCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-123478 HexaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-1234789 HeptaCDF **	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-123678 HexaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-123678 HexaCDF **	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-12378 PentaCDD *	%	117	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-12378 PentaCDF **	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-123789 HexaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-234678 HexaCDF **	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-23478 PentaCDF **	%	117	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-2378 TetraCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-2378 TetraCDF **	%	105	N/A	N/A	N/A	N/A	N/A	N/A	8511386
C13-OCDD *	%	75	N/A	N/A	N/A	N/A	N/A	N/A	8511386
Confirmation C13-2378 TetraCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	8531877

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 ** CDF = Chloro Dibenzo-p-Furan
 N/A = Not Applicable
 * CDD = Chloro Dibenzo-p-Dioxin



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.12 U	0.12	0.25	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.26 U	0.26	0.25	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.094 U	0.094	0.63	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.21 U	0.21	0.63	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.13 U	0.13	0.63	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.25 U	0.25	0.25	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.13 U	0.13	0.25	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.38 U	0.38	0.63	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.13 U	0.13	0.25	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.18 U	0.18	0.63	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.78 J	0.37	2.5	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.23 U	0.23	0.63	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.13 U	0.13	0.25	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.25 U	0.25	0.63	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.082 U	0.082	0.63	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.19 U	0.19	0.25	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.17 U	0.17	0.63	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.27 U	0.27	0.25	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.10 U	0.10	0.63	0.13	N/A	N/A	N/A	8533813
TriCB-(21)+(33)	ng/L	0.11 U	0.11	0.63	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.11 U	0.11	0.25	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.037 U	0.037	0.25	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.052 U	0.052	0.25	0.0043	N/A	N/A	1	8533813
2,3,4',6-TriCB-(25)	ng/L	0.11 U	0.11	0.25	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.10 U	0.10	0.63	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.14 U	0.14	0.25	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.098 U	0.098	0.63	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.14 U	0.14	0.25	0.0087	N/A	N/A	1	8533813
2,3',5',6-TriCB-(34)	ng/L	0.037 U	0.037	0.25	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.11 U	0.11	0.25	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.031 U	0.031	0.25	0.0052	N/A	N/A	1	8533813
3,4,4'-TriCB-(37)	ng/L	0.042 U	0.042	0.25	0.0041	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
345-TriCB-(38)	ng/L	0.035 U	0.035	0.25	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.073 U	0.073	0.25	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.33 U	0.33	1.3	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.66 U	0.66	0.63	0.011	N/A	N/A	1	8533813
22'35-TetraCB-(43)	ng/L	0.46 U	0.46	0.63	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.32 U	0.32	1.3	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.35 U	0.35	0.63	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.59 U	0.59	0.25	0.014	N/A	N/A	1	8533813
22'45-TetraCB-(48)	ng/L	0.51 U	0.51	0.63	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.30 U	0.30	1.3	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.52 U	0.52	1.3	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.51 U	0.51	0.63	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.30 U	0.30	0.63	0.020	N/A	N/A	1	8533813
233'4-TetraCB-(55)	ng/L	0.12 U	0.12	0.63	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.35 U	0.35	0.63	0.018	N/A	N/A	1	8533813
233'5-TetraCB-(57)	ng/L	0.11 U	0.11	0.63	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.11 U	0.11	0.63	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.37 U	0.37	1.3	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.34 U	0.34	0.63	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.35 U	0.35	2.5	0.035	N/A	N/A	1	8533813
234'5-TetraCB-(63)	ng/L	0.33 U	0.33	0.63	0.0080	N/A	N/A	1	8533813
234'6-TetraCB-(64)	ng/L	0.29 U	0.29	0.63	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.33 U	0.33	0.63	0.0084	N/A	N/A	1	8533813
23'45-TetraCB-(67)	ng/L	0.19 U	0.19	0.63	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.11 U	0.11	0.63	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.11 U	0.11	0.63	0.0082	N/A	N/A	1	8533813
23'5'6-TetraCB-(73)	ng/L	0.12 U	0.12	0.63	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.13 U	0.13	0.63	0.011	0.000100	0.0000130	1	8533813
33'45-TetraCB-(78)	ng/L	0.12 U	0.12	0.63	0.013	N/A	N/A	1	8533813
33'45'-TetraCB(79)	ng/L	0.20 U	0.20	0.63	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.19 U	0.19	0.63	0.0087	N/A	N/A	1	8533813
344'5-TetraCB-(81)	ng/L	0.11 U	0.11	0.63	0.0079	0.000300	0.0000330	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'4-PentaCB-(82)	ng/L	0.31 U	0.31	0.63	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.38 U	0.38	1.3	0.033	N/A	N/A	1	8533813
22'33'6-PentaCB-(84)	ng/L	0.41 U	0.41	0.25	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.30 U	0.30	1.3	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.31 U	0.31	2.5	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.40 U	0.40	0.63	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.31 U	0.31	0.63	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.43 J	0.32	2.5	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.43 U	0.43	0.63	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.38 U	0.38	2.5	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.28 U	0.28	0.63	0.017	N/A	N/A	1	8533813
22'35'6-PentaCB-(95)	ng/L	0.42 U	0.42	0.63	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.22 U	0.22	0.63	0.014	N/A	N/A	1	8533813
22'45'6-PentaCB-(103)	ng/L	0.38 U	0.38	0.63	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.089 U	0.089	0.63	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.093 U	0.093	0.63	0.0052	0.0000300	0.00000279	1	8533813
233'45-PentaCB-(106)	ng/L	0.077 U	0.077	0.63	0.018	N/A	N/A	1	8533813
233'4'5-PentaCB-(107)	ng/L	0.19 U	0.19	0.63	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.15 U	0.15	1.3	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.49 J	0.30	1.3	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.085 U	0.085	0.63	0.012	N/A	N/A	1	8533813
233'56-PentaCB-(112)	ng/L	0.083 U	0.083	0.63	0.018	N/A	N/A	1	8533813
2344'5-PentaCB-(114)	ng/L	0.10 U	0.10	0.63	0.0084	0.0000300	0.00000300	1	8533813
23'44'5-PentaCB-(118)	ng/L	0.127 J	0.095	1.3	0.0071	0.0000300	0.00000381	1	8533813
23'455'-PentaCB-(120)	ng/L	0.090 U	0.090	0.63	0.014	N/A	N/A	1	8533813
23'45'6-PentaCB-(121)	ng/L	0.088 U	0.088	0.63	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.29 U	0.29	0.63	0.011	N/A	N/A	1	8533813
23'44'5'-PentaCB-(123)	ng/L	0.11 U	0.11	0.63	0.014	0.0000300	0.00000330	1	8533813
33'44'5-PentaCB-(126)	ng/L	0.078 U	0.078	0.63	0.0061	0.100	0.00780	1	8533813
33'455'-PentaCB-(127)	ng/L	0.072 U	0.072	0.63	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.33 U	0.33	1.3	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.52 J	0.39	2.5	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'45'-HexaCB-(130)	ng/L	0.42 U	0.42	0.63	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.53 U	0.53	0.63	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.44 U	0.44	0.63	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.44 U	0.44	0.63	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.33 U	0.33	1.3	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.51 U	0.51	1.3	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.37 U	0.37	0.63	0.014	N/A	N/A	1	8533813
22'344'5'-HexaCB-(137)	ng/L	0.41 U	0.41	1.3	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.37 U	0.37	1.3	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.38 U	0.38	0.63	0.018	N/A	N/A	1	8533813
22'3456'-HexaCB-(142)	ng/L	0.16 U	0.16	0.63	0.018	N/A	N/A	1	8533813
22'345'6'-HexaCB-(144)	ng/L	0.50 U	0.50	0.63	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.12 U	0.12	0.63	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.34 U	0.34	0.63	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.36 U	0.36	1.3	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.17 U	0.17	0.63	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.12 U	0.12	0.63	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.12 U	0.12	0.63	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.32 J	0.31	1.3	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.39 U	0.39	0.63	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.093 U	0.093	0.63	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.10 U	0.10	1.3	0.015	0.0000300	0.00000300	1	8533813
233'44'6'-HexaCB-(158)	ng/L	0.25 U	0.25	0.63	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.14 U	0.14	0.63	0.015	N/A	N/A	1	8533813
233'456'-HexaCB-(160)	ng/L	0.11 U	0.11	0.63	0.013	N/A	N/A	1	8533813
233'45'6'-HexaCB-(161)	ng/L	0.10 U	0.10	0.63	0.022	N/A	N/A	1	8533813
233'4'55'-HexaCB-(162)	ng/L	0.14 U	0.14	0.63	0.016	N/A	N/A	1	8533813
233'4'5'6'-HexaCB-(164)	ng/L	0.27 U	0.27	0.63	0.020	N/A	N/A	1	8533813
233'55'6'-HexaCB-(165)	ng/L	0.11 U	0.11	0.63	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.095 U	0.095	0.63	0.0096	0.0000300	0.00000285	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.070 U	0.070	0.63	0.0092	0.0300	0.00210	1	8533813
22'33'44'5'-HeptaCB-(170)	ng/L	0.095 U	0.095	0.63	0.011	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HeptaCB-(171)+(173)	ng/L	0.20 U	0.20	1.3	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.24 U	0.24	0.63	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.22 U	0.22	0.63	0.017	N/A	N/A	1	8533813
22'33'45'6-HeptaCB-(175)	ng/L	0.29 U	0.29	0.63	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.21 U	0.21	0.63	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.24 U	0.24	0.63	0.013	N/A	N/A	1	8533813
22'33'55'6-HeptaCB-(178)	ng/L	0.30 U	0.30	0.63	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.21 U	0.21	0.63	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.12 U	0.12	1.3	0.018	N/A	N/A	1	8533813
22'344'56-HeptaCB-(181)	ng/L	0.13 U	0.13	0.63	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.088 U	0.088	0.63	0.0066	N/A	N/A	1	8533813
22'344'5'6-HeptaCB-(183)	ng/L	0.20 U	0.20	0.63	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.067 U	0.067	0.63	0.0065	N/A	N/A	1	8533813
22'3455'6-HeptaCB-(185)	ng/L	0.089 U	0.089	0.63	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.073 U	0.073	0.63	0.0095	N/A	N/A	1	8533813
22'34'55'6-HeptaCB-(187)	ng/L	0.27 U	0.27	0.63	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.066 U	0.066	0.63	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.079 U	0.079	0.63	0.014	0.0000300	0.00000237	1	8533813
233'44'56-HeptaCB-(190)	ng/L	0.17 U	0.17	0.63	0.016	N/A	N/A	1	8533813
233'44'5'6-HeptaCB-(191)	ng/L	0.11 U	0.11	0.63	0.014	N/A	N/A	1	8533813
233'455'6-HeptaCB-(192)	ng/L	0.063 U	0.063	0.63	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.21 U	0.21	0.63	0.024	N/A	N/A	1	8533813
22'33'44'56-OctaCB-(195)	ng/L	0.23 U	0.23	0.63	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.25 U	0.25	0.63	0.017	N/A	N/A	1	8533813
22'33'44'66'OctaCB-(197)	ng/L	0.054 U	0.054	0.63	0.033	N/A	N/A	1	8533813
OctaCB-(198)+(199)	ng/L	0.26 U	0.26	1.3	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.12 U	0.12	0.63	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.13 U	0.13	0.63	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.076 U	0.076	0.63	0.013	N/A	N/A	1	8533813
22'344'55'6-OctaCB-(203)	ng/L	0.24 U	0.24	0.63	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.045 U	0.045	0.63	0.018	N/A	N/A	1	8533813
233'44'55'6-OctaCB-(205)	ng/L	0.053 U	0.053	0.63	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'55'6'-NonaCB-(206)	ng/L	0.075 U	0.075	0.63	0.020	N/A	N/A	1	8533813
22'33'44'56'6'-NonaCB-(207)	ng/L	0.044 U	0.044	0.63	0.018	N/A	N/A	1	8533813
22'33'45'56'6'-NonaCB-(208)	ng/L	0.042 U	0.042	0.63	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.047 U	0.047	0.63	0.015	N/A	N/A	1	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.00997	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	112	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	103	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'45'56'6'-NonaCB-(208)	%	109	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'-OctaCB-(202)	%	113	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	103	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'-HeptaCB-(180)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'-HeptaCB-(188)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'-HexaCB-(155)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'-PentaCB-(104)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'-TetraCB-(54)	%	41	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6'-TriCB-(19)	%	56	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	142	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'-HeptaCB-(189)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'-PentaCB-(105)	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'-PentaCB-(111)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'-HexaCB-(167)	%	75	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	73	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	70	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'-HexaCB-(169)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'-TetraCB-(77)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'5'-TetraCB-(81)	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8533813
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch N/A = Not Applicable									



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VAE871							
Sampling Date		2023/02/07 08:30				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B3A-20230207- GW-36.0	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-344'-TriCB-(37)	%	77	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	54	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	138	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	120	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	72	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



Bureau Veritas Job #: C338911
 Report Date: 2023/04/24

Apex Laboratories
 Client Project #: A3B0217

TEST SUMMARY

Bureau Veritas ID: VAE871
Sample ID: MFA-B3A-20230207-GW-36.0
Matrix: Water

Collected: 2023/02/07
Shipped:
Received: 2023/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8511386	2023/02/12	2023/02/21	Ravneet Kaur
2378TCDF Confirmation (M8290A/M1613)	HRMS/MS	8531877	2023/02/12	2023/03/02	Angel Guerrero
OC Pesticides in Water by GCTQ	GCTQ/MS	8503096	2023/02/14	2023/02/17	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/03/06	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8514543	2023/02/21	2023/02/22	Tonghui (Jenny) Chen

Bureau Veritas ID: VAE872
Sample ID: FIELD BLANK
Matrix: Water

Collected: 2023/02/07
Shipped:
Received: 2023/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	8514543	2023/02/21	2023/02/22	Tonghui (Jenny) Chen



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.8°C
Package 2	5.6°C
Package 3	3.9°C

Sample VAE871 [MFA-B3A-20230207-GW-36.0] : all results are taken from 10x dilution due to matrix interferences, RDL is adjusted accordingly

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

PCB Congeners in Water (1668C): Worksheet Blank contains some traces of PCB congeners natives that are above the RDL. However, all samples in worksheet (8533813) shows trace concentration levels below RDL. Results should be reviewed with caution.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
	8503096	CTC	Spiked Blank	13C10-cis Nonachlor	2023/02/16		74	%	36 - 139
				13C10-Heptachlor	2023/02/16		56	%	5 - 120
				13C10-Heptachlor Epoxide	2023/02/16		75	%	27 - 137
				13C10-Oxychlordane	2023/02/16		70	%	23 - 135
				13C10-trans Nonachlor	2023/02/16		73	%	14 - 136
				13C12-Endrin	2023/02/16		70	%	35 - 155
				13C12-Endrin Ketone	2023/02/16		72	%	35 - 155
				13C6-beta BHC	2023/02/16		54	%	32 - 130
				13C6-d6-gamma BHC (Lindane)	2023/02/16		65	%	11 - 120
				13C-Methoxychlor	2023/02/16		78	%	5 - 120
				13C-pp-DDD	2023/02/16		67	%	5 - 120
				13C-pp-DDE	2023/02/16		83	%	47 - 160
				13C-pp-DDT	2023/02/16		78	%	5 - 120
				C13-Hexachlorobenzene	2023/02/16		64	%	5 - 120
				Aldrin	2023/02/16		127	%	50 - 200
				alpha-BHC	2023/02/16		121	%	50 - 200
				delta-BHC	2023/02/16		138	%	50 - 200
				beta-BHC	2023/02/16		121	%	50 - 200
				Lindane	2023/02/16		119	%	50 - 200
				a-Chlordane	2023/02/16		108	%	50 - 200
				g-Chlordane	2023/02/16		106	%	50 - 200
				Oxychlordane	2023/02/16		100	%	50 - 200
				o,p-DDD	2023/02/16		112	%	50 - 200
				p,p-DDD	2023/02/16		122	%	50 - 200
				o,p-DDE	2023/02/16		101	%	50 - 200
				p,p-DDE	2023/02/16		116	%	50 - 200
				o,p-DDT	2023/02/16		107	%	50 - 200
				p,p-DDT	2023/02/16		105	%	50 - 200
				Dieldrin	2023/02/16		122	%	50 - 200
				Endosulfan I	2023/02/16		113	%	50 - 200
				Endosulfan II	2023/02/16		119	%	50 - 200
				Endosulfan sulfate	2023/02/16		110	%	50 - 200
				Endrin	2023/02/16		116	%	50 - 200
				Endrin aldehyde	2023/02/16		111	%	50 - 200
				Endrin ketone	2023/02/16		120	%	50 - 200
				Heptachlor	2023/02/16		129	%	50 - 200
				Heptachlor epoxide	2023/02/16		117	%	50 - 200
				Hexachlorobenzene	2023/02/16		110	%	50 - 200
				Methoxychlor	2023/02/16		119	%	50 - 200
				Mirex	2023/02/16		101	%	50 - 200
				cis-Nonachlor	2023/02/16		126	%	50 - 200
				trans-Nonachlor	2023/02/16		115	%	50 - 200
	8503096	CTC	Spiked Blank DUP	13C10-cis Nonachlor	2023/02/16		76	%	36 - 139
				13C10-Heptachlor	2023/02/16		57	%	5 - 120
				13C10-Heptachlor Epoxide	2023/02/16		73	%	27 - 137
				13C10-Oxychlordane	2023/02/16		72	%	23 - 135
				13C10-trans Nonachlor	2023/02/16		73	%	14 - 136
				13C12-Endrin	2023/02/16		75	%	35 - 155
				13C12-Endrin Ketone	2023/02/16		64	%	35 - 155
				13C6-beta BHC	2023/02/16		62	%	32 - 130
				13C6-d6-gamma BHC (Lindane)	2023/02/16		75	%	11 - 120
				13C-Methoxychlor	2023/02/16		76	%	5 - 120
				13C-pp-DDD	2023/02/16		66	%	5 - 120



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C-pp-DDE	2023/02/16		82	%	47 - 160
			13C-pp-DDT	2023/02/16		79	%	5 - 120
			C13-Hexachlorobenzene	2023/02/16		62	%	5 - 120
			Aldrin	2023/02/16		133	%	50 - 200
			alpha-BHC	2023/02/16		121	%	50 - 200
			delta-BHC	2023/02/16		138	%	50 - 200
			beta-BHC	2023/02/16		120	%	50 - 200
			Lindane	2023/02/16		119	%	50 - 200
			a-Chlordane	2023/02/16		109	%	50 - 200
			g-Chlordane	2023/02/16		105	%	50 - 200
			Oxychlordane	2023/02/16		96	%	50 - 200
			o,p-DDD	2023/02/16		112	%	50 - 200
			p,p-DDD	2023/02/16		123	%	50 - 200
			o,p-DDE	2023/02/16		102	%	50 - 200
			p,p-DDE	2023/02/16		116	%	50 - 200
			o,p-DDT	2023/02/16		102	%	50 - 200
			p,p-DDT	2023/02/16		104	%	50 - 200
			Dieldrin	2023/02/16		132	%	50 - 200
			Endosulfan I	2023/02/16		119	%	50 - 200
			Endosulfan II	2023/02/16		119	%	50 - 200
			Endosulfan sulfate	2023/02/16		122	%	50 - 200
			Endrin	2023/02/16		106	%	50 - 200
			Endrin aldehyde	2023/02/16		120	%	50 - 200
			Endrin ketone	2023/02/16		129	%	50 - 200
			Heptachlor	2023/02/16		120	%	50 - 200
			Heptachlor epoxide	2023/02/16		117	%	50 - 200
			Hexachlorobenzene	2023/02/16		112	%	50 - 200
			Methoxychlor	2023/02/16		124	%	50 - 200
			Mirex	2023/02/16		109	%	50 - 200
			cis-Nonachlor	2023/02/16		118	%	50 - 200
			trans-Nonachlor	2023/02/16		114	%	50 - 200
8503096	CTC	RPD	Aldrin	2023/02/16	4.8		%	25
			alpha-BHC	2023/02/16	0.031		%	25
			delta-BHC	2023/02/16	0.18		%	25
			beta-BHC	2023/02/16	0.27		%	25
			Lindane	2023/02/16	0.13		%	25
			a-Chlordane	2023/02/16	0.59		%	25
			g-Chlordane	2023/02/16	1.3		%	25
			Oxychlordane	2023/02/16	3.8		%	25
			o,p-DDD	2023/02/16	0.085		%	25
			p,p-DDD	2023/02/16	0.81		%	25
			o,p-DDE	2023/02/16	1.2		%	25
			p,p-DDE	2023/02/16	0.052		%	25
			o,p-DDT	2023/02/16	4.6		%	25
			p,p-DDT	2023/02/16	0.38		%	25
			Dieldrin	2023/02/16	7.7		%	25
			Endosulfan I	2023/02/16	5.1		%	25
			Endosulfan II	2023/02/16	0.095		%	25
			Endosulfan sulfate	2023/02/16	10		%	25
			Endrin	2023/02/16	8.3		%	25
			Endrin aldehyde	2023/02/16	8.1		%	25
			Endrin ketone	2023/02/16	7.1		%	25
			Heptachlor	2023/02/16	7.2		%	25



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Heptachlor epoxide	2023/02/16	0.36		%	25
			Hexachlorobenzene	2023/02/16	2.3		%	25
			Methoxychlor	2023/02/16	4.0		%	25
			Mirex	2023/02/16	7.7		%	25
			cis-Nonachlor	2023/02/16	6.3		%	25
			trans-Nonachlor	2023/02/16	1.0		%	25
8503096	CTC	Method Blank	13C10-cis Nonachlor	2023/02/16		63	%	36 - 139
			13C10-Heptachlor	2023/02/16		64	%	5 - 120
			13C10-Heptachlor Epoxide	2023/02/16		68	%	27 - 137
			13C10-Oxychlordan	2023/02/16		64	%	23 - 135
			13C10-trans Nonachlor	2023/02/16		63	%	14 - 136
			13C12-Endrin	2023/02/16		74	%	35 - 155
			13C12-Endrin Ketone	2023/02/16		67	%	35 - 155
			13C6-beta BHC	2023/02/16		63	%	32 - 130
			13C6-d6-gamma BHC (Lindane)	2023/02/16		77	%	11 - 120
			13C-Methoxychlor	2023/02/16		73	%	5 - 120
			13C-pp-DDD	2023/02/16		56	%	5 - 120
			13C-pp-DDE	2023/02/16		82	%	47 - 160
			13C-pp-DDT	2023/02/16		75	%	5 - 120
			C13-Hexachlorobenzene	2023/02/16		62	%	5 - 120
			Aldrin	2023/02/16	0.021 U, MDL=0.021		ng/L	
			alpha-BHC	2023/02/16	0.024 U, MDL=0.024		ng/L	
			delta-BHC	2023/02/16	0.029 U, MDL=0.029		ng/L	
			beta-BHC	2023/02/16	0.014 U, MDL=0.014		ng/L	
			Lindane	2023/02/16	0.033 U, MDL=0.033		ng/L	
			a-Chlordane	2023/02/16	0.029 U, MDL=0.029		ng/L	
			g-Chlordane	2023/02/16	0.029 U, MDL=0.029		ng/L	
			Oxychlordan	2023/02/16	0.028 U, MDL=0.028		ng/L	
			o,p-DDD	2023/02/16	0.020 U, MDL=0.020		ng/L	
			p,p-DDD	2023/02/16	0.014 U, MDL=0.014		ng/L	
			o,p-DDE	2023/02/16	0.016 U, MDL=0.016		ng/L	
			p,p-DDE	2023/02/16	0.012 U, MDL=0.012		ng/L	
			o,p-DDT	2023/02/16	0.040 U, MDL=0.040		ng/L	
			p,p-DDT	2023/02/16	0.050 U, MDL=0.050		ng/L	
			Dieldrin	2023/02/16	0.050 U, MDL=0.050		ng/L	
			Endosulfan I	2023/02/16	0.067 U, MDL=0.067		ng/L	
			Endosulfan II	2023/02/16	0.074 U, MDL=0.074		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Endosulfan sulfate	2023/02/16	0.070 U, MDL=0.070		ng/L	
			Endrin	2023/02/16	0.061 J, MDL=0.045		ng/L	
			Endrin aldehyde	2023/02/16	0.071 U, MDL=0.071		ng/L	
			Endrin ketone	2023/02/16	0.034 U, MDL=0.034		ng/L	
			Heptachlor	2023/02/16	0.029 U, MDL=0.029		ng/L	
			Heptachlor epoxide	2023/02/16	0.015 U, MDL=0.015		ng/L	
			Hexachlorobenzene	2023/02/16	0.10 U, MDL=0.10		ng/L	
			Methoxychlor	2023/02/16	0.040 U, MDL=0.040		ng/L	
			Mirex	2023/02/16	0.021 U, MDL=0.021		ng/L	
			cis-Nonachlor	2023/02/16	0.037 U, MDL=0.037		ng/L	
			trans-Nonachlor	2023/02/16	0.044 U, MDL=0.044		ng/L	
8511386	RAK	Spiked Blank	37CL4 2378 Tetra CDD	2023/02/21		75	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/21		91	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/21		81	%	28 - 143
			C13-123478 HexaCDD	2023/02/21		88	%	32 - 141
			C13-123478 HexaCDF	2023/02/21		83	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/21		86	%	28 - 138
			C13-123678 HexaCDD	2023/02/21		89	%	28 - 130
			C13-123678 HexaCDF	2023/02/21		84	%	26 - 123
			C13-12378 PentaCDD	2023/02/21		82	%	25 - 181
			C13-12378 PentaCDF	2023/02/21		79	%	24 - 185
			C13-123789 HexaCDF	2023/02/21		86	%	29 - 147
			C13-234678 HexaCDF	2023/02/21		89	%	28 - 136
			C13-23478 PentaCDF	2023/02/21		83	%	21 - 178
			C13-2378 TetraCDD	2023/02/21		74	%	25 - 164
			C13-2378 TetraCDF	2023/02/21		83	%	24 - 169
			C13-OCDD	2023/02/21		83	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/21		116	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/21		107	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/21		108	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/21		109	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2023/02/21		106	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/21		107	%	70 - 140
			Octa CDD	2023/02/21		117	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/21		101	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/21		108	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/21		107	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/21		110	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/21		106	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/21		100	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/21		107	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2023/02/21		111	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2023/02/21		108	%	78 - 138



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits			
8511386	RAK	Spiked Blank DUP	Octa CDF	2023/02/21		118	%	63 - 170			
			37CL4 2378 Tetra CDD	2023/02/21		91	%	35 - 197			
			C13-1234678 HeptaCDD	2023/02/21		99	%	23 - 140			
			C13-1234678 HeptaCDF	2023/02/21		90	%	28 - 143			
			C13-123478 HexaCDD	2023/02/21		95	%	32 - 141			
			C13-123478 HexaCDF	2023/02/21		87	%	26 - 152			
			C13-1234789 HeptaCDF	2023/02/21		99	%	28 - 138			
			C13-123678 HexaCDD	2023/02/21		104	%	28 - 130			
			C13-123678 HexaCDF	2023/02/21		90	%	26 - 123			
			C13-12378 PentaCDD	2023/02/21		93	%	25 - 181			
			C13-12378 PentaCDF	2023/02/21		90	%	24 - 185			
			C13-123789 HexaCDF	2023/02/21		98	%	29 - 147			
			C13-234678 HexaCDF	2023/02/21		99	%	28 - 136			
			C13-23478 PentaCDF	2023/02/21		99	%	21 - 178			
			C13-2378 TetraCDD	2023/02/21		80	%	25 - 164			
			C13-2378 TetraCDF	2023/02/21		88	%	24 - 169			
			C13-OCDD	2023/02/21		95	%	17 - 157			
			2,3,7,8-Tetra CDD	2023/02/21		113	%	67 - 158			
			1,2,3,7,8-Penta CDD	2023/02/21		107	%	25 - 181			
			1,2,3,4,7,8-Hexa CDD	2023/02/21		106	%	70 - 164			
			1,2,3,6,7,8-Hexa CDD	2023/02/21		104	%	76 - 134			
			1,2,3,7,8,9-Hexa CDD	2023/02/21		104	%	64 - 162			
			1,2,3,4,6,7,8-Hepta CDD	2023/02/21		107	%	70 - 140			
			Octa CDD	2023/02/21		115	%	78 - 144			
			2,3,7,8-Tetra CDF	2023/02/21		99	%	75 - 158			
			1,2,3,7,8-Penta CDF	2023/02/21		107	%	80 - 134			
			2,3,4,7,8-Penta CDF	2023/02/21		104	%	68 - 160			
			1,2,3,4,7,8-Hexa CDF	2023/02/21		110	%	72 - 134			
			1,2,3,6,7,8-Hexa CDF	2023/02/21		107	%	84 - 130			
			2,3,4,6,7,8-Hexa CDF	2023/02/21		100	%	70 - 156			
			1,2,3,7,8,9-Hexa CDF	2023/02/21		104	%	78 - 130			
			1,2,3,4,6,7,8-Hepta CDF	2023/02/21		109	%	82 - 122			
			1,2,3,4,7,8,9-Hepta CDF	2023/02/21		104	%	78 - 138			
			Octa CDF	2023/02/21		114	%	63 - 170			
			8511386	RAK	RPD	2,3,7,8-Tetra CDD	2023/02/21	2.6		%	25
						1,2,3,7,8-Penta CDD	2023/02/21	0		%	25
						1,2,3,4,7,8-Hexa CDD	2023/02/21	1.9		%	25
						1,2,3,6,7,8-Hexa CDD	2023/02/21	4.7		%	25
						1,2,3,7,8,9-Hexa CDD	2023/02/21	1.9		%	25
						1,2,3,4,6,7,8-Hepta CDD	2023/02/21	0		%	25
Octa CDD	2023/02/21	1.7					%	25			
2,3,7,8-Tetra CDF	2023/02/21	2.0					%	25			
1,2,3,7,8-Penta CDF	2023/02/21	0.93					%	25			
2,3,4,7,8-Penta CDF	2023/02/21	2.8					%	25			
1,2,3,4,7,8-Hexa CDF	2023/02/21	0					%	25			
1,2,3,6,7,8-Hexa CDF	2023/02/21	0.94					%	25			
2,3,4,6,7,8-Hexa CDF	2023/02/21	0					%	25			
1,2,3,7,8,9-Hexa CDF	2023/02/21	2.8					%	25			
1,2,3,4,6,7,8-Hepta CDF	2023/02/21	1.8					%	25			
1,2,3,4,7,8,9-Hepta CDF	2023/02/21	3.8					%	25			
Octa CDF	2023/02/21	3.4					%	25			
8511386	RAK	Method Blank				37CL4 2378 Tetra CDD	2023/02/20		93	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/20		77	%	23 - 140			



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-1234678 HeptaCDF	2023/02/20		74	%	28 - 143
			C13-123478 HexaCDD	2023/02/20		81	%	32 - 141
			C13-123478 HexaCDF	2023/02/20		80	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/20		75	%	28 - 138
			C13-123678 HexaCDD	2023/02/20		88	%	28 - 130
			C13-123678 HexaCDF	2023/02/20		82	%	26 - 123
			C13-12378 PentaCDD	2023/02/20		83	%	25 - 181
			C13-12378 PentaCDF	2023/02/20		83	%	24 - 185
			C13-123789 HexaCDF	2023/02/20		85	%	29 - 147
			C13-234678 HexaCDF	2023/02/20		87	%	28 - 136
			C13-23478 PentaCDF	2023/02/20		89	%	21 - 178
			C13-2378 TetraCDD	2023/02/20		74	%	25 - 164
			C13-2378 TetraCDF	2023/02/20		81	%	24 - 169
			C13-OCDD	2023/02/20		69	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/20	1.24 U, EDL=1.24		pg/L	
			1,2,3,7,8-Penta CDD	2023/02/20	1.43 U, EDL=1.43		pg/L	
			1,2,3,4,7,8-Hexa CDD	2023/02/20	1.63 U, EDL=1.63		pg/L	
			1,2,3,6,7,8-Hexa CDD	2023/02/20	1.50 U, EDL=1.50		pg/L	
			1,2,3,7,8,9-Hexa CDD	2023/02/20	1.47 U, EDL=1.47		pg/L	
			1,2,3,4,6,7,8-Hepta CDD	2023/02/20	1.81 U, EDL=1.81		pg/L	
			Octa CDD	2023/02/20	3.93 U, EDL=3.93		pg/L	
			Total Tetra CDD	2023/02/20	1.24 U, EDL=1.24		pg/L	
			Total Penta CDD	2023/02/20	1.71 U, EDL=1.71		pg/L	
			Total Hexa CDD	2023/02/20	1.53 U, EDL=1.53		pg/L	
			Total Hepta CDD	2023/02/20	1.81 U, EDL=1.81		pg/L	
			2,3,7,8-Tetra CDF	2023/02/20	1.05 U, EDL=1.05		pg/L	
			1,2,3,7,8-Penta CDF	2023/02/20	1.80 U, EDL=1.80		pg/L	
			2,3,4,7,8-Penta CDF	2023/02/20	1.55 U, EDL=1.55		pg/L	
			1,2,3,4,7,8-Hexa CDF	2023/02/20	1.08 U, EDL=1.08		pg/L	
			1,2,3,6,7,8-Hexa CDF	2023/02/20	1.04 U, EDL=1.04		pg/L	
			2,3,4,6,7,8-Hexa CDF	2023/02/20	0.965 U, EDL=0.965		pg/L	
			1,2,3,7,8,9-Hexa CDF	2023/02/20	1.13 U, EDL=1.13		pg/L	
			1,2,3,4,6,7,8-Hepta CDF	2023/02/20	1.08 U, EDL=1.08		pg/L	
			1,2,3,4,7,8,9-Hepta CDF	2023/02/20	1.22 U, EDL=1.22		pg/L	



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Octa CDF	2023/02/20	0.965 U, EDL=0.965		pg/L	
			Total Tetra CDF	2023/02/20	1.05 U, EDL=1.05		pg/L	
			Total Penta CDF	2023/02/20	1.66 U, EDL=1.66		pg/L	
			Total Hexa CDF	2023/02/20	1.05 U, EDL=1.05		pg/L	
			Total Hepta CDF	2023/02/20	1.14 U, EDL=1.14		pg/L	
8514543	TJC	Spiked Blank	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/22		100	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/22		98	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/22		96	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/22		98	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/22		93	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/22		101	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/22		88	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/22		93	%	50 - 150
			13C3-HFPO-DA	2023/02/22		101	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/22		99	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/22		100	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/22		101	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/22		100	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/22		102	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/22		102	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/22		99	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/22		91	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/22		99	%	50 - 150
			D3-MeFOSA	2023/02/22		73	%	50 - 150
			D3-MeFOSAA	2023/02/22		88	%	50 - 150
			D5-EtFOSA	2023/02/22		67	%	50 - 150
			D5-EtFOSAA	2023/02/22		86	%	50 - 150
			D7-MeFOSE	2023/02/22		83	%	50 - 150
			D9-EtFOSE	2023/02/22		79	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/22		100	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/02/22		101	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/02/22		100	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/02/22		100	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/02/22		101	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/02/22		102	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/02/22		103	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2023/02/22		99	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/02/22		99	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/02/22		103	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/22		103	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/02/22		99	%	70 - 130
			Perfluoropentanesulfonic acid PFPes	2023/02/22		98	%	70 - 130
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/22		101	%	70 - 130
			Perfluoroheptanesulfonic acid PFHpS	2023/02/22		97	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/02/22		101	%	70 - 130
			Perfluorononanesulfonic acid (PFNS)	2023/02/22		94	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/02/22		95	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/22		100	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			EtFOSA	2023/02/22		107	%	70 - 130
			MeFOSA	2023/02/22		104	%	70 - 130
			EtFOSE	2023/02/22		104	%	70 - 130
			MeFOSE	2023/02/22		101	%	70 - 130
			EtFOSAA	2023/02/22		102	%	70 - 130
			MeFOSAA	2023/02/22		101	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/02/22		102	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/02/22		100	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/02/22		104	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/02/22		103	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/22		99	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/02/22		97	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/02/22		94	%	70 - 130
8514543	TJC	Spiked Blank DUP	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/22		97	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/22		97	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/22		95	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/22		96	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/22		86	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/22		99	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/22		84	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/22		90	%	50 - 150
			13C3-HFPO-DA	2023/02/22		100	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/22		98	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/22		99	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/22		99	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/22		97	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/22		100	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/22		98	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/22		98	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/22		82	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/22		96	%	50 - 150
			D3-MeFOSA	2023/02/22		69	%	50 - 150
			D3-MeFOSAA	2023/02/22		85	%	50 - 150
			D5-EtFOSA	2023/02/22		65	%	50 - 150
			D5-EtFOSAA	2023/02/22		82	%	50 - 150
			D7-MeFOSE	2023/02/22		78	%	50 - 150
			D9-EtFOSE	2023/02/22		78	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/22		101	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/02/22		100	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/02/22		103	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/02/22		102	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/02/22		100	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/02/22		104	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/02/22		99	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2023/02/22		100	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/02/22		102	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/02/22		103	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/22		107	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/02/22		100	%	70 - 130
			Perfluoropentanesulfonic acid PFPes	2023/02/22		98	%	70 - 130
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/22		104	%	70 - 130
			Perfluoroheptanesulfonic acid PFHpS	2023/02/22		96	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/02/22		103	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorononanesulfonic acid (PFNS)	2023/02/22		93	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/02/22		92	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/22		105	%	70 - 130
			EtFOSA	2023/02/22		111	%	70 - 130
			MeFOSA	2023/02/22		107	%	70 - 130
			EtFOSE	2023/02/22		101	%	70 - 130
			MeFOSE	2023/02/22		100	%	70 - 130
			EtFOSAA	2023/02/22		103	%	70 - 130
			MeFOSAA	2023/02/22		99	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/02/22		104	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/02/22		102	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/02/22		101	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/02/22		99	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/22		100	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/02/22		96	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/02/22		94	%	70 - 130
8514543	TJC	RPD	Perfluorobutanoic acid (PFBA)	2023/02/22	1.2		%	30
			Perfluoropentanoic acid (PFPeA)	2023/02/22	0.82		%	30
			Perfluorohexanoic acid (PFHxA)	2023/02/22	3.2		%	30
			Perfluoroheptanoic acid (PFHpA)	2023/02/22	1.2		%	30
			Perfluorooctanoic acid (PFOA)	2023/02/22	1.0		%	30
			Perfluorononanoic acid (PFNA)	2023/02/22	1.7		%	30
			Perfluorodecanoic acid (PFDA)	2023/02/22	3.0		%	30
			Perfluoroundecanoic acid (PFUnA)	2023/02/22	0.36		%	30
			Perfluorododecanoic acid (PFDoA)	2023/02/22	3.7		%	30
			Perfluorotridecanoic acid (PFTRDA)	2023/02/22	0.86		%	30
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/22	4.3		%	30
			Perfluorobutanesulfonic acid (PFBS)	2023/02/22	1.1		%	30
			Perfluoropentanesulfonic acid PFPes	2023/02/22	0.11		%	30
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/22	2.5		%	30
			Perfluoroheptanesulfonic acid PFHpS	2023/02/22	0.48		%	30
			Perfluorooctanesulfonic acid (PFOS)	2023/02/22	1.9		%	30
			Perfluorononanesulfonic acid (PFNS)	2023/02/22	1.0		%	30
			Perfluorodecanesulfonic acid (PFDS)	2023/02/22	3.3		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/22	5.4		%	30
			EtFOSA	2023/02/22	3.3		%	30
			MeFOSA	2023/02/22	2.8		%	30
			EtFOSE	2023/02/22	3.4		%	30
			MeFOSE	2023/02/22	1.0		%	30
			EtFOSAA	2023/02/22	1.2		%	30
			MeFOSAA	2023/02/22	1.1		%	30
			4:2 Fluorotelomer sulfonic acid	2023/02/22	1.7		%	30
			6:2 Fluorotelomer sulfonic acid	2023/02/22	1.4		%	30
			8:2 Fluorotelomer sulfonic acid	2023/02/22	3.2		%	30
			Hexafluoropropyleneoxide dimer acid	2023/02/22	3.5		%	30
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/22	1.2		%	30
			9Cl-PF3ONS (F-53B Major)	2023/02/22	0.28		%	30
			11Cl-PF3OUdS (F-53B Minor)	2023/02/22	0.48		%	30
8514543	TJC	Method Blank	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/22		107	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/22		105	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/22		99	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/22		93	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/22		87	%	50 - 150



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C2-Perfluorohexanoic acid	2023/02/22		99	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/22		80	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/22		88	%	50 - 150
			13C3-HFPO-DA	2023/02/22		99	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/22		97	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/22		99	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/22		102	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/22		96	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/22		101	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/22		98	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/22		99	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/22		89	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/22		99	%	50 - 150
			D3-MeFOSA	2023/02/22		72	%	50 - 150
			D3-MeFOSAA	2023/02/22		84	%	50 - 150
			D5-EtFOSA	2023/02/22		66	%	50 - 150
			D5-EtFOSAA	2023/02/22		85	%	50 - 150
			D7-MeFOSE	2023/02/22		80	%	50 - 150
			D9-EtFOSE	2023/02/22		77	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/22	0.0015 U, MDL=0.0015		ug/L	
			Perfluoropentanoic acid (PFPeA)	2023/02/22	0.0025 U, MDL=0.0025		ug/L	
			Perfluorohexanoic acid (PFHxA)	2023/02/22	0.0038 U, MDL=0.0038		ug/L	
			Perfluoroheptanoic acid (PFHpA)	2023/02/22	0.0018 U, MDL=0.0018		ug/L	
			Perfluorooctanoic acid (PFOA)	2023/02/22	0.0030 U, MDL=0.0030		ug/L	
			Perfluorononanoic acid (PFNA)	2023/02/22	0.0021 U, MDL=0.0021		ug/L	
			Perfluorodecanoic acid (PFDA)	2023/02/22	0.0016 U, MDL=0.0016		ug/L	
			Perfluoroundecanoic acid (PFUnA)	2023/02/22	0.0024 U, MDL=0.0024		ug/L	
			Perfluorododecanoic acid (PFDoA)	2023/02/22	0.0029 U, MDL=0.0029		ug/L	
			Perfluorotridecanoic acid (PFTRDA)	2023/02/22	0.0026 U, MDL=0.0026		ug/L	
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/22	0.0016 U, MDL=0.0016		ug/L	
			Perfluorobutanesulfonic acid (PFBS)	2023/02/22	0.0021 U, MDL=0.0021		ug/L	
			Perfluoropentanesulfonic acid PFPes	2023/02/22	0.0023 U, MDL=0.0023		ug/L	
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/22	0.0022 U, MDL=0.0022		ug/L	
			Perfluoroheptanesulfonic acid PFHpS	2023/02/22	0.0039 U, MDL=0.0039		ug/L	
			Perfluorooctanesulfonic acid (PFOS)	2023/02/22	0.0035 U, MDL=0.0035		ug/L	
			Perfluoronanesulfonic acid (PFNS)	2023/02/22	0.0037 U, MDL=0.0037		ug/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorodecanesulfonic acid (PFDS)	2023/02/22	0.0048 U, MDL=0.0048		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/22	0.0034 U, MDL=0.0034		ug/L	
			EtFOSA	2023/02/22	0.0095 U, MDL=0.0095		ug/L	
			MeFOSA	2023/02/22	0.0084 U, MDL=0.0084		ug/L	
			EtFOSE	2023/02/22	0.0070 U, MDL=0.0070		ug/L	
			MeFOSE	2023/02/22	0.0073 U, MDL=0.0073		ug/L	
			EtFOSAA	2023/02/22	0.0046 U, MDL=0.0046		ug/L	
			MeFOSAA	2023/02/22	0.0045 U, MDL=0.0045		ug/L	
			4:2 Fluorotelomer sulfonic acid	2023/02/22	0.0033 U, MDL=0.0033		ug/L	
			6:2 Fluorotelomer sulfonic acid	2023/02/22	0.0015 U, MDL=0.0015		ug/L	
			8:2 Fluorotelomer sulfonic acid	2023/02/22	0.0031 U, MDL=0.0031		ug/L	
			Hexafluoropropyleneoxide dimer acid	2023/02/22	0.0052 U, MDL=0.0052		ug/L	
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/22	0.0027 U, MDL=0.0027		ug/L	
			9Cl-PF3ONS (F-53B Major)	2023/02/22	0.0043 U, MDL=0.0043		ug/L	
			11Cl-PF3OUdS (F-53B Minor)	2023/02/22	0.0035 U, MDL=0.0035		ug/L	
8531877	AGU	Method Blank	Confirmation 2,3,7,8-Tetra CDF	2023/03/02	1.6 U, EDL=1.6		pg/L	
8533813	CXU	Spiked Blank	Confirmation C13-2378 TetraCDF	2023/03/02		45	%	40 - 135
			C13-2,44'-TriCB-(28)	2023/04/04		80 (1)	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/04/04		108	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/04		116	%	40 - 145
			C13-22'33'45'56'6'-NonaCB-(208)	2023/04/04		107	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		98	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/04/04		85	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		111	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		77	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		60	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		66	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		40	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		50	%	40 - 145
			C13-22'-DiCB-(4)	2023/04/04		33	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/04/04		115	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		123	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		132 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		94	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/04/04		109	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/04/04		121	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/04/04		126 (1)	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/04/04		127 (1)	%	40 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-2-MonoCB-(1)	2023/04/04		35	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		121	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/04/04		144 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		120	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/04/04		115	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		98 (1)	%	40 - 145
			C13-44'-DiCB-(15)	2023/04/04		73	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		44	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		96	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		114	%	40 - 145
			2-MonoCB-(1)	2023/04/04		108	%	60 - 145
			3-MonoCB-(2)	2023/04/04		118	%	N/A
			4-MonoCB-(3)	2023/04/04		107	%	60 - 145
			22'-DiCB-(4)	2023/04/04		114	%	60 - 145
			2,3-DiCB-(5)	2023/04/04		92	%	N/A
			2,3'-DiCB-(6)	2023/04/04		95	%	N/A
			2,4-DiCB-(7)	2023/04/04		89	%	N/A
			2,4'-DiCB-(8)	2023/04/04		53	%	N/A
			2,5-DiCB-(9)	2023/04/04		92	%	N/A
			2,6-DiCB-(10)	2023/04/04		71	%	N/A
			3,3'-DiCB-(11)	2023/04/04		126	%	N/A
			DiCB-(12)+(13)	2023/04/04		102	%	N/A
			3,5-DiCB-(14)	2023/04/04		106	%	N/A
			4,4'-DiCB-(15)	2023/04/04		112	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		70	%	N/A
			22'4-TriCB-(17)	2023/04/04		68	%	N/A
			TriCB-(18)+(30)	2023/04/04		59	%	N/A
			22'6-TriCB-(19)	2023/04/04		105	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		92	%	N/A
			TriCB-(21)+(33)	2023/04/04		100	%	N/A
			234'-TriCB-(22)	2023/04/04		101	%	N/A
			235-TriCB-(23)	2023/04/04		90	%	N/A
			236-TriCB-(24)	2023/04/04		81	%	N/A
			23'4-TriCB-(25)	2023/04/04		102	%	N/A
			TriCB-(26)+(29)	2023/04/04		91	%	N/A
			23'6-TriCB-(27)	2023/04/04		60	%	N/A
			24'5-TriCB-(31)	2023/04/04		94	%	N/A
			24'6-TriCB-(32)	2023/04/04		72	%	N/A
			23'5'-TriCB-(34)	2023/04/04		89	%	N/A
			33'4-TriCB-(35)	2023/04/04		115	%	N/A
			33'5-TriCB-(36)	2023/04/04		106	%	N/A
			344'-TriCB-(37)	2023/04/04		107	%	60 - 145
			345-TriCB-(38)	2023/04/04		109	%	N/A
			34'5-TriCB-(39)	2023/04/04		119	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		83	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		94	%	N/A
			22'35-TetraCB-(43)	2023/04/04		84	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		83	%	N/A
			TetraCB-(45)+(51)	2023/04/04		69	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		71	%	N/A
			22'45-TetraCB-(48)	2023/04/04		78	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		77	%	N/A
			TetraCB-(50)+(53)	2023/04/04		68	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'55'-TetraCB-(52)	2023/04/04		80	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		115	%	60 - 145
			233'4'-TetraCB-(55)	2023/04/04		94	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		97	%	N/A
			233'5'-TetraCB-(57)	2023/04/04		86	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		88	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		78	%	N/A
			2344'-TetraCB -(60)	2023/04/04		95	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		95	%	N/A
			234'5'-TetraCB-(63)	2023/04/04		92	%	N/A
			234'6'-TetraCB-(64)	2023/04/04		92	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		96	%	N/A
			23'45'-TetraCB-(67)	2023/04/04		89	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		89	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		84	%	N/A
			23'5'6'-TetraCB-(73)	2023/04/04		69	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		94	%	60 - 145
			33'45'-TetraCB-(78)	2023/04/04		114	%	N/A
			33'45'-TetraCB(79)	2023/04/04		103	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		92	%	N/A
			344'5'-TetraCB-(81)	2023/04/04		99	%	60 - 145
			22'33'4'-PentaCB-(82)	2023/04/04		104	%	N/A
			PentaCB-(83)+(99)	2023/04/04		91	%	N/A
			22'33'6'-PentaCB-(84)	2023/04/04		83	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		88	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		87	%	N/A
			PentaCB-(88)+(91)	2023/04/04		84	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		98	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		88	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		97	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		78	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		77	%	N/A
			22'35'6'-PentaCB-(95)	2023/04/04		94	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		83	%	N/A
			22'45'6'-PentaCB-(103)	2023/04/04		84	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		100	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		106	%	60 - 145
			233'45'-PentaCB-(106)	2023/04/04		111	%	N/A
			233'4'5'-PentaCB-(107)	2023/04/04		91	%	N/A
			PentaCB-(108)+(124)	2023/04/04		98	%	N/A
			PentaCB-(110)+(115)	2023/04/04		99	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		92	%	N/A
			233'56'-PentaCB-(112)	2023/04/04		94	%	N/A
			2344'5'-PentaCB-(114)	2023/04/04		104	%	60 - 145
			23'44'5'-PentaCB-(118)	2023/04/04		97	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		100	%	N/A
			23'45'6'-PentaCB-(121)	2023/04/04		83	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		125	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		101	%	60 - 145
			33'44'5'-PentaCB-(126)	2023/04/04		98	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		107	%	N/A
			HexaCB-(128)+(166)	2023/04/04		92	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		98	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'45'-HexaCB-(130)	2023/04/04		91	%	N/A
			22'33'46'-HexaCB-(131)	2023/04/04		105	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		89	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		93	%	N/A
			HexaCB-(134)+(143)	2023/04/04		94	%	N/A
			HexaCB-(135)+(151)	2023/04/04		89	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		84	%	N/A
			22'344'5'-HexaCB-(137)	2023/04/04		86	%	N/A
			HexaCB-(139)+(140)	2023/04/04		86	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		94	%	N/A
			22'3456'-HexaCB-(142)	2023/04/04		94	%	N/A
			22'345'6'-HexaCB-(144)	2023/04/04		96	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		82	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		90	%	N/A
			HexaCB-(147)+(149)	2023/04/04		87	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		86	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		80	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		82	%	N/A
			HexaCB-(153)+(168)	2023/04/04		87	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		85	%	N/A
			22'44'66'-HexaCB-(155)	2023/04/04		98	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		101	%	N/A
			233'44'6'-HexaCB-(158)	2023/04/04		93	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		91	%	N/A
			233'456'-HexaCB-(160)	2023/04/04		97	%	N/A
			233'45'6'-HexaCB-(161)	2023/04/04		88	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		93	%	N/A
			233'4'5'6'-HexaCB-(164)	2023/04/04		95	%	N/A
			233'55'6'-HexaCB-(165)	2023/04/04		89	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		105	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		103	%	60 - 145
			22'33'44'5'-HeptaCB-(170)	2023/04/04		87	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		93	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		94	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		94	%	N/A
			22'33'45'6'-HeptaCB-(175)	2023/04/04		86	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		84	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		90	%	N/A
			22'33'55'6'-HeptaCB-(178)	2023/04/04		88	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		88	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		99	%	N/A
			22'344'56'-HeptaCB-(181)	2023/04/04		93	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		89	%	N/A
			22'344'5'6'-HeptaCB-(183)	2023/04/04		92	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		82	%	N/A
			22'3455'6'-HeptaCB-(185)	2023/04/04		87	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		87	%	N/A
			22'34'55'6'-HeptaCB-(187)	2023/04/04		90	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		100	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		100	%	60 - 145
			233'44'56'-HeptaCB-(190)	2023/04/04		91	%	N/A
			233'44'5'6'-HeptaCB-(191)	2023/04/04		92	%	N/A
			233'455'6'-HeptaCB-(192)	2023/04/04		94	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'44'55'-OctaCB-(194)	2023/04/04		100	%	N/A
			22'33'44'56'-OctaCB-(195)	2023/04/04		103	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		97	%	N/A
			22'33'44'66'-OctaCB-(197)	2023/04/04		91	%	N/A
			OctaCB-(198)+(199)	2023/04/04		98	%	N/A
			22'33'45'66'-OctaCB-(200)	2023/04/04		100	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		89	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		92	%	60 - 145
			22'344'55'6'-OctaCB-(203)	2023/04/04		101	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		87	%	N/A
			233'44'55'6'-OctaCB-(205)	2023/04/04		92	%	60 - 145
			22'33'44'55'6'-NonaCB-(206)	2023/04/04		91	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		86	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		93	%	60 - 145
			DecaCB-(209)	2023/04/04		108	%	60 - 145
8533813	CXU	Spiked Blank DUP	C13-2,44'-TriCB-(28)	2023/04/04		82	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/04/04		100	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/04		106	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/04		95	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		91	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/04/04		83	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		102	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		71	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		56	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		66	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		41	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		52	%	40 - 145
			C13-22'-DiCB-(4)	2023/04/04		37	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/04/04		107	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		111	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		125 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		92	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/04/04		101	%	40 - 145
			C13-2344'5'-PentaCB-(114)	2023/04/04		115	%	40 - 145
			C13-23'44'5'-PentaCB-(118)	2023/04/04		116	%	40 - 145
			C13-2'344'5'-PentaCB-(123)	2023/04/04		118	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		39	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		112	%	40 - 145
			C13-33'44'5'-PentaCB-(126)	2023/04/04		134 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		113	%	40 - 145
			C13-344'5'-TetraCB-(81)	2023/04/04		110	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		96	%	40 - 145
			C13-44'-DiCB-(15)	2023/04/04		75	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		49 (1)	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		85	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		103	%	40 - 145
			2-MonoCB-(1)	2023/04/04		107	%	60 - 145
			3-MonoCB-(2)	2023/04/04		116	%	N/A
			4-MonoCB-(3)	2023/04/04		106	%	60 - 145
			22'-DiCB-(4)	2023/04/04		109	%	60 - 145
			2,3-DiCB-(5)	2023/04/04		96	%	N/A
			2,3'-DiCB-(6)	2023/04/04		95	%	N/A
			2,4-DiCB-(7)	2023/04/04		90	%	N/A



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			2,4'-DiCB-(8)	2023/04/04		55	%	N/A
			2,5-DiCB-(9)	2023/04/04		94	%	N/A
			2,6-DiCB-(10)	2023/04/04		72	%	N/A
			3,3'-DiCB-(11)	2023/04/04		127	%	N/A
			DiCB-(12)+(13)	2023/04/04		102	%	N/A
			3,5-DiCB-(14)	2023/04/04		106	%	N/A
			4,4'-DiCB-(15)	2023/04/04		111	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		77	%	N/A
			22'4-TriCB-(17)	2023/04/04		71	%	N/A
			TriCB-(18)+(30)	2023/04/04		61	%	N/A
			22'6-TriCB-(19)	2023/04/04		102	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		97	%	N/A
			TriCB-(21)+(33)	2023/04/04		102	%	N/A
			234'-TriCB-(22)	2023/04/04		101	%	N/A
			235-TriCB-(23)	2023/04/04		93	%	N/A
			236-TriCB-(24)	2023/04/04		75	%	N/A
			23'4-TriCB-(25)	2023/04/04		106	%	N/A
			TriCB-(26)+(29)	2023/04/04		92	%	N/A
			23'6-TriCB-(27)	2023/04/04		66	%	N/A
			24'5-TriCB-(31)	2023/04/04		97	%	N/A
			24'6-TriCB-(32)	2023/04/04		74	%	N/A
			23'5'-TriCB-(34)	2023/04/04		90	%	N/A
			33'4-TriCB-(35)	2023/04/04		117	%	N/A
			33'5-TriCB-(36)	2023/04/04		106	%	N/A
			344'-TriCB-(37)	2023/04/04		109	%	60 - 145
			345-TriCB-(38)	2023/04/04		112	%	N/A
			34'5-TriCB-(39)	2023/04/04		120	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		86	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		97	%	N/A
			22'35-TetraCB-(43)	2023/04/04		90	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		87	%	N/A
			TetraCB-(45)+(51)	2023/04/04		73	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		73	%	N/A
			22'45-TetraCB-(48)	2023/04/04		82	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		80	%	N/A
			TetraCB-(50)+(53)	2023/04/04		72	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		87	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		116	%	60 - 145
			233'4-TetraCB-(55)	2023/04/04		97	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		99	%	N/A
			233'5-TetraCB-(57)	2023/04/04		90	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		91	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		83	%	N/A
			2344'-TetraCB -(60)	2023/04/04		98	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		99	%	N/A
			234'5-TetraCB-(63)	2023/04/04		96	%	N/A
			234'6-TetraCB-(64)	2023/04/04		96	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		98	%	N/A
			23'45-TetraCB-(67)	2023/04/04		91	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		91	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		89	%	N/A
			23'5'6-TetraCB-(73)	2023/04/04		71	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		98	%	60 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			33'45'-TetraCB-(78)	2023/04/04		116	%	N/A
			33'45'-TetraCB(79)	2023/04/04		105	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		95	%	N/A
			344'5'-TetraCB-(81)	2023/04/04		100	%	60 - 145
			22'33'4'-PentaCB-(82)	2023/04/04		108	%	N/A
			PentaCB-(83)+(99)	2023/04/04		96	%	N/A
			22'33'6'-PentaCB-(84)	2023/04/04		87	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		93	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		92	%	N/A
			PentaCB-(88)+(91)	2023/04/04		89	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		103	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		93	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		101	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		82	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		80	%	N/A
			22'35'6'-PentaCB-(95)	2023/04/04		103	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		88	%	N/A
			22'45'6'-PentaCB-(103)	2023/04/04		88	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		102	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		105	%	60 - 145
			233'45'-PentaCB-(106)	2023/04/04		112	%	N/A
			233'4'5'-PentaCB-(107)	2023/04/04		96	%	N/A
			PentaCB-(108)+(124)	2023/04/04		101	%	N/A
			PentaCB-(110)+(115)	2023/04/04		104	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		96	%	N/A
			233'56'-PentaCB-(112)	2023/04/04		97	%	N/A
			2344'5'-PentaCB-(114)	2023/04/04		106	%	60 - 145
			23'44'5'-PentaCB-(118)	2023/04/04		103	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		105	%	N/A
			23'45'6'-PentaCB-(121)	2023/04/04		88	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		128	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		104	%	60 - 145
			33'44'5'-PentaCB-(126)	2023/04/04		100	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		109	%	N/A
			HexaCB-(128)+(166)	2023/04/04		97	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		103	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		93	%	N/A
			22'33'46'-HexaCB-(131)	2023/04/04		108	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		92	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		96	%	N/A
			HexaCB-(134)+(143)	2023/04/04		99	%	N/A
			HexaCB-(135)+(151)	2023/04/04		94	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		92	%	N/A
			22'344'5'-HexaCB-(137)	2023/04/04		85	%	N/A
			HexaCB-(139)+(140)	2023/04/04		90	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		98	%	N/A
			22'3456'-HexaCB-(142)	2023/04/04		96	%	N/A
			22'345'6'-HexaCB-(144)	2023/04/04		97	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		86	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		93	%	N/A
			HexaCB-(147)+(149)	2023/04/04		91	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		93	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		84	%	N/A



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'3566'-HexaCB-(152)	2023/04/04		87	%	N/A
			HexaCB-(153)+(168)	2023/04/04		91	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		89	%	N/A
			22'44'66'-HexaCB-(155)	2023/04/04		103	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		105	%	N/A
			233'44'6-HexaCB-(158)	2023/04/04		96	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		95	%	N/A
			233'456-HexaCB-(160)	2023/04/04		99	%	N/A
			233'45'6-HexaCB-(161)	2023/04/04		92	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		97	%	N/A
			233'4'5'6-HexaCB-(164)	2023/04/04		104	%	N/A
			233'55'6-HexaCB-(165)	2023/04/04		91	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		107	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		106	%	60 - 145
			22'33'44'5-HeptaCB-(170)	2023/04/04		88	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		96	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		98	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		96	%	N/A
			22'33'45'6-HeptaCB-(175)	2023/04/04		93	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		90	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		93	%	N/A
			22'33'55'6-HeptaCB-(178)	2023/04/04		93	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		94	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		103	%	N/A
			22'344'56-HeptaCB-(181)	2023/04/04		96	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		97	%	N/A
			22'344'5'6-HeptaCB-(183)	2023/04/04		88	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		86	%	N/A
			22'3455'6-HeptaCB-(185)	2023/04/04		103	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		91	%	N/A
			22'34'55'6-HeptaCB-(187)	2023/04/04		96	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		103	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		104	%	60 - 145
			233'44'56-HeptaCB-(190)	2023/04/04		95	%	N/A
			233'44'5'6-HeptaCB-(191)	2023/04/04		95	%	N/A
			233'455'6-HeptaCB-(192)	2023/04/04		99	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		101	%	N/A
			22'33'44'56'-OctaCB-(195)	2023/04/04		102	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		99	%	N/A
			22'33'44'66'-OctaCB-(197)	2023/04/04		94	%	N/A
			OctaCB-(198)+(199)	2023/04/04		100	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		104	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		92	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		95	%	60 - 145
			22'344'55'6-OctaCB-(203)	2023/04/04		103	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		91	%	N/A
			233'44'55'6-OctaCB-(205)	2023/04/04		93	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2023/04/04		93	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		90	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		97	%	60 - 145
			DecaCB-(209)	2023/04/04		115	%	60 - 145
8533813	CXU	RPD	2-MonoCB-(1)	2023/04/04	1.0		%	30
			3-MonoCB-(2)	2023/04/04	1.9		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			4-MonoCB-(3)	2023/04/04	0.85		%	30
			22'-DiCB-(4)	2023/04/04	4.4		%	30
			2,3-DiCB-(5)	2023/04/04	3.6		%	30
			2,3'-DiCB-(6)	2023/04/04	0		%	30
			2,4-DiCB-(7)	2023/04/04	1.0		%	30
			2,4'-DiCB-(8)	2023/04/04	3.7		%	30
			2,5-DiCB-(9)	2023/04/04	2.3		%	30
			2,6-DiCB-(10)	2023/04/04	2.0		%	30
			3,3'-DiCB-(11)	2023/04/04	1.0		%	30
			DiCB-(12)+(13)	2023/04/04	0.29		%	30
			3,5-DiCB-(14)	2023/04/04	0.38		%	30
			4,4'-DiCB-(15)	2023/04/04	1.2		%	30
			22'3-TriCB-(16)	2023/04/04	9.8		%	30
			22'4-TriCB-(17)	2023/04/04	4.0		%	30
			TriCB-(18)+(30)	2023/04/04	2.5		%	30
			22'6-TriCB-(19)	2023/04/04	2.5		%	30
			TriCB-(20) + (28)	2023/04/04	4.3		%	30
			TriCB-(21)+(33)	2023/04/04	1.7		%	30
			234'-TriCB-(22)	2023/04/04	0.099		%	30
			235-TriCB-(23)	2023/04/04	3.2		%	30
			236-TriCB-(24)	2023/04/04	7.4		%	30
			23'4-TriCB-(25)	2023/04/04	3.3		%	30
			TriCB-(26)+(29)	2023/04/04	1.4		%	30
			23'6-TriCB-(27)	2023/04/04	9.2		%	30
			24'5-TriCB-(31)	2023/04/04	3.2		%	30
			24'6-TriCB-(32)	2023/04/04	2.3		%	30
			23'5'-TriCB-(34)	2023/04/04	1.7		%	30
			33'4-TriCB-(35)	2023/04/04	1.5		%	30
			33'5-TriCB-(36)	2023/04/04	0		%	30
			344'-TriCB-(37)	2023/04/04	2.1		%	30
			345-TriCB-(38)	2023/04/04	2.4		%	30
			34'5-TriCB-(39)	2023/04/04	1.1		%	30
			TetraCB-(40)+(41)+(71)	2023/04/04	4.3		%	30
			22'34'-TetraCB-(42)	2023/04/04	2.5		%	30
			22'35-TetraCB-(43)	2023/04/04	6.9		%	30
			TetraCB-(44)+(47)+(65)	2023/04/04	4.6		%	30
			TetraCB-(45)+(51)	2023/04/04	5.5		%	30
			22'36'-TetraCB-(46)	2023/04/04	3.7		%	30
			22'45-TetraCB-(48)	2023/04/04	5.1		%	30
			TetraCB-(49)+TetraCB-(69)	2023/04/04	4.3		%	30
			TetraCB-(50)+(53)	2023/04/04	6.2		%	30
			22'55'-TetraCB-(52)	2023/04/04	7.4		%	30
			22'66'-TetraCB-(54)	2023/04/04	1.3		%	30
			233'4-TetraCB-(55)	2023/04/04	3.1		%	30
			233'4'-Tetra CB(56)	2023/04/04	2.0		%	30
			233'5-TetraCB-(57)	2023/04/04	4.1		%	30
			233'5'-TetraCB-(58)	2023/04/04	3.5		%	30
			TetraCB-(59)+(62)+(75)	2023/04/04	6.1		%	30
			2344'-TetraCB -(60)	2023/04/04	2.9		%	30
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04	4.1		%	30
			234'5-TetraCB-(63)	2023/04/04	4.2		%	30
			234'6-TetraCB-(64)	2023/04/04	4.5		%	30
			23'44'-TetraCB-(66)	2023/04/04	1.8		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			23'45'-TetraCB-(67)	2023/04/04	1.6		%	30
			23'45'-TetraCB-(68)	2023/04/04	2.8		%	30
			23'55'-TetraCB-(72)	2023/04/04	5.7		%	30
			23'5'6'-TetraCB-(73)	2023/04/04	3.7		%	30
			33'44'-TetraCB-(77)	2023/04/04	3.3		%	30
			33'45'-TetraCB-(78)	2023/04/04	1.7		%	30
			33'45'-TetraCB(79)	2023/04/04	2.8		%	30
			33'55'-TetraCB-(80)	2023/04/04	3.5		%	30
			344'5'-TetraCB-(81)	2023/04/04	1.8		%	30
			22'33'4'-PentaCB-(82)	2023/04/04	3.5		%	30
			PentaCB-(83)+(99)	2023/04/04	5.9		%	30
			22'33'6'-PentaCB-(84)	2023/04/04	4.5		%	30
			PentaCB-(85)+(116)+(117)	2023/04/04	5.1		%	30
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04	5.0		%	30
			PentaCB-(88)+(91)	2023/04/04	6.0		%	30
			22'346'-PentaCB-(89)	2023/04/04	5.1		%	30
			PentaCB-(90)+(101)+(113)	2023/04/04	5.0		%	30
			22'355'-PentaCB-(92)	2023/04/04	3.6		%	30
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04	5.5		%	30
			22'356'-PentaCB-(94)	2023/04/04	3.7		%	30
			22'35'6'-PentaCB-(95)	2023/04/04	8.8		%	30
			22'366'-PentaCB-(96)	2023/04/04	6.0		%	30
			22'45'6'-PentaCB-(103)	2023/04/04	4.9		%	30
			22'466'-PentaCB-(104)	2023/04/04	1.6		%	30
			233'44'-PentaCB-(105)	2023/04/04	0.66		%	30
			233'45'-PentaCB-(106)	2023/04/04	1.5		%	30
			233'4'5'-PentaCB-(107)	2023/04/04	4.9		%	30
			PentaCB-(108)+(124)	2023/04/04	3.1		%	30
			PentaCB-(110)+(115)	2023/04/04	5.0		%	30
			233'55'-PentaCB-(111)	2023/04/04	4.0		%	30
			233'56'-PentaCB-(112)	2023/04/04	4.0		%	30
			2344'5'-PentaCB-(114)	2023/04/04	2.1		%	30
			23'44'5'-PentaCB-(118)	2023/04/04	6.1		%	30
			23'455'-PentaCB-(120)	2023/04/04	5.4		%	30
			23'45'6'-PentaCB-(121)	2023/04/04	6.6		%	30
			233'4'5'-PentaCB-(122)	2023/04/04	2.0		%	30
			23'44'5'-PentaCB-(123)	2023/04/04	3.4		%	30
			33'44'5'-PentaCB-(126)	2023/04/04	2.3		%	30
			33'455'-PentaCB-(127)	2023/04/04	1.5		%	30
			HexaCB-(128)+(166)	2023/04/04	6.0		%	30
			HexaCB-(129)+(138)+(163)	2023/04/04	5.1		%	30
			22'33'45'-HexaCB-(130)	2023/04/04	2.4		%	30
			22'33'46'-HexaCB-(131)	2023/04/04	2.8		%	30
			22'33'46'-HexaCB-(132)	2023/04/04	3.3		%	30
			22'33'55'-HexaCB-(133)	2023/04/04	2.7		%	30
			HexaCB-(134)+(143)	2023/04/04	4.9		%	30
			HexaCB-(135)+(151)	2023/04/04	5.0		%	30
			22'33'66'-HexaCB-(136)	2023/04/04	8.6		%	30
			22'344'5'-HexaCB-(137)	2023/04/04	0.47		%	30
			HexaCB-(139)+(140)	2023/04/04	4.0		%	30
			22'3455'-HexaCB-(141)	2023/04/04	4.7		%	30
			22'3456'-HexaCB-(142)	2023/04/04	2.2		%	30
			22'345'6'-HexaCB-(144)	2023/04/04	1.8		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'3466'-HexaCB-(145)	2023/04/04	4.7		%	30
			22'34'55'-HexaCB-(146)	2023/04/04	3.7		%	30
			HexaCB-(147)+(149)	2023/04/04	5.2		%	30
			22'34'56'-HexaCB-(148)	2023/04/04	7.8		%	30
			22'34'66'-HexaCB-(150)	2023/04/04	4.1		%	30
			22'3566'-HexaCB-(152)	2023/04/04	6.5		%	30
			HexaCB-(153)+(168)	2023/04/04	4.8		%	30
			22'44'56'-HexaCB-(154)	2023/04/04	5.4		%	30
			22'44'66'-HexaCB-(155)	2023/04/04	5.3		%	30
			HexaCB-(156)+(157)	2023/04/04	3.4		%	30
			233'44'6-HexaCB-(158)	2023/04/04	3.6		%	30
			233'455'-HexaCB-(159)	2023/04/04	4.4		%	30
			233'456-HexaCB-(160)	2023/04/04	2.2		%	30
			233'45'6-HexaCB-(161)	2023/04/04	4.2		%	30
			233'4'55'-HexaCB-(162)	2023/04/04	4.3		%	30
			233'4'5'6-HexaCB-(164)	2023/04/04	9.2		%	30
			233'55'6-HexaCB-(165)	2023/04/04	2.3		%	30
			23'44'55'-HexaCB-(167)	2023/04/04	1.2		%	30
			33'44'55'-HexaCB-(169)	2023/04/04	2.3		%	30
			22'33'44'5-HeptaCB-(170)	2023/04/04	1.4		%	30
			HeptaCB-(171)+(173)	2023/04/04	3.9		%	30
			22'33'455'-HeptaCB-(172)	2023/04/04	4.6		%	30
			22'33'456'-HeptaCB-(174)	2023/04/04	1.9		%	30
			22'33'45'6-HeptaCB-(175)	2023/04/04	7.6		%	30
			22'33'466'-HeptaCB-(176)	2023/04/04	7.6		%	30
			22'33'45'6'-HeptaCB-(177)	2023/04/04	3.2		%	30
			22'33'55'6-HeptaCB-(178)	2023/04/04	5.2		%	30
			22'33'566'-HeptaCB-(179)	2023/04/04	6.6		%	30
			HeptaCB-(180)+(193)	2023/04/04	3.9		%	30
			22'344'56-HeptaCB-(181)	2023/04/04	3.9		%	30
			22'344'56'-HeptaCB-(182)	2023/04/04	8.6		%	30
			22'344'5'6-HeptaCB-(183)	2023/04/04	4.2		%	30
			22'344'66'-HeptaCB-(184)	2023/04/04	5.0		%	30
			22'3455'6-HeptaCB-(185)	2023/04/04	17		%	30
			22'34566'-HeptaCB-(186)	2023/04/04	4.4		%	30
			22'34'55'6-HeptaCB-(187)	2023/04/04	6.8		%	30
			22'34'566'-HeptaCB-(188)	2023/04/04	3.3		%	30
			233'44'55'-HeptaCB-(189)	2023/04/04	3.4		%	30
			233'44'56-HeptaCB-(190)	2023/04/04	4.3		%	30
			233'44'5'6-HeptaCB-(191)	2023/04/04	3.0		%	30
			233'455'6-HeptaCB-(192)	2023/04/04	5.1		%	30
			22'33'44'55'-OctaCB-(194)	2023/04/04	1.5		%	30
			22'33'44'56-OctaCB-(195)	2023/04/04	0.098		%	30
			22'33'44'56'-OctaCB-(196)	2023/04/04	2.2		%	30
			22'33'44'66'OctaCB-(197)	2023/04/04	2.5		%	30
			OctaCB-(198)+(199)	2023/04/04	1.7		%	30
			22'33'4566'-OctaCB-(200)	2023/04/04	3.6		%	30
			22'33'45'66'-OctaCB-(201)	2023/04/04	2.5		%	30
			22'33'55'66'-OctaCB-(202)	2023/04/04	3.6		%	30
			22'344'55'6-OctaCB-(203)	2023/04/04	2.2		%	30
			22'344'566'-OctaCB-(204)	2023/04/04	3.8		%	30
			233'44'55'6-OctaCB-(205)	2023/04/04	0.86		%	30
			22'33'44'55'6-NonaCB-(206)	2023/04/04	2.2		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'44'566'-NonaCB-(207)	2023/04/04	4.3		%	30
			22'33'455'66'-NonaCB-(208)	2023/04/04	4.9		%	30
			DecaCB-(209)	2023/04/04	6.0		%	30
8533813	CXU	Method Blank	C13-2,44'-TriCB-(28)	2023/03/03		109	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/03/03		89	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/03/03		118	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/03/03		94	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/03/03		94	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/03/03		76	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/03/03		110	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/03/03		69	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/03/03		48	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/03/03		67	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/03/03		56	%	15 - 145
			C13-22'6-TriCB-(19)	2023/03/03		52	%	40 - 145
			C13-22'-DiCB-(4)	2023/03/03		37	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/03/03		109	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/03/03		113	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/03/03		146 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/03/03		98	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/03/03		96	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/03/03		139	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/03/03		143	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/03/03		143	%	40 - 145
			C13-2-MonoCB-(1)	2023/03/03		39	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/03/03		101	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/03/03		151 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/03/03		86	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/03/03		82	%	40 - 145
			C13-344'-TriCB-(37)	2023/03/03		80	%	40 - 145
			C13-44'-DiCB-(15)	2023/03/03		82	%	15 - 145
			C13-4-MonoCB-(3)	2023/03/03		49	%	15 - 145
			C13-DecaCB-(209)	2023/03/03		69	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/03/03		96	%	40 - 145
			2-MonoCB-(1)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			3-MonoCB-(2)	2023/03/03	0.0087 U, EDL=0.0087		ng/L	
			4-MonoCB-(3)	2023/03/03	0.0083 U, EDL=0.0083		ng/L	
			22'-DiCB-(4)	2023/03/03	0.029 U, EDL=0.029		ng/L	
			2,3-DiCB-(5)	2023/03/03	0.0053 U, EDL=0.0053		ng/L	
			2,3'-DiCB-(6)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			2,4-DiCB-(7)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			2,4'-DiCB-(8)	2023/03/03	0.0062 J, EDL=0.0051		ng/L	
			2,5-DiCB-(9)	2023/03/03	0.0055 U, EDL=0.0055		ng/L	
			2,6-DiCB-(10)	2023/03/03	0.0097 U, EDL=0.0097		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			3,3'-DiCB-(11)	2023/03/03	0.0834 J, EDL=0.0052		ng/L	
			DiCB-(12)+(13)	2023/03/03	0.0051 U, EDL=0.0051		ng/L	
			3,5-DiCB-(14)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			4,4'-DiCB-(15)	2023/03/03	0.0110 J, EDL=0.0053		ng/L	
			22'3-TriCB-(16)	2023/03/03	0.0279 J, EDL=0.0081		ng/L	
			22'4-TriCB-(17)	2023/03/03	0.0179 J, EDL=0.0061		ng/L	
			TriCB-(18)+(30)	2023/03/03	0.0176 J, EDL=0.0053		ng/L	
			22'6-TriCB-(19)	2023/03/03	0.0081 U, EDL=0.0081		ng/L	
			TriCB-(20) + (28)	2023/03/03	0.0548, EDL=0.0027		ng/L	
			TriCB-(21)+(33)	2023/03/03	0.0405 J, EDL=0.0029		ng/L	
			234'-TriCB-(22)	2023/03/03	0.0213, EDL=0.0029		ng/L	
			235-TriCB-(23)	2023/03/03	0.0028 U, EDL=0.0028		ng/L	
			236-TriCB-(24)	2023/03/03	0.0048 U, EDL=0.0048		ng/L	
			23'4-TriCB-(25)	2023/03/03	0.0050 U, EDL=0.0050		ng/L	
			TriCB-(26)+(29)	2023/03/03	0.0111 J, EDL=0.0022		ng/L	
			23'6-TriCB-(27)	2023/03/03	0.0046 U, EDL=0.0046		ng/L	
			24'5-TriCB-(31)	2023/03/03	0.0613, EDL=0.0026		ng/L	
			24'6-TriCB-(32)	2023/03/03	0.0157 J, EDL=0.0043		ng/L	
			23'5'-TriCB-(34)	2023/03/03	0.0029 U, EDL=0.0029		ng/L	
			33'4-TriCB-(35)	2023/03/03	0.0030 U, EDL=0.0030		ng/L	
			33'5-TriCB-(36)	2023/03/03	0.0025 U, EDL=0.0025		ng/L	
			344'-TriCB-(37)	2023/03/03	0.0127 J, EDL=0.0031		ng/L	
			345-TriCB-(38)	2023/03/03	0.0029 U, EDL=0.0029		ng/L	
			34'5-TriCB-(39)	2023/03/03	0.0030 U, EDL=0.0030		ng/L	
			TetraCB-(40)+(41)+(71)	2023/03/03	0.029 J, EDL=0.015		ng/L	
			22'34'-TetraCB-(42)	2023/03/03	0.020 U, EDL=0.020		ng/L	
			22'35-TetraCB-(43)	2023/03/03	0.018 U, EDL=0.018		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			TetraCB-(44)+(47)+(65)	2023/03/03	0.057 U, EDL=0.057 (2)		ng/L	
			TetraCB-(45)+(51)	2023/03/03	0.015 U, EDL=0.015		ng/L	
			22'36'-TetraCB-(46)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			22'45'-TetraCB-(48)	2023/03/03	0.015 U, EDL=0.015		ng/L	
			TetraCB-(49)+TetraCB-(69)	2023/03/03	0.051 J, EDL=0.013		ng/L	
			TetraCB-(50)+(53)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'55'-TetraCB-(52)	2023/03/03	0.150, EDL=0.015		ng/L	
			22'66'-TetraCB-(54)	2023/03/03	0.025 U, EDL=0.025		ng/L	
			233'4'-TetraCB-(55)	2023/03/03	0.0095 U, EDL=0.0095		ng/L	
			233'4'-Tetra CB(56)	2023/03/03	0.0176 J, EDL=0.0097		ng/L	
			233'5'-TetraCB-(57)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			233'5'-TetraCB-(58)	2023/03/03	0.0094 U, EDL=0.0094		ng/L	
			TetraCB-(59)+(62)+(75)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			2344'-TetraCB -(60)	2023/03/03	0.0121 J, EDL=0.0092		ng/L	
			TetraCB-(61)+(70)+(74)+(76)	2023/03/03	0.115 J, EDL=0.0086		ng/L	
			234'5'-TetraCB-(63)	2023/03/03	0.0091 U, EDL=0.0091		ng/L	
			234'6'-TetraCB-(64)	2023/03/03	0.028 J, EDL=0.013		ng/L	
			23'44'-TetraCB-(66)	2023/03/03	0.0394 J, EDL=0.0086		ng/L	
			23'45'-TetraCB-(67)	2023/03/03	0.0080 U, EDL=0.0080		ng/L	
			23'45'-TetraCB-(68)	2023/03/03	0.0085 U, EDL=0.0085		ng/L	
			23'55'-TetraCB-(72)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			23'5'6'-TetraCB-(73)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			33'44'-TetraCB-(77)	2023/03/03	0.0098 U, EDL=0.0098		ng/L	
			33'45'-TetraCB-(78)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			33'45'-TetraCB(79)	2023/03/03	0.0084 U, EDL=0.0084		ng/L	
			33'55'-TetraCB-(80)	2023/03/03	0.0077 U, EDL=0.0077		ng/L	
			344'5'-TetraCB-(81)	2023/03/03	0.010 U, EDL=0.010		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'4-PentaCB-(82)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			PentaCB-(83)+(99)	2023/03/03	0.059 J, EDL=0.014		ng/L	
			22'33'6-PentaCB-(84)	2023/03/03	0.024, EDL=0.014		ng/L	
			PentaCB-(85)+(116)+(117)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/03/03	0.068 J, EDL=0.011		ng/L	
			PentaCB-(88)+(91)	2023/03/03	0.012 U, EDL=0.012		ng/L	
			22'346'-PentaCB-(89)	2023/03/03	0.016 U, EDL=0.016		ng/L	
			PentaCB-(90)+(101)+(113)	2023/03/03	0.206, EDL=0.011		ng/L	
			22'355'-PentaCB-(92)	2023/03/03	0.035 J, EDL=0.015		ng/L	
			PentaCB-(93)+(98)+(100)+(102)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'356'-PentaCB-(94)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'35'6-PentaCB-(95)	2023/03/03	0.210, EDL=0.015		ng/L	
			22'366'-PentaCB-(96)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'45'6-PentaCB-(103)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'466'-PentaCB-(104)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			233'44'-PentaCB-(105)	2023/03/03	0.0276 J, EDL=0.0052		ng/L	
			233'45-PentaCB-(106)	2023/03/03	0.0057 U, EDL=0.0057		ng/L	
			233'4'5-PentaCB-(107)	2023/03/03	0.0081 J, EDL=0.0043		ng/L	
			PentaCB-(108)+(124)	2023/03/03	0.0053 U, EDL=0.0053		ng/L	
			PentaCB-(110)+(115)	2023/03/03	0.122, EDL=0.011		ng/L	
			233'55'-PentaCB-(111)	2023/03/03	0.0092 U, EDL=0.0092		ng/L	
			233'56-PentaCB-(112)	2023/03/03	0.0091 U, EDL=0.0091		ng/L	
			2344'5-PentaCB-(114)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			23'44'5-PentaCB-(118)	2023/03/03	0.0962 J, EDL=0.0048		ng/L	
			23'455'-PentaCB-(120)	2023/03/03	0.0097 U, EDL=0.0097		ng/L	
			23'45'6-PentaCB-(121)	2023/03/03	0.0092 U, EDL=0.0092		ng/L	
			233'4'5'-PentaCB-(122)	2023/03/03	0.0070 U, EDL=0.0070		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			23'44'5'-PentaCB-(123)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			33'44'5'-PentaCB-(126)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			33'455'-PentaCB-(127)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			HexaCB-(128)+(166)	2023/03/03	0.0124 J, EDL=0.0057		ng/L	
			HexaCB-(129)+(138)+(163)	2023/03/03	0.201, EDL=0.0064		ng/L	
			22'33'45'-HexaCB-(130)	2023/03/03	0.0072 J, EDL=0.0069		ng/L	
			22'33'46'-HexaCB-(131)	2023/03/03	0.0083 U, EDL=0.0083		ng/L	
			22'33'46'-HexaCB-(132)	2023/03/03	0.0682, EDL=0.0069		ng/L	
			22'33'55'-HexaCB-(133)	2023/03/03	0.0071 U, EDL=0.0071		ng/L	
			HexaCB-(134)+(143)	2023/03/03	0.0135 J, EDL=0.0076		ng/L	
			HexaCB-(135)+(151)	2023/03/03	0.143, EDL=0.013		ng/L	
			22'33'66'-HexaCB-(136)	2023/03/03	0.0455 J, EDL=0.0099		ng/L	
			22'344'5'-HexaCB-(137)	2023/03/03	0.0065 U, EDL=0.0065		ng/L	
			HexaCB-(139)+(140)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'3455'-HexaCB-(141)	2023/03/03	0.0545, EDL=0.0062		ng/L	
			22'3456'-HexaCB-(142)	2023/03/03	0.0074 U, EDL=0.0074		ng/L	
			22'345'6'-HexaCB-(144)	2023/03/03	0.022 J, EDL=0.013		ng/L	
			22'3466'-HexaCB-(145)	2023/03/03	0.0093 U, EDL=0.0093		ng/L	
			22'34'55'-HexaCB-(146)	2023/03/03	0.0310 J, EDL=0.0058		ng/L	
			HexaCB-(147)+(149)	2023/03/03	0.274, EDL=0.0055		ng/L	
			22'34'56'-HexaCB-(148)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'34'66'-HexaCB-(150)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			22'3566'-HexaCB-(152)	2023/03/03	0.0094 U, EDL=0.0094		ng/L	
			HexaCB-(153)+(168)	2023/03/03	0.237, EDL=0.0050		ng/L	
			22'44'56'-HexaCB-(154)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'44'66'-HexaCB-(155)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			HexaCB-(156)+(157)	2023/03/03	0.0088 J, EDL=0.0035		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C338911

Report Date: 2023/04/24

Apex Laboratories

Client Project #: A3B0217

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'44'6-HexaCB-(158)	2023/03/03	0.0167 J, EDL=0.0042		ng/L	
			233'455'-HexaCB-(159)	2023/03/03	0.0033 U, EDL=0.0033		ng/L	
			233'456-HexaCB-(160)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			233'45'6-HexaCB-(161)	2023/03/03	0.0048 U, EDL=0.0048		ng/L	
			233'4'55'-HexaCB-(162)	2023/03/03	0.0032 U, EDL=0.0032		ng/L	
			233'4'5'6-HexaCB-(164)	2023/03/03	0.0103 J, EDL=0.0046		ng/L	
			233'55'6-HexaCB-(165)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			23'44'55'-HexaCB-(167)	2023/03/03	0.0041 J, EDL=0.0035		ng/L	
			33'44'55'-HexaCB-(169)	2023/03/03	0.0038 U, EDL=0.0038		ng/L	
			22'33'44'5-HeptaCB-(170)	2023/03/03	0.0208 J, EDL=0.0054		ng/L	
			HeptaCB-(171)+(173)	2023/03/03	0.013 U, EDL=0.013 (2)		ng/L	
			22'33'455'-HeptaCB-(172)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'33'456'-HeptaCB-(174)	2023/03/03	0.0523, EDL=0.0054		ng/L	
			22'33'45'6-HeptaCB-(175)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'33'466'-HeptaCB-(176)	2023/03/03	0.0140 J, EDL=0.0076		ng/L	
			22'33'45'6'-HeptaCB-(177)	2023/03/03	0.0308 J, EDL=0.0059		ng/L	
			22'33'55'6-HeptaCB-(178)	2023/03/03	0.014 J, EDL=0.011		ng/L	
			22'33'566'-HeptaCB-(179)	2023/03/03	0.0419 J, EDL=0.0074		ng/L	
			HeptaCB-(180)+(193)	2023/03/03	0.0737 J, EDL=0.0047		ng/L	
			22'344'56-HeptaCB-(181)	2023/03/03	0.0056 U, EDL=0.0056		ng/L	
			22'344'56'-HeptaCB-(182)	2023/03/03	0.0098 U, EDL=0.0098		ng/L	
			22'344'5'6-HeptaCB-(183)	2023/03/03	0.0419 J, EDL=0.0048		ng/L	
			22'344'66'-HeptaCB-(184)	2023/03/03	0.0073 U, EDL=0.0073		ng/L	
			22'3455'6-HeptaCB-(185)	2023/03/03	0.0058 U, EDL=0.0058		ng/L	
			22'34566'-HeptaCB-(186)	2023/03/03	0.0079 U, EDL=0.0079		ng/L	
			22'34'55'6-HeptaCB-(187)	2023/03/03	0.085, EDL=0.010		ng/L	
			22'34'566'-HeptaCB-(188)	2023/03/03	0.0080 U, EDL=0.0080		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'44'55'-HeptaCB-(189)	2023/03/03	0.0039 U, EDL=0.0039		ng/L	
			233'44'56'-HeptaCB-(190)	2023/03/03	0.0049 J, EDL=0.0043		ng/L	
			233'44'5'6'-HeptaCB-(191)	2023/03/03	0.0042 U, EDL=0.0042		ng/L	
			233'455'6'-HeptaCB-(192)	2023/03/03	0.0047 U, EDL=0.0047		ng/L	
			22'33'44'55'-OctaCB-(194)	2023/03/03	0.0078 U, EDL=0.0078		ng/L	
			22'33'44'56'-OctaCB-(195)	2023/03/03	0.0084 U, EDL=0.0084		ng/L	
			22'33'44'56'-OctaCB-(196)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'33'44'66'-OctaCB-(197)	2023/03/03	0.0081 U, EDL=0.0081		ng/L	
			OctaCB-(198)+(199)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'33'4566'-OctaCB-(200)	2023/03/03	0.0082 U, EDL=0.0082		ng/L	
			22'33'45'66'-OctaCB-(201)	2023/03/03	0.0076 U, EDL=0.0076		ng/L	
			22'33'55'66'-OctaCB-(202)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			22'344'55'6'-OctaCB-(203)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'344'566'-OctaCB-(204)	2023/03/03	0.0075 U, EDL=0.0075		ng/L	
			233'44'55'6'-OctaCB-(205)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'33'44'55'6'-NonaCB-(206)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'33'44'566'-NonaCB-(207)	2023/03/03	0.0076 U, EDL=0.0076		ng/L	
			22'33'455'66'-NonaCB-(208)	2023/03/03	0.0079 U, EDL=0.0079		ng/L	
			DecaCB-(209)	2023/03/03	0.012 U, EDL=0.012		ng/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

(1) The extracted internal standard analyte exhibited high recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. For results that were not detected (ND), this potential high bias has no impact.

(2) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



Bureau Veritas Job #: C338911
Report Date: 2023/04/24

Apex Laboratories
Client Project #: A3B0217

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Angel Guerrero, Supervisor, Ultra Trace Analysis, HRMS and SVOC

Colm McNamara, Senior Analyst, Liquid Chromatography

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

SUBCONTRACT ORDER

Apex Laboratories

AB21123 **A3B0217**

SENDING LABORATORY:

Apex Laboratories
 6700 S.W. Sandburg Street
 Tigard, OR 97223
 Phone: (503) 718-2323
 Fax: (503) 336-0745
 Project Manager: Philip Nerenberg


RECEIVING LABORATORY:

BV Labs / Maxxam
 C/O FEDEX DEPOT 299 Cayuga Rd
 Cheektowaga, NY 14225
 Phone : (800) 668-0639
 Fax: (905) 332-9169

Sample Name: MFA-B3A-20230207-GW-36.0 **Water** **Sampled:** 02/07/23 08:30 (A3B0217-01)

AVK 2/8/23

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/20/23 17:00	02/07/24 08:30	
1668C PCB Congeners (SUB)	02/20/23 17:00	02/07/24 08:30	
1699 Insecticides/Pesticides (SUB)	02/20/23 17:00	02/14/23 08:30	waters
537M - PFOAs (SUB)	02/20/23 17:00	02/14/23 08:30	
<i>Containers Supplied:</i>			
(H)Other-Non Preserved			
(I)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(U)1 L Amber Glass - Non Preserved			

09-Feb-23 12:55
 Lori Dufour

 C338911
 AJH ENV-713

Sample Name: Field Blank **Water** **Sampled:** 02/07/23 08:20 (A3B0217-02)

Analysis	Due	Expires	Comments
537M - PFOAs (SUB)	02/20/23 17:00	02/14/23 08:20	
<i>Containers Supplied:</i>			
(A)Other-Non Preserved			
(B)Other-Non Preserved			

Standard TAT

Temp. Blank - 1.4/1.6/1.2, 1.6/1.7/1.4, 4.3/4.4/4.3

[Signature]

2-8-23

Fed Ex (Shipper)

Temp. - Refer to ACTR

Released By Date

Received By Date

Fed Ex (Shipper)

KALCI SOLADHARA 2023/02/09 12:55

Released By Date

Received By Date



Your Project #: A3A1010

Attention: Philip Nerenberg

Apex Laboratories
6700 SW Sandburg St.
Tigard, OR
USA 97223

Report Date: 2023/04/20
Report #: R7596014
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C338927

Received: 2023/02/09, 12:55

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Moisture	1	N/A	2023/02/21	CAM SOP-00445	Carter 2nd ed 51.2 m
PFAS in soil by SPE/LCMS (1)	1	2023/02/24	2023/02/26	CAM SOP-00894	ASTM D7968-17a m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Lori Dufour, Project Manager

Email: Lori.Dufour@bureauveritas.com

Phone# (905) 817-5700

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		VBK409			
Sampling Date		2023/01/31			
	UNITS	MFA-B1-B5-COMP-SL	RDL	MDL	QC Batch
Moisture	%	3.8	1.0	0.50	8513637
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					



PERFLUOROALKYL SUBSTANCES (SOIL)

Bureau Veritas ID		VBK409			
Sampling Date		2023/01/31			
	UNITS	MFA-B1-B5-COMP-SL	RDL	MDL	QC Batch
Perfluorobutanoic acid (PFBA)	ug/kg	0.14 U	1.0	0.14	8521318
Perfluoropentanoic acid (PFPeA)	ug/kg	0.17 U	1.0	0.17	8521318
Perfluorohexanoic acid (PFHxA)	ug/kg	0.72 J	1.0	0.15	8521318
Perfluoroheptanoic acid (PFHpA)	ug/kg	0.51 J	1.0	0.17	8521318
Perfluorooctanoic acid (PFOA)	ug/kg	0.95 J	1.0	0.17	8521318
Perfluorononanoic acid (PFNA)	ug/kg	0.76 J	1.0	0.14	8521318
Perfluorodecanoic acid (PFDA)	ug/kg	1.5	1.0	0.13	8521318
Perfluoroundecanoic acid (PFUnA)	ug/kg	1.3	1.0	0.22	8521318
Perfluorododecanoic acid (PFDoA)	ug/kg	1.2	1.0	0.16	8521318
Perfluorotridecanoic acid (PFTRDA)	ug/kg	0.61 J	1.0	0.12	8521318
Perfluorotetradecanoic acid(PFTEDA)	ug/kg	0.46 J	1.0	0.13	8521318
Perfluorobutanesulfonic acid (PFBS)	ug/kg	0.15 U	1.0	0.15	8521318
Perfluoropentanesulfonic acid PFPes	ug/kg	0.34 U	1.0	0.34	8521318
Perfluorohexanesulfonic acid(PFHxS)	ug/kg	2.2 (1)	1.0	0.12	8521318
Perfluoroheptanesulfonic acid PFHpS	ug/kg	0.21 U	1.0	0.21	8521318
Perfluorooctanesulfonic acid (PFOS)	ug/kg	0.57 J	1.0	0.36	8521318
Perfluorononanesulfonic acid (PFNS)	ug/kg	0.18 U	1.0	0.18	8521318
Perfluorodecanesulfonic acid (PFDS)	ug/kg	0.92 J	1.0	0.21	8521318
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.10 U	1.0	0.10	8521318
EtFOSA	ug/kg	0.38 U	1.0	0.38	8521318
MeFOSA	ug/kg	0.45 U	1.0	0.45	8521318
EtFOSE	ug/kg	0.37 U	1.0	0.37	8521318
MeFOSE	ug/kg	0.34 U	1.0	0.34	8521318
EtFOSAA	ug/kg	7.0	1.0	0.16	8521318
MeFOSAA	ug/kg	4.3	1.0	0.24	8521318
4:2 Fluorotelomer sulfonic acid	ug/kg	0.10 U	1.0	0.10	8521318
6:2 Fluorotelomer sulfonic acid	ug/kg	0.24 U	1.0	0.24	8521318
8:2 Fluorotelomer sulfonic acid	ug/kg	0.26 U	1.0	0.26	8521318
Hexafluoropropyleneoxide dimer acid	ug/kg	0.16 U	1.0	0.16	8521318
4,8-Dioxa-3H-perfluorononanoic acid	ug/kg	0.15 U	1.0	0.15	8521318
9Cl-PF3ONS (F-53B Major)	ug/kg	0.10 U	1.0	0.10	8521318
11Cl-PF3OUdS (F-53B Minor)	ug/kg	0.28 U	1.0	0.28	8521318
Surrogate Recovery (%)					
13C2-4:2-Fluorotelomersulfonic Acid	%	62	N/A	N/A	8521318
13C2-6:2-Fluorotelomersulfonic Acid	%	68	N/A	N/A	8521318
13C2-8:2-Fluorotelomersulfonic Acid	%	64	N/A	N/A	8521318
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					
N/A = Not Applicable					
(1) Result is estimated as analyte confirmation criteria (ion ratio) were not met.					



PERFLUOROALKYL SUBSTANCES (SOIL)

Bureau Veritas ID		VBK409			
Sampling Date		2023/01/31			
	UNITS	MFA-B1-B5-COMP-SL	RDL	MDL	QC Batch
13C2-Perfluorodecanoic acid	%	47 (1)	N/A	N/A	8521318
13C2-Perfluorododecanoic acid	%	52	N/A	N/A	8521318
13C2-Perfluorohexanoic acid	%	59	N/A	N/A	8521318
13C2-perfluorotetradecanoic acid	%	37 (2)	N/A	N/A	8521318
13C2-Perfluoroundecanoic acid	%	57	N/A	N/A	8521318
13C3-HFPO-DA	%	57	N/A	N/A	8521318
13C3-Perfluorobutanesulfonic acid	%	64	N/A	N/A	8521318
13C4-Perfluorobutanoic acid	%	69	N/A	N/A	8521318
13C4-Perfluoroheptanoic acid	%	63	N/A	N/A	8521318
13C4-Perfluorooctanesulfonic acid	%	62	N/A	N/A	8521318
13C4-Perfluorooctanoic acid	%	57	N/A	N/A	8521318
13C5-Perfluorononanoic acid	%	57	N/A	N/A	8521318
13C5-Perfluoropentanoic acid	%	66	N/A	N/A	8521318
13C8-Perfluorooctane Sulfonamide	%	56	N/A	N/A	8521318
18O2-Perfluorohexanesulfonic acid	%	61	N/A	N/A	8521318
D3-MeFOSA	%	36	N/A	N/A	8521318
D3-MeFOSAA	%	61	N/A	N/A	8521318
D5-EtFOSA	%	29	N/A	N/A	8521318
D5-EtFOSAA	%	62	N/A	N/A	8521318
D7-MeFOSE	%	35	N/A	N/A	8521318
D9-EtFOSE	%	31	N/A	N/A	8521318
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (PFDA, PFDS). (2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (PFTeDA, PFTrDA).					



Bureau Veritas Job #: C338927
Report Date: 2023/04/20

Apex Laboratories
Client Project #: A3A1010

TEST SUMMARY

Bureau Veritas ID: VBK409
Sample ID: MFA-B1-B5-COMP-SL
Matrix: Soil

Collected: 2023/01/31
Shipped:
Received: 2023/02/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	8513637	N/A	2023/02/21	Joe Thomas
PFAS in soil by SPE/LCMS	LCMS	8521318	2023/02/24	2023/02/26	Adnan Khan



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.8°C
Package 2	5.6°C
Package 3	3.9°C

Revised Report (2023/4/20): Updated footnote comment (1) to reflect correct EIS and native analytes.

Sample VBK409 was air dried prior to analysis for moisture and extraction and analysed for PFAS as per client request.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C338927

Report Date: 2023/04/20

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8513637	SB3	RPD - Sample/Sample Dup	Moisture	2023/02/21	4.2		%	20
8521318	AKH	Matrix Spike	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/26		86	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/26		83	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/26		86	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/26		81	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/26		71	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/26		86	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/26		57	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/26		77	%	50 - 150
			13C3-HFPO-DA	2023/02/26		87	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/26		86	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/26		90	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/26		87	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/26		83	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/26		88	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/26		86	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/26		90	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/26		74	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/26		85	%	50 - 150
			D3-MeFOSA	2023/02/26		55	%	25 - 150
			D3-MeFOSAA	2023/02/26		69	%	50 - 150
			D5-EtFOSA	2023/02/26		50	%	25 - 150
			D5-EtFOSAA	2023/02/26		68	%	50 - 150
			D7-MeFOSE	2023/02/26		61	%	25 - 150
			D9-EtFOSE	2023/02/26		58	%	25 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/26		110	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/02/26		106	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/02/26		110	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/02/26		111	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/02/26		108	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/02/26		109	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/02/26		112	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2023/02/26		110	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/02/26		112	%	70 - 130
			Perfluorotridecanoic acid (PFTEDA)	2023/02/26		123	%	70 - 130
			Perfluorotetradecanoic acid (PFTEDA)	2023/02/26		108	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/02/26		110	%	70 - 130
			Perfluoropentanesulfonic acid (PFPS)	2023/02/26		106	%	70 - 130
			Perfluorohexanesulfonic acid (PFHS)	2023/02/26		107	%	70 - 130
			Perfluoroheptanesulfonic acid (PFHPS)	2023/02/26		106	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/02/26		113	%	70 - 130
			Perfluorononanesulfonic acid (PFNS)	2023/02/26		100	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/02/26		109	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/26		108	%	70 - 130
			EtFOSA	2023/02/26		108	%	70 - 130
			MeFOSA	2023/02/26		103	%	70 - 130
			EtFOSE	2023/02/26		107	%	70 - 130
			MeFOSE	2023/02/26		112	%	70 - 130
			EtFOSAA	2023/02/26		111	%	70 - 130
			MeFOSAA	2023/02/26		112	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/02/26		110	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/02/26		112	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/02/26		110	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C338927

Report Date: 2023/04/20

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8521318	AKH	Spiked Blank	Hexafluoropropyleneoxide dimer acid	2023/02/26		111	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/26		109	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/02/26		105	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/02/26		105	%	70 - 130
			13C2-4:2-Fluorotelomersulfonic Acid	2023/02/26		85	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/26		84	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/26		80	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/26		82	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/26		72	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/26		84	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/26		56	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/26		82	%	50 - 150
			13C3-HFPO-DA	2023/02/26		81	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/26		84	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/26		87	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/26		84	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/26		80	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/26		86	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/26		84	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/26		87	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/26		76	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/26		84	%	50 - 150
			D3-MeFOSA	2023/02/26		42	%	25 - 150
			D3-MeFOSAA	2023/02/26		78	%	50 - 150
			D5-EtFOSA	2023/02/26		38	%	25 - 150
			D5-EtFOSAA	2023/02/26		80	%	50 - 150
			D7-MeFOSE	2023/02/26		60	%	25 - 150
			D9-EtFOSE	2023/02/26		59	%	25 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/26		109	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/02/26		106	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/02/26		107	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/02/26		109	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/02/26		104	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/02/26		106	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/02/26		107	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2023/02/26		104	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/02/26		105	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/02/26		117	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/26		107	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/02/26		107	%	70 - 130
Perfluoropentanesulfonic acid PFPes	2023/02/26		103	%	70 - 130			
Perfluorohexanesulfonic acid(PFHxS)	2023/02/26		107	%	70 - 130			
Perfluoroheptanesulfonic acid PFHpS	2023/02/26		106	%	70 - 130			
Perfluorooctanesulfonic acid (PFOS)	2023/02/26		111	%	70 - 130			
Perfluorononanesulfonic acid (PFNS)	2023/02/26		98	%	70 - 130			
Perfluorodecanesulfonic acid (PFDS)	2023/02/26		103	%	70 - 130			
Perfluorooctane Sulfonamide (PFOSA)	2023/02/26		109	%	70 - 130			
EtFOSA	2023/02/26		108	%	70 - 130			
MeFOSA	2023/02/26		100	%	70 - 130			
EtFOSE	2023/02/26		109	%	70 - 130			
MeFOSE	2023/02/26		109	%	70 - 130			
EtFOSAA	2023/02/26		108	%	70 - 130			
MeFOSAA	2023/02/26		109	%	70 - 130			



BUREAU
VERITAS

Bureau Veritas Job #: C338927

Report Date: 2023/04/20

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			4:2 Fluorotelomer sulfonic acid	2023/02/26		107	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/02/26		107	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/02/26		112	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/02/26		113	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/26		110	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/02/26		101	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/02/26		103	%	70 - 130
8521318	AKH	Method Blank	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/26		90	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/26		83	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/26		80	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/26		75	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/26		70	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/26		82	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/26		52	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/26		77	%	50 - 150
			13C3-HFPO-DA	2023/02/26		80	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/26		80	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/26		86	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/26		85	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/26		75	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/26		82	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/26		79	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/26		86	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/26		68	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/26		80	%	50 - 150
			D3-MeFOSA	2023/02/26		31	%	25 - 150
			D3-MeFOSAA	2023/02/26		72	%	50 - 150
			D5-EtFOSA	2023/02/26		27	%	25 - 150
			D5-EtFOSAA	2023/02/26		77	%	50 - 150
			D7-MeFOSE	2023/02/26		52	%	25 - 150
			D9-EtFOSE	2023/02/26		56	%	25 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/26	0.14 U, MDL=0.14		ug/kg	
			Perfluoropentanoic acid (PFPeA)	2023/02/26	0.17 U, MDL=0.17		ug/kg	
			Perfluorohexanoic acid (PFHxA)	2023/02/26	0.15 U, MDL=0.15		ug/kg	
			Perfluoroheptanoic acid (PFHpA)	2023/02/26	0.17 U, MDL=0.17		ug/kg	
			Perfluorooctanoic acid (PFOA)	2023/02/26	0.17 U, MDL=0.17		ug/kg	
			Perfluorononanoic acid (PFNA)	2023/02/26	0.14 U, MDL=0.14		ug/kg	
			Perfluorodecanoic acid (PFDA)	2023/02/26	0.13 U, MDL=0.13		ug/kg	
			Perfluoroundecanoic acid (PFUnA)	2023/02/26	0.22 U, MDL=0.22		ug/kg	
			Perfluorododecanoic acid (PFDoA)	2023/02/26	0.16 U, MDL=0.16		ug/kg	
			Perfluorotridecanoic acid (PFTRDA)	2023/02/26	0.12 U, MDL=0.12		ug/kg	
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/26	0.13 U, MDL=0.13		ug/kg	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorobutanesulfonic acid (PFBS)	2023/02/26	0.15 U, MDL=0.15		ug/kg	
			Perfluoropentanesulfonic acid PFPes	2023/02/26	0.34 U, MDL=0.34		ug/kg	
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/26	0.12 U, MDL=0.12		ug/kg	
			Perfluoroheptanesulfonic acid PFHpS	2023/02/26	0.21 U, MDL=0.21		ug/kg	
			Perfluorooctanesulfonic acid (PFOS)	2023/02/26	0.36 U, MDL=0.36		ug/kg	
			Perfluorononanesulfonic acid (PFNS)	2023/02/26	0.18 U, MDL=0.18		ug/kg	
			Perfluorodecanesulfonic acid (PFDS)	2023/02/26	0.21 U, MDL=0.21		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/26	0.10 U, MDL=0.10		ug/kg	
			EtFOSA	2023/02/26	0.38 U, MDL=0.38		ug/kg	
			MeFOSA	2023/02/26	0.45 U, MDL=0.45		ug/kg	
			EtFOSE	2023/02/26	0.37 U, MDL=0.37		ug/kg	
			MeFOSE	2023/02/26	0.34 U, MDL=0.34		ug/kg	
			EtFOSAA	2023/02/26	0.16 U, MDL=0.16		ug/kg	
			MeFOSAA	2023/02/26	0.24 U, MDL=0.24		ug/kg	
			4:2 Fluorotelomer sulfonic acid	2023/02/26	0.10 U, MDL=0.10		ug/kg	
			6:2 Fluorotelomer sulfonic acid	2023/02/26	0.24 U, MDL=0.24		ug/kg	
			8:2 Fluorotelomer sulfonic acid	2023/02/26	0.26 U, MDL=0.26		ug/kg	
			Hexafluoropropyleneoxide dimer acid	2023/02/26	0.16 U, MDL=0.16		ug/kg	
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/26	0.15 U, MDL=0.15		ug/kg	
			9Cl-PF3ONS (F-53B Major)	2023/02/26	0.10 U, MDL=0.10		ug/kg	
			11Cl-PF3OUds (F-53B Minor)	2023/02/26	0.28 U, MDL=0.28		ug/kg	
8521318	AKH	RPD - Sample/Sample Dup	Perfluorobutanoic acid (PFBA)	2023/02/26	NC		%	30
			Perfluoropentanoic acid (PFPeA)	2023/02/26	NC		%	30
			Perfluorohexanoic acid (PFHxA)	2023/02/26	NC		%	30
			Perfluoroheptanoic acid (PFHpA)	2023/02/26	NC		%	30
			Perfluorooctanoic acid (PFOA)	2023/02/26	NC		%	30
			Perfluorononanoic acid (PFNA)	2023/02/26	NC		%	30
			Perfluorodecanoic acid (PFDA)	2023/02/26	NC		%	30
			Perfluoroundecanoic acid (PFUnA)	2023/02/26	NC		%	30
			Perfluorododecanoic acid (PFDoA)	2023/02/26	NC		%	30
			Perfluorotridecanoic acid (PFTRDA)	2023/02/26	NC		%	30
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/26	NC		%	30
			Perfluorobutanesulfonic acid (PFBS)	2023/02/26	NC		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C338927

Report Date: 2023/04/20

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoropentanesulfonic acid PFPes	2023/02/26	NC		%	30
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/26	NC		%	30
			Perfluoroheptanesulfonic acid PFHpS	2023/02/26	NC		%	30
			Perfluorooctanesulfonic acid (PFOS)	2023/02/26	NC		%	30
			Perfluorononanesulfonic acid (PFNS)	2023/02/26	NC		%	30
			Perfluorodecanesulfonic acid (PFDS)	2023/02/26	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/26	NC		%	30
			4:2 Fluorotelomer sulfonic acid	2023/02/26	NC		%	30
			6:2 Fluorotelomer sulfonic acid	2023/02/26	NC		%	30
			8:2 Fluorotelomer sulfonic acid	2023/02/26	NC		%	30

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Colm McNamara, Senior Analyst, Liquid Chromatography

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

SUBCONTRACT ORDER

Apex Laboratories
A3A1010

09-Feb-23 12:55

Lori Dufour
C338927

APC 2/8/23

AJH ENV-1272

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

BV Labs / Maxxam
C/O FEDEX DEPOT 299 Cayuga Rd
Cheektowaga, NY 14225
Phone : (800) 668-0639
Fax: (905) 332-9169



Sample Name: MFA-B1-2023013-21.9 **Sediment** **Sampled: 01/30/23 16:00** (A3A1010-01)

Analysis Due Expires Comments

Sample Compositing2 02/01/23 17:00 05/09/23 16:00 BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06

Containers Supplied:
(E)250 mL Poly (WM) - Non Preserved

Sample Name: MFA-B3-20230131-31.0 **Sediment** **Sampled: 01/31/23 10:50** (A3A1010-02)

Analysis Due Expires Comments

Sample Compositing2 02/01/23 17:00 05/10/23 10:50 BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06

Containers Supplied:
(E)250 mL Poly (WM) - Non Preserved

Sample Name: MFA-B2-20230131-23.0 **Sediment** **Sampled: 01/31/23 09:00** (A3A1010-03)

Analysis Due Expires Comments

Sample Compositing2 02/01/23 17:00 05/10/23 09:00 BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06

Containers Supplied:
(E)250 mL Poly (WM) - Non Preserved

Sample Name: MFA-B4-20230202-SL-26.5 **Sediment** **Sampled: 02/02/23 09:10** (A3A1010-04)

Analysis Due Expires Comments

Sample Compositing2 02/01/23 17:00 05/12/23 09:10 BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06

Containers Supplied:
(E)250 mL Poly (WM) - Non Preserved

Standard TAT

*Temp. Blank - 1.6/1.7/1.4, 1.4/1.6/1.2
4.3/4.4/4*

Released By Date Received By Date

Fed Ex (Shipper)

Fed Ex (Shipper)

KALGI SOLADHARA

2023/02/09 12:55

Released By Date Received By Date

Temp - Refer to ACTR

SUBCONTRACT ORDER

Apex Laboratories


A3A1010

AAC 2/8/23

Analysis	Due	Expires	Comments
Sample Name: MFA-B5-20230203-SL-27.0		Sediment	Sampled: 02/03/23 15:00
			<i>AAC 2/8/23</i> (A3A1010-05)
Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/13/23 15:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

Analysis	Due	Expires	Comments
Sample Name: MFA-SL-Composite		Sediment	Sampled: 01/30/23 16:00
			As Received Composite of -01,-02,-03,-04,-05 (A3A1010-06)
Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB) <i>AAC 2/8/23</i>	02/13/23 17:00	01/30/24 16:00	} will send next week!
1668C PCB Congeners (SUB)	02/13/23 17:00	01/30/24 16:00	
Subcontract Outside	02/23/23 17:00	07/29/23 16:00	PFAS EPA-1633
<i>Containers Supplied:</i> (C)250 mL Poly (WM) - Non Preserved			

Standard TAT

	<i>2-8-23</i>	Fed Ex (Shipper)	
Released By	Date	Received By	Date
Fed Ex (Shipper)		<i>See Page 1</i>	
Released By	Date	Received By	Date



Your Project #: A3A1010
Your C.O.C. #: n/a

Attention: Philip Nerenberg

Apex Laboratories
6700 SW Sandburg St.
Tigard, OR
USA 97223

Report Date: 2023/06/06
Report #: R7659013
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C347690

Received: 2023/02/17, 12:20

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dioxins/Furans in Soil (1613B) (1)	1	2023/02/22	2023/02/24	BRL SOP-00410	EPA 1613B m
2378TCDF Confirmation (M8290A/M1613)	1	2023/02/22	2023/03/02	BRL SOP-00406 BRL SOP-00410	EPA M8290Am/ M1613Bm
PCB Congeners in Soil (1668C) (2)	1	2023/03/28	2023/04/07	BRL SOP-00408	EPA 1668C m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

(2) Soils are reported on a dry weight basis unless otherwise specified.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Lori Dufour, Project Manager

Email: Lori.Dufour@bureauveritas.com

Phone# (905) 817-5700

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL-PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	77.1	0.126	1.00	0.227	1.00	77.1	1	8520730
1,2,3,7,8-Penta CDD *	pg/g	37.8	0.132	5.00	0.258	1.00	37.8	1	8520730
1,2,3,4,7,8-Hexa CDD *	pg/g	7.73	0.142	5.00	0.204	0.100	0.773	1	8520730
1,2,3,6,7,8-Hexa CDD *	pg/g	610	0.120	5.00	0.173	0.100	61.0	1	8520730
1,2,3,7,8,9-Hexa CDD *	pg/g	312	0.126	5.00	0.179	0.100	31.2	1	8520730
1,2,3,4,6,7,8-Hepta CDD *	pg/g	474	0.140	5.00	0.743	0.0100	4.74	1	8520730
Octa CDD *	pg/g	2230	0.154	10.0	0.800	0.000300	0.669	1	8520730
Total Tetra CDD *	pg/g	144	0.126	1.00	0.400	N/A	N/A	10	8520730
Total Penta CDD *	pg/g	251	0.132	5.00	0.400	N/A	N/A	10	8520730
Total Hexa CDD *	pg/g	3910	0.129	5.00	0.400	N/A	N/A	6	8520730
Total Hepta CDD *	pg/g	820	0.140	5.00	0.400	N/A	N/A	2	8520730
2,3,7,8-Tetra CDF **	pg/g	498	0.0995	1.00	0.181	0.100	49.8	1	8520730
1,2,3,7,8-Penta CDF **	pg/g	11.0	0.155	5.00	0.242	0.0300	0.330	1	8520730
2,3,4,7,8-Penta CDF **	pg/g	8.20	0.142	5.00	0.211	0.300	2.46	1	8520730
1,2,3,4,7,8-Hexa CDF **	pg/g	6.77	0.157	5.00	0.228	0.100	0.677	1	8520730
1,2,3,6,7,8-Hexa CDF **	pg/g	2.64 J	0.141	5.00	0.203	0.100	0.264	1	8520730
2,3,4,6,7,8-Hexa CDF **	pg/g	2.96 J	0.148	5.00	0.177	0.100	0.296	1	8520730
1,2,3,7,8,9-Hexa CDF **	pg/g	0.453 U (1)	0.453	5.00	0.185	0.100	0.0453	0	8520730
1,2,3,4,6,7,8-Hepta CDF **	pg/g	50.9	0.110	5.00	0.185	0.0100	0.509	1	8520730
1,2,3,4,7,8,9-Hepta CDF **	pg/g	3.56 J	0.115	5.00	0.194	0.0100	0.0356	1	8520730
Octa CDF **	pg/g	108	0.144	10.0	0.919	0.000300	0.0324	1	8520730
Total Tetra CDF **	pg/g	1110	0.0995	1.00	0.400	N/A	N/A	16	8520730
Total Penta CDF **	pg/g	130	0.148	5.00	0.400	N/A	N/A	13	8520730
Total Hexa CDF **	pg/g	67.4	0.153	5.00	0.400	N/A	N/A	9	8520730
Total Hepta CDF **	pg/g	137	0.112	5.00	0.400	N/A	N/A	3	8520730
Confirmation 2,3,7,8-Tetra CDF **	pg/g	440 (2)	0.52	5.0	0.090	0.100	44.0	N/A	8531857
TOTAL TOXIC EQUIVALENCY	pg/g	N/A	N/A	N/A	N/A	N/A	262	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(2) results reported from 5x dilution



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

DIOXINS AND FURANS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL-PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-1234678 HeptaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-1234678 HeptaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-123478 HexaCDD *	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-123478 HexaCDF **	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-1234789 HeptaCDF **	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-123678 HexaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-123678 HexaCDF **	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-12378 PentaCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-12378 PentaCDF **	%	86	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-123789 HexaCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-234678 HexaCDF **	%	86	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-23478 PentaCDF **	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-2378 TetraCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-2378 TetraCDF **	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8520730
C13-OCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8520730
Confirmation C13-2378 TetraCDF **	%	46	N/A	N/A	N/A	N/A	N/A	N/A	8531857

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
4,4'-DiCB-(15)	ng/g	5.16	0.0069	0.0050	0.0039	N/A	N/A	1	8576352
22'3'-TriCB-(16)	ng/g	0.020 U	0.020	0.0050	0.013	N/A	N/A	1	8576352
22'4'-TriCB-(17)	ng/g	0.031 U	0.031	0.0020	0.0040	N/A	N/A	1	8576352
TriCB-(18)+(30)	ng/g	1.10	0.027	0.0050	0.0052	N/A	N/A	1	8576352
22'6'-TriCB-(19)	ng/g	0.034 U	0.034	0.0020	0.0052	N/A	N/A	1	8576352
TriCB-(20) + (28)	ng/g	3.24	0.015	0.050	0.0090	N/A	N/A	1	8576352
TriCB-(21)+(33)	ng/g	0.693	0.0082	0.0050	0.011	N/A	N/A	1	8576352
234'-TriCB-(22)	ng/g	1.00	0.016	0.0020	0.0049	N/A	N/A	1	8576352
235-TriCB-(23)	ng/g	0.0082 U	0.0082	0.0020	0.0046	N/A	N/A	1	8576352
236-TriCB-(24)	ng/g	0.012 U	0.012	0.0020	0.0090	N/A	N/A	1	8576352
23'4'-TriCB-(25)	ng/g	0.0083 U	0.0083	0.0020	0.0064	N/A	N/A	1	8576352
TriCB-(26)+(29)	ng/g	0.480	0.015	0.0050	0.0087	N/A	N/A	1	8576352
23'6'-TriCB-(27)	ng/g	0.012 U	0.012	0.0020	0.0065	N/A	N/A	1	8576352
24'5'-TriCB-(31)	ng/g	2.73	0.015	0.0050	0.0038	N/A	N/A	1	8576352
24'6'-TriCB-(32)	ng/g	0.022 U	0.022	0.0020	0.0024	N/A	N/A	1	8576352
23'5'-TriCB-(34)	ng/g	0.0079 U	0.0079	0.0020	0.0060	N/A	N/A	1	8576352
33'4'-TriCB-(35)	ng/g	0.562	0.016	0.0020	0.0042	N/A	N/A	1	8576352
33'5'-TriCB-(36)	ng/g	0.0075 U	0.0075	0.0020	0.0029	N/A	N/A	1	8576352
344'-TriCB-(37)	ng/g	0.374	0.0078	0.0020	0.0029	N/A	N/A	1	8576352
345-TriCB-(38)	ng/g	0.0080 U	0.0080	0.0020	0.0038	N/A	N/A	1	8576352
34'5'-TriCB-(39)	ng/g	0.0082 U	0.0082	0.0020	0.0052	N/A	N/A	1	8576352
TetraCB-(40)+(41)+(71)	ng/g	0.021 U	0.021	0.010	0.016	N/A	N/A	1	8576352
22'34'-TetraCB-(42)	ng/g	0.056 U	0.056	0.0050	0.014	N/A	N/A	1	8576352
22'35'-TetraCB-(43)	ng/g	0.028 U	0.028	0.0050	0.019	N/A	N/A	1	8576352
TetraCB-(44)+(47)+(65)	ng/g	7.84	0.040	0.010	0.041	N/A	N/A	1	8576352
TetraCB-(45)+(51)	ng/g	0.022 U	0.022	0.0050	0.018	N/A	N/A	1	8576352
22'36'-TetraCB-(46)	ng/g	0.024 U	0.024	0.0020	0.0090	N/A	N/A	1	8576352
22'45'-TetraCB-(48)	ng/g	0.042 U	0.042	0.0050	0.0042	N/A	N/A	1	8576352
TetraCB-(49)+TetraCB-(69)	ng/g	6.53	0.037	0.010	0.010	N/A	N/A	1	8576352
TetraCB-(50)+(53)	ng/g	0.043 U	0.043	0.010	0.013	N/A	N/A	1	8576352
22'55'-TetraCB-(52)	ng/g	19.2	0.042	0.0050	0.016	N/A	N/A	1	8576352

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'66'-TetraCB-(54)	ng/g	0.044 U	0.044	0.0050	0.0096	N/A	N/A	1	8576352
233'4'-TetraCB-(55)	ng/g	0.014 U	0.014	0.0050	0.011	N/A	N/A	1	8576352
233'4'-Tetra CB(56)	ng/g	1.11	0.014	0.0050	0.0051	N/A	N/A	1	8576352
233'5'-TetraCB-(57)	ng/g	0.014 U	0.014	0.0050	0.0056	N/A	N/A	1	8576352
233'5'-TetraCB-(58)	ng/g	0.014 U	0.014	0.0050	0.011	N/A	N/A	1	8576352
TetraCB-(59)+(62)+(75)	ng/g	0.015 U	0.015	0.010	0.014	N/A	N/A	1	8576352
2344'-TetraCB -(60)	ng/g	0.014 U	0.014	0.0050	0.0053	N/A	N/A	1	8576352
TetraCB-(61)+(70)+(74)+(76)	ng/g	17.9	0.028	0.020	0.022	N/A	N/A	1	8576352
234'5'-TetraCB-(63)	ng/g	0.013 U	0.013	0.0050	0.0071	N/A	N/A	1	8576352
234'6'-TetraCB-(64)	ng/g	3.11	0.036	0.0050	0.0047	N/A	N/A	1	8576352
23'44'-TetraCB-(66)	ng/g	6.60	0.027	0.0050	0.099	N/A	N/A	1	8576352
23'45'-TetraCB-(67)	ng/g	0.012 U	0.012	0.0050	0.011	N/A	N/A	1	8576352
23'45'-TetraCB-(68)	ng/g	0.013 U	0.013	0.0050	0.0088	N/A	N/A	1	8576352
23'55'-TetraCB-(72)	ng/g	0.013 U	0.013	0.0050	0.0086	N/A	N/A	1	8576352
23'5'6'-TetraCB-(73)	ng/g	0.014 U	0.014	0.0050	0.019	N/A	N/A	1	8576352
33'44'-TetraCB-(77)	ng/g	0.015 U	0.015	0.0050	0.0063	0.000100	0.00000150	1	8576352
33'45'-TetraCB-(78)	ng/g	0.015 U	0.015	0.0050	0.0065	N/A	N/A	1	8576352
33'45'-TetraCB(79)	ng/g	0.012 U	0.012	0.0050	0.0058	N/A	N/A	1	8576352
33'55'-TetraCB-(80)	ng/g	0.011 U	0.011	0.0050	0.0061	N/A	N/A	1	8576352
344'5'-TetraCB-(81)	ng/g	0.013 U	0.013	0.0050	0.0058	0.000300	0.00000390	1	8576352
22'33'4'-PentaCB-(82)	ng/g	0.027 U	0.027	0.0050	0.0048	N/A	N/A	1	8576352
PentaCB-(83)+(99)	ng/g	15.8	0.048	0.010	0.016	N/A	N/A	1	8576352
22'33'6'-PentaCB-(84)	ng/g	5.86	0.050	0.0020	0.0077	N/A	N/A	1	8576352
PentaCB-(85)+(116)+(117)	ng/g	4.02	0.037	0.010	0.027	N/A	N/A	1	8576352
PentaCB-(86)(87)(97)(109)(119)(125)	ng/g	20.3	0.040	0.020	0.029	N/A	N/A	1	8576352
PentaCB-(88)+(91)	ng/g	1.84	0.025	0.0050	0.013	N/A	N/A	1	8576352
22'346'-PentaCB-(89)	ng/g	0.030 U	0.030	0.0050	0.0080	N/A	N/A	1	8576352
PentaCB-(90)+(101)+(113)	ng/g	32.8	0.041	0.020	0.011	N/A	N/A	1	8576352
22'355'-PentaCB-(92)	ng/g	3.27	0.027	0.0050	0.0044	N/A	N/A	1	8576352
PentaCB-(93)+(98)+(100)+(102)	ng/g	0.024 U	0.024	0.020	0.024	N/A	N/A	1	8576352

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'356'-PentaCB-(94)	ng/g	0.027 U	0.027	0.0050	0.0063	N/A	N/A	1	8576352
22'35'6'-PentaCB-(95)	ng/g	23.2	0.055	0.0050	0.0088	N/A	N/A	1	8576352
22'366'-PentaCB-(96)	ng/g	0.024 U	0.024	0.0050	0.010	N/A	N/A	1	8576352
22'45'6'-PentaCB-(103)	ng/g	0.025 U	0.025	0.0050	0.0061	N/A	N/A	1	8576352
22'466'-PentaCB-(104)	ng/g	0.023 U	0.023	0.0050	0.0056	N/A	N/A	1	8576352
233'44'-PentaCB-(105)	ng/g	6.49	0.013	0.0050	0.0044	0.0000300	0.000195	1	8576352
233'45'-PentaCB-(106)	ng/g	0.011 U	0.011	0.0050	0.0036	N/A	N/A	1	8576352
233'4'5'-PentaCB-(107)	ng/g	2.29	0.017	0.0050	0.017	N/A	N/A	1	8576352
PentaCB-(108)+(124)	ng/g	1.28	0.021	0.010	0.011	N/A	N/A	1	8576352
PentaCB-(110)+(115)	ng/g	37.2	0.037	0.010	0.012	N/A	N/A	1	8576352
233'55'-PentaCB-(111)	ng/g	0.016 U	0.016	0.0050	0.0056	N/A	N/A	1	8576352
233'56'-PentaCB-(112)	ng/g	0.016 U	0.016	0.0050	0.0078	N/A	N/A	1	8576352
2344'5'-PentaCB-(114)	ng/g	0.011 U	0.011	0.0050	0.0042	0.0000300	0.000000330	1	8576352
23'44'5'-PentaCB-(118)	ng/g	17.8	0.010	0.010	0.0066	0.0000300	0.000534	1	8576352
23'455'-PentaCB-(120)	ng/g	0.017 U	0.017	0.0050	0.0064	N/A	N/A	1	8576352
23'45'6'-PentaCB-(121)	ng/g	0.017 U	0.017	0.0050	0.0063	N/A	N/A	1	8576352
233'4'5'-PentaCB-(122)	ng/g	0.013 U	0.013	0.0050	0.0066	N/A	N/A	1	8576352
23'44'5'-PentaCB-(123)	ng/g	0.011 U	0.011	0.0050	0.014	0.0000300	0.000000330	1	8576352
33'44'5'-PentaCB-(126)	ng/g	0.013 U	0.013	0.0050	0.0030	0.100	0.00130	1	8576352
33'455'-PentaCB-(127)	ng/g	0.010 U	0.010	0.0050	0.0032	N/A	N/A	1	8576352
HexaCB-(128)+(166)	ng/g	3.64	0.028	0.010	0.021	N/A	N/A	1	8576352
HexaCB-(129)+(138)+(163)	ng/g	25.3	0.033	0.020	0.037	N/A	N/A	1	8576352
22'33'45'-HexaCB-(130)	ng/g	1.52	0.036	0.0050	0.0051	N/A	N/A	1	8576352
22'33'46'-HexaCB-(131)	ng/g	0.022 U	0.022	0.0050	0.0099	N/A	N/A	1	8576352
22'33'46'-HexaCB-(132)	ng/g	7.64	0.037	0.0050	0.0087	N/A	N/A	1	8576352
22'33'55'-HexaCB-(133)	ng/g	0.019 U	0.019	0.0050	0.010	N/A	N/A	1	8576352
HexaCB-(134)+(143)	ng/g	1.36	0.040	0.010	0.017	N/A	N/A	1	8576352
HexaCB-(135)+(151)	ng/g	6.22	0.068	0.020	0.014	N/A	N/A	1	8576352
22'33'66'-HexaCB-(136)	ng/g	2.76	0.052	0.0050	0.0083	N/A	N/A	1	8576352
22'344'5'-HexaCB-(137)	ng/g	0.016 U	0.016	0.010	0.030	N/A	N/A	1	8576352

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HexaCB-(139)+(140)	ng/g	0.015 U	0.015	0.010	0.016	N/A	N/A	1	8576352
22'3455'-HexaCB-(141)	ng/g	3.20	0.030	0.0050	0.012	N/A	N/A	1	8576352
22'3456'-HexaCB-(142)	ng/g	0.020 U	0.020	0.0050	0.0088	N/A	N/A	1	8576352
22'345'6'-HexaCB-(144)	ng/g	0.036 U	0.036	0.0050	0.0072	N/A	N/A	1	8576352
22'3466'-HexaCB-(145)	ng/g	0.025 U	0.025	0.0050	0.0082	N/A	N/A	1	8576352
22'34'55'-HexaCB-(146)	ng/g	2.46	0.029	0.0050	0.010	N/A	N/A	1	8576352
HexaCB-(147)+(149)	ng/g	11.9	0.027	0.010	0.019	N/A	N/A	1	8576352
22'34'56'-HexaCB-(148)	ng/g	0.034 U	0.034	0.0050	0.0084	N/A	N/A	1	8576352
22'34'66'-HexaCB-(150)	ng/g	0.024 U	0.024	0.0050	0.0061	N/A	N/A	1	8576352
22'3566'-HexaCB-(152)	ng/g	0.027 U	0.027	0.0050	0.013	N/A	N/A	1	8576352
HexaCB-(153)+(168)	ng/g	15.4	0.025	0.010	0.013	N/A	N/A	1	8576352
22'44'56'-HexaCB-(154)	ng/g	0.027 U	0.027	0.0050	0.012	N/A	N/A	1	8576352
22'44'66'-HexaCB-(155)	ng/g	0.024 U	0.024	0.0050	0.0087	N/A	N/A	1	8576352
HexaCB-(156)+(157)	ng/g	3.36	0.011	0.010	0.0086	0.0000300	0.000101	1	8576352
233'44'6'-HexaCB-(158)	ng/g	2.47	0.021	0.0050	0.0072	N/A	N/A	1	8576352
233'455'-HexaCB-(159)	ng/g	0.0085 U	0.0085	0.0050	0.0082	N/A	N/A	1	8576352
233'456'-HexaCB-(160)	ng/g	0.013 U	0.013	0.0050	0.017	N/A	N/A	1	8576352
233'45'6'-HexaCB-(161)	ng/g	0.012 U	0.012	0.0050	0.011	N/A	N/A	1	8576352
233'4'55'-HexaCB-(162)	ng/g	0.0083 U	0.0083	0.0050	0.0083	N/A	N/A	1	8576352
233'4'5'6'-HexaCB-(164)	ng/g	0.012 U	0.012	0.0050	0.017	N/A	N/A	1	8576352
233'55'6'-HexaCB-(165)	ng/g	0.013 U	0.013	0.0050	0.010	N/A	N/A	1	8576352
23'44'55'-HexaCB-(167)	ng/g	1.06	0.012	0.0050	0.0056	0.0000300	0.0000318	1	8576352
33'44'55'-HexaCB-(169)	ng/g	0.010 U	0.010	0.0050	0.024	0.0300	0.000300	1	8576352
22'33'44'5'-HeptaCB-(170)	ng/g	2.23	0.024	0.0050	0.0042	N/A	N/A	1	8576352
HeptaCB-(171)+(173)	ng/g	0.041 U	0.041	0.010	0.011	N/A	N/A	1	8576352
22'33'455'-HeptaCB-(172)	ng/g	0.020 U	0.020	0.0050	0.0080	N/A	N/A	1	8576352
22'33'456'-HeptaCB-(174)	ng/g	3.00	0.037	0.0050	0.014	N/A	N/A	1	8576352
22'33'45'6'-HeptaCB-(175)	ng/g	0.031 U	0.031	0.0050	0.0092	N/A	N/A	1	8576352
22'33'466'-HeptaCB-(176)	ng/g	0.024 U	0.024	0.0050	0.0098	N/A	N/A	1	8576352
22'33'45'6'-HeptaCB-(177)	ng/g	1.57	0.041	0.0050	0.0078	N/A	N/A	1	8576352

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'55'6-HeptaCB-(178)	ng/g	0.034 U	0.034	0.0050	0.010	N/A	N/A	1	8576352
22'33'56'6-HeptaCB-(179)	ng/g	0.047 U	0.047	0.0050	0.0086	N/A	N/A	1	8576352
HeptaCB-(180)+(193)	ng/g	8.67	0.032	0.010	0.0085	N/A	N/A	1	8576352
22'344'56-HeptaCB-(181)	ng/g	0.019 U	0.019	0.0050	0.0080	N/A	N/A	1	8576352
22'344'56-HeptaCB-(182)	ng/g	0.029 U	0.029	0.0050	0.0092	N/A	N/A	1	8576352
22'344'5'6-HeptaCB-(183)	ng/g	1.84	0.034	0.0050	0.028	N/A	N/A	1	8576352
22'344'66-HeptaCB-(184)	ng/g	0.022 U	0.022	0.0050	0.010	N/A	N/A	1	8576352
22'3455'6-HeptaCB-(185)	ng/g	0.020 U	0.020	0.0050	0.022	N/A	N/A	1	8576352
22'34566-HeptaCB-(186)	ng/g	0.024 U	0.024	0.0050	0.0086	N/A	N/A	1	8576352
22'34'55'6-HeptaCB-(187)	ng/g	3.19	0.059	0.0050	0.011	N/A	N/A	1	8576352
22'34'566-HeptaCB-(188)	ng/g	0.029 U	0.029	0.0050	0.0047	N/A	N/A	1	8576352
233'44'55-HeptaCB-(189)	ng/g	0.013 U	0.013	0.0050	0.0041	0.0000300	0.000000390	1	8576352
233'44'56-HeptaCB-(190)	ng/g	0.029 U	0.029	0.0050	0.0041	N/A	N/A	1	8576352
233'44'5'6-HeptaCB-(191)	ng/g	0.014 U	0.014	0.0050	0.0045	N/A	N/A	1	8576352
233'455'6-HeptaCB-(192)	ng/g	0.016 U	0.016	0.0050	0.0090	N/A	N/A	1	8576352
22'33'44'55'-OctaCB-(194)	ng/g	0.026 U	0.026	0.0050	0.0095	N/A	N/A	1	8576352
22'33'44'56-OctaCB-(195)	ng/g	0.027 U	0.027	0.0050	0.0094	N/A	N/A	1	8576352
22'33'44'56'-OctaCB-(196)	ng/g	0.067 U	0.067	0.0050	0.016	N/A	N/A	1	8576352
22'33'44'66-OctaCB-(197)	ng/g	0.024 U	0.024	0.0050	0.044	N/A	N/A	1	8576352
OctaCB-(198)+(199)	ng/g	0.036 U	0.036	0.010	0.014	N/A	N/A	1	8576352
22'33'4566'-OctaCB-(200)	ng/g	0.054 U	0.054	0.0050	0.032	N/A	N/A	1	8576352
22'33'45'66'-OctaCB-(201)	ng/g	0.023 U	0.023	0.0050	0.017	N/A	N/A	1	8576352
22'33'55'66'-OctaCB-(202)	ng/g	0.027 U	0.027	0.0050	0.0081	N/A	N/A	1	8576352
22'344'55'6-OctaCB-(203)	ng/g	0.067 U	0.067	0.0050	0.011	N/A	N/A	1	8576352
22'344'566'-OctaCB-(204)	ng/g	0.024 U	0.024	0.0050	0.021	N/A	N/A	1	8576352
233'44'55'6-OctaCB-(205)	ng/g	0.019 U	0.019	0.0050	0.0096	N/A	N/A	1	8576352
22'33'44'55'6-NonaCB-(206)	ng/g	0.019 U	0.019	0.0050	0.0077	N/A	N/A	1	8576352
22'33'44'566'-NonaCB-(207)	ng/g	0.016 U	0.016	0.0050	0.0081	N/A	N/A	1	8576352
22'33'455'66'-NonaCB-(208)	ng/g	0.019 U	0.019	0.0050	0.0073	N/A	N/A	1	8576352
DecaCB-(209)	ng/g	0.019 U	0.019	0.0050	0.012	N/A	N/A	1	8576352

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Total PCB	ng/g	0 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
TOTAL TOXIC EQUIVALENCY	ng/g	N/A	N/A	N/A	N/A	N/A	0.00247	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	22	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'33'44'55'6'-NonaCB-(206)	%	30 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'33'44'5'-HeptaCB-(170)	%	31 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'33'455'66'-NonaCB-(208)	%	26 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'33'55'66'-OctaCB-(202)	%	28 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'33'55'6'-HeptaCB-(178)	%	12 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'344'55'-HeptaCB-(180)	%	25 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'34'566'-HeptaCB-(188)	%	26 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'44'66'-HexaCB-(155)	%	26 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'466'-PentaCB-(104)	%	22 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'66'-TetraCB-(54)	%	15	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'6'-TriCB-(19)	%	22	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-22'-DiCB-(4)	%	5.0 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-233'44'55'6'-OctaCB-(205)	%	31 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-233'44'55'-HeptaCB-(189)	%	39 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-233'44'-PentaCB-(105)	%	35 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-233'55'-PentaCB-(111)	%	11 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-23'44'55'-HexaCB-(167)	%	38 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-2344'5'-PentaCB-(114)	%	38 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-23'44'5'-PentaCB-(118)	%	39 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-2'344'5'-PentaCB-(123)	%	34 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-2-MonoCB-(1)	%	5.0 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-33'44'55'-HexaCB-(169)	%	42	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-33'44'5'-PentaCB-(126)	%	31 (2)	N/A	N/A	N/A	N/A	N/A	N/A	8576352

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to Mono, Di and Tetra Channels failing to report Totals, Total PCBs cannot be calculated. Sum of Tri, Penta - Deca Totals is approximately 291.1364.
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



SEMI-VOLATILE ORGANICS BY HRMS (SOIL)

Bureau Veritas ID		VBZ186							
Sampling Date		2023/01/30 16:00							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MFA-B1-B5- COMP-SL- PRO	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-33'44'-TetraCB-(77)	%	36 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-344'5-TetraCB-(81)	%	37 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-344'-TriCB-(37)	%	49	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-44'-DiCB-(15)	%	36	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-4-MonoCB-(3)	%	19	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-DecaCB-(209)	%	28 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8576352
C13-HexaCB-(156)+(157)	%	40	N/A	N/A	N/A	N/A	N/A	N/A	8576352

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 N/A = Not Applicable
 (1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

TEST SUMMARY

Bureau Veritas ID: VBZ186
Sample ID: MFA-B1-B5- COMP-SL-PRO
Matrix: Soil

Collected: 2023/01/30
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	8520730	2023/02/22	2023/02/24	Yan Qin
2378TCDF Confirmation (M8290A/M1613)	HRMS/MS	8531857	2023/02/22	2023/03/02	Angel Guerrero
PCB Congeners in Soil (1668C)	HRMS/MS	8576352	2023/03/28	2023/04/07	Cathy Xu



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.4°C
-----------	-------

Revised Report (2023/6/6): Corrected sample ID to MFA-B1-B5-COMP-SL-PRO and added temperature blank records in general comments. Updated results for PCB 77.

Temperature Blank Record: 4.2C, 4.8C. 4.2C.

Sample VBZ186 [MFA-B1-B5- COMP-SL-PRO] : Recoveries are low due to matrix interferences in the sample. No results available for PCB 1 to PCB 10. Results should be reviewed with caution.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8520730	YQI	Matrix Spike	37CL4 2378 Tetra CDD	2023/02/27		103	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/27		128	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/27		113	%	28 - 143
			C13-123478 HexaCDD	2023/02/27		139	%	32 - 141
			C13-123478 HexaCDF	2023/02/27		144	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/27		121	%	26 - 138
			C13-123678 HexaCDD	2023/02/27		137 (1)	%	28 - 130
			C13-123678 HexaCDF	2023/02/27		125 (1)	%	26 - 123
			C13-12378 PentaCDD	2023/02/27		96	%	25 - 181
			C13-12378 PentaCDF	2023/02/27		90	%	24 - 185
			C13-123789 HexaCDF	2023/02/27		136	%	29 - 147
			C13-234678 HexaCDF	2023/02/27		121	%	28 - 136
			C13-23478 PentaCDF	2023/02/27		91	%	21 - 178
			C13-2378 TetraCDD	2023/02/27		100	%	25 - 164
			C13-2378 TetraCDF	2023/02/27		103	%	24 - 169
			C13-OCDD	2023/02/27		109	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/27		108	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/27		98	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/27		106 (2)	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/27		96 (2)	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2023/02/27		69 (2)	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/27		101 (2)	%	70 - 140
			Octa CDD	2023/02/27		105 (2)	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/27		107	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/27		100	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/27		96	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/27		93 (2)	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/27		98 (2)	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/27		94 (2)	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/27		101 (2)	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2023/02/27		104 (2)	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2023/02/27		98 (2)	%	78 - 138
Octa CDF	2023/02/27		103 (2)	%	63 - 170			
8520730	YQI	Spiked Blank	37CL4 2378 Tetra CDD	2023/02/24		93	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/24		86	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/24		77	%	28 - 143
			C13-123478 HexaCDD	2023/02/24		83	%	32 - 141
			C13-123478 HexaCDF	2023/02/24		77	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/24		86	%	26 - 138
			C13-123678 HexaCDD	2023/02/24		92	%	28 - 130
			C13-123678 HexaCDF	2023/02/24		89	%	26 - 123
			C13-12378 PentaCDD	2023/02/24		97	%	25 - 181
			C13-12378 PentaCDF	2023/02/24		86	%	24 - 185
			C13-123789 HexaCDF	2023/02/24		84	%	29 - 147
			C13-234678 HexaCDF	2023/02/24		90	%	28 - 136
			C13-23478 PentaCDF	2023/02/24		92	%	21 - 178
			C13-2378 TetraCDD	2023/02/24		86	%	25 - 164
			C13-2378 TetraCDF	2023/02/24		91	%	24 - 169
			C13-OCDD	2023/02/24		87	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/24		105	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/24		95	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/24		100	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/24		99	%	76 - 134



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,7,8,9-Hexa CDD	2023/02/24		99	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/24		102	%	70 - 140
			Octa CDD	2023/02/24		100	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/24		101	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/24		97	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/24		92	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/24		103	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/24		102	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/24		95	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/24		101	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2023/02/24		110	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2023/02/24		103	%	78 - 138
			Octa CDF	2023/02/24		91	%	63 - 170
8520730	YQI	Method Blank	37CL4 2378 Tetra CDD	2023/02/24		101	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/24		104	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/24		92	%	28 - 143
			C13-123478 HexaCDD	2023/02/24		88	%	32 - 141
			C13-123478 HexaCDF	2023/02/24		84	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/24		109	%	26 - 138
			C13-123678 HexaCDD	2023/02/24		109	%	28 - 130
			C13-123678 HexaCDF	2023/02/24		91	%	26 - 123
			C13-12378 PentaCDD	2023/02/24		117	%	25 - 181
			C13-12378 PentaCDF	2023/02/24		98	%	24 - 185
			C13-123789 HexaCDF	2023/02/24		99	%	29 - 147
			C13-234678 HexaCDF	2023/02/24		98	%	28 - 136
			C13-23478 PentaCDF	2023/02/24		110	%	21 - 178
			C13-2378 TetraCDD	2023/02/24		99	%	25 - 164
			C13-2378 TetraCDF	2023/02/24		102	%	24 - 169
			C13-OCDD	2023/02/24		123	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/24	0.0992 U, EDL=0.0992		pg/g	
			1,2,3,7,8-Penta CDD	2023/02/24	0.178 U, EDL=0.178		pg/g	
			1,2,3,4,7,8-Hexa CDD	2023/02/24	0.119 U, EDL=0.119		pg/g	
			1,2,3,6,7,8-Hexa CDD	2023/02/24	0.0960 U, EDL=0.0960		pg/g	
			1,2,3,7,8,9-Hexa CDD	2023/02/24	0.110 U, EDL=0.110		pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2023/02/24	0.201 U, EDL=0.201 (3)		pg/g	
			Octa CDD	2023/02/24	0.514 J, EDL=0.131		pg/g	
			Total Tetra CDD	2023/02/24	0.0992 U, EDL=0.0992		pg/g	
			Total Penta CDD	2023/02/24	0.178 U, EDL=0.178		pg/g	
			Total Hexa CDD	2023/02/24	0.112 U, EDL=0.112		pg/g	
			Total Hepta CDD	2023/02/24	0.145 U, EDL=0.145		pg/g	
			2,3,7,8-Tetra CDF	2023/02/24	0.105 U, EDL=0.105		pg/g	



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,7,8-Penta CDF	2023/02/24	0.141 U, EDL=0.141		pg/g	
			2,3,4,7,8-Penta CDF	2023/02/24	0.0820 U, EDL=0.0820		pg/g	
			1,2,3,4,7,8-Hexa CDF	2023/02/24	0.110 U, EDL=0.110		pg/g	
			1,2,3,6,7,8-Hexa CDF	2023/02/24	0.125 U, EDL=0.125		pg/g	
			2,3,4,6,7,8-Hexa CDF	2023/02/24	0.119 U, EDL=0.119		pg/g	
			1,2,3,7,8,9-Hexa CDF	2023/02/24	0.165 U, EDL=0.165		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2023/02/24	0.187 U, EDL=0.187		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2023/02/24	0.0900 U, EDL=0.0900		pg/g	
			Octa CDF	2023/02/24	0.268 J, EDL=0.125		pg/g	
			Total Tetra CDF	2023/02/24	0.105 U, EDL=0.105		pg/g	
			Total Penta CDF	2023/02/24	0.128 U, EDL=0.128		pg/g	
			Total Hexa CDF	2023/02/24	0.148 U, EDL=0.148		pg/g	
			Total Hepta CDF	2023/02/24	0.195 U, EDL=0.195		pg/g	
8520730	YQI	RPD - Sample/Sample Dup	2,3,7,8-Tetra CDD	2023/02/24	NC		%	25
			1,2,3,7,8-Penta CDD	2023/02/24	NC		%	25
			1,2,3,4,7,8-Hexa CDD	2023/02/24	NC		%	25
			1,2,3,6,7,8-Hexa CDD	2023/02/24	NC		%	25
			1,2,3,7,8,9-Hexa CDD	2023/02/24	NC		%	25
			1,2,3,4,6,7,8-Hepta CDD	2023/02/24	NC		%	25
			Octa CDD	2023/02/24	NC		%	25
			Total Tetra CDD	2023/02/24	NC		%	25
			Total Penta CDD	2023/02/24	NC		%	25
			Total Hexa CDD	2023/02/24	NC		%	25
			Total Hepta CDD	2023/02/24	NC		%	25
			2,3,7,8-Tetra CDF	2023/02/24	NC		%	25
			1,2,3,7,8-Penta CDF	2023/02/24	NC		%	25
			2,3,4,7,8-Penta CDF	2023/02/24	NC		%	25
			1,2,3,4,7,8-Hexa CDF	2023/02/24	NC		%	25
			1,2,3,6,7,8-Hexa CDF	2023/02/24	NC		%	25
			2,3,4,6,7,8-Hexa CDF	2023/02/24	NC		%	25
			1,2,3,7,8,9-Hexa CDF	2023/02/24	NC		%	25
			1,2,3,4,6,7,8-Hepta CDF	2023/02/24	NC		%	25
			1,2,3,4,7,8,9-Hepta CDF	2023/02/24	NC		%	25
			Octa CDF	2023/02/24	NC (3)		%	25
			Total Tetra CDF	2023/02/24	NC		%	25
			Total Penta CDF	2023/02/24	NC		%	25
			Total Hexa CDF	2023/02/24	NC		%	25
			Total Hepta CDF	2023/02/24	NC		%	25
8531857	AGU	Method Blank	Confirmation 2,3,7,8-Tetra CDF	2023/03/02	0.16 U, EDL=0.16		pg/g	
			Confirmation C13-2378 TetraCDF	2023/03/02		45	%	40 - 135



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8576352	CXU	Spiked Blank	C13-2,44'-TriCB-(28)	2023/04/04		63	%	15 - 145
			C13-22'33'44'55'6-NonaCB-(206)	2023/04/04		99	%	40 - 145
			C13-22'33'44'5-HeptaCB-(170)	2023/04/04		97	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/04		91	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		83	%	40 - 145
			C13-22'33'55'6-HeptaCB-(178)	2023/04/04		73	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		92	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		62	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		49	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		53	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		38	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		45	%	15 - 145
			C13-22'-DiCB-(4)	2023/04/04		36	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2023/04/04		99	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		100	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		101	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		81	%	40 - 145
			C13-23'44'55'-HexaCB-(167)	2023/04/04		87	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/04/04		94	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/04/04		97	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/04/04		94	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		38	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		98	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/04/04		110	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		91	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/04/04		86	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		68	%	15 - 145
			C13-44'-DiCB-(15)	2023/04/04		57	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		42	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		85	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		93	%	40 - 145
			4,4'-DiCB-(15)	2023/04/04		124	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		83	%	N/A
			22'4-TriCB-(17)	2023/04/04		94	%	N/A
			TriCB-(18)+(30)	2023/04/04		91	%	N/A
			22'6-TriCB-(19)	2023/04/04		114	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		103	%	N/A
			TriCB-(21)+(33)	2023/04/04		112	%	N/A
			234'-TriCB-(22)	2023/04/04		110	%	N/A
			235-TriCB-(23)	2023/04/04		104	%	N/A
			236-TriCB-(24)	2023/04/04		102	%	N/A
			23'4-TriCB-(25)	2023/04/04		117	%	N/A
			TriCB-(26)+(29)	2023/04/04		100	%	N/A
			23'6-TriCB-(27)	2023/04/04		94	%	N/A
			24'5-TriCB-(31)	2023/04/04		103	%	N/A
			24'6-TriCB-(32)	2023/04/04		97	%	N/A
			23'5'-TriCB-(34)	2023/04/04		100	%	N/A
			33'4-TriCB-(35)	2023/04/04		123	%	N/A
			33'5-TriCB-(36)	2023/04/04		116	%	N/A
			344'-TriCB-(37)	2023/04/04		119	%	60 - 145
			345-TriCB-(38)	2023/04/04		119	%	N/A
			34'5-TriCB-(39)	2023/04/04		128	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		89	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'34'-TetraCB-(42)	2023/04/04		101	%	N/A
			22'35'-TetraCB-(43)	2023/04/04		93	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		89	%	N/A
			TetraCB-(45)+(51)	2023/04/04		78	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		78	%	N/A
			22'45'-TetraCB-(48)	2023/04/04		84	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		85	%	N/A
			TetraCB-(50)+(53)	2023/04/04		76	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		87	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		121	%	60 - 145
			233'4'-TetraCB-(55)	2023/04/04		99	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		103	%	N/A
			233'5'-TetraCB-(57)	2023/04/04		93	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		95	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		86	%	N/A
			2344'-TetraCB -(60)	2023/04/04		100	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		100	%	N/A
			234'5'-TetraCB-(63)	2023/04/04		99	%	N/A
			234'6'-TetraCB-(64)	2023/04/04		100	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		101	%	N/A
			23'45'-TetraCB-(67)	2023/04/04		95	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		93	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		92	%	N/A
			23'5'6'-TetraCB-(73)	2023/04/04		74	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		103	%	60 - 145
			33'45'-TetraCB-(78)	2023/04/04		121	%	N/A
			33'45'-TetraCB(79)	2023/04/04		112	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		99	%	N/A
			344'5'-TetraCB-(81)	2023/04/04		109	%	60 - 145
			22'33'4'-PentaCB-(82)	2023/04/04		122	%	N/A
			PentaCB-(83)+(99)	2023/04/04		105	%	N/A
			22'33'6'-PentaCB-(84)	2023/04/04		96	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		103	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		103	%	N/A
			PentaCB-(88)+(91)	2023/04/04		96	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		112	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		102	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		109	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		90	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		93	%	N/A
			22'35'6'-PentaCB-(95)	2023/04/04		108	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		95	%	N/A
			22'45'6'-PentaCB-(103)	2023/04/04		97	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		110	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		115	%	60 - 145
			233'45'-PentaCB-(106)	2023/04/04		118	%	N/A
			233'4'5'-PentaCB-(107)	2023/04/04		105	%	N/A
			PentaCB-(108)+(124)	2023/04/04		109	%	N/A
			PentaCB-(110)+(115)	2023/04/04		113	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		107	%	N/A
			233'56'-PentaCB-(112)	2023/04/04		106	%	N/A
			2344'5'-PentaCB-(114)	2023/04/04		114	%	60 - 145
			23'44'5'-PentaCB-(118)	2023/04/04		109	%	60 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			23'455'-PentaCB-(120)	2023/04/04		118	%	N/A
			23'45'6'-PentaCB-(121)	2023/04/04		95	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		141	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		114	%	60 - 145
			33'44'5'-PentaCB-(126)	2023/04/04		111	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		118	%	N/A
			HexaCB-(128)+(166)	2023/04/04		105	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		110	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		100	%	N/A
			22'33'46'-HexaCB-(131)	2023/04/04		115	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		95	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		102	%	N/A
			HexaCB-(134)+(143)	2023/04/04		106	%	N/A
			HexaCB-(135)+(151)	2023/04/04		100	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		98	%	N/A
			22'344'5'-HexaCB-(137)	2023/04/04		90	%	N/A
			HexaCB-(139)+(140)	2023/04/04		95	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		110	%	N/A
			22'3456'-HexaCB-(142)	2023/04/04		100	%	N/A
			22'345'6'-HexaCB-(144)	2023/04/04		106	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		93	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		100	%	N/A
			HexaCB-(147)+(149)	2023/04/04		95	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		98	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		92	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		93	%	N/A
			HexaCB-(153)+(168)	2023/04/04		97	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		97	%	N/A
			22'44'66'-HexaCB-(155)	2023/04/04		111	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		113	%	N/A
			233'44'6'-HexaCB-(158)	2023/04/04		103	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		102	%	N/A
			233'456'-HexaCB-(160)	2023/04/04		108	%	N/A
			233'45'6'-HexaCB-(161)	2023/04/04		100	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		103	%	N/A
			233'4'5'6'-HexaCB-(164)	2023/04/04		110	%	N/A
			233'55'6'-HexaCB-(165)	2023/04/04		100	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		119	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		116	%	60 - 145
			22'33'44'5'-HeptaCB-(170)	2023/04/04		96	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		102	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		102	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		104	%	N/A
			22'33'45'6'-HeptaCB-(175)	2023/04/04		99	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		95	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		100	%	N/A
			22'33'55'6'-HeptaCB-(178)	2023/04/04		101	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		99	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		111	%	N/A
			22'344'56'-HeptaCB-(181)	2023/04/04		105	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		104	%	N/A
			22'344'5'6'-HeptaCB-(183)	2023/04/04		93	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		98	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'3455'6-HeptaCB-(185)	2023/04/04		110	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		101	%	N/A
			22'34'55'6-HeptaCB-(187)	2023/04/04		105	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		114	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		114	%	60 - 145
			233'44'56-HeptaCB-(190)	2023/04/04		104	%	N/A
			233'44'5'6-HeptaCB-(191)	2023/04/04		102	%	N/A
			233'455'6-HeptaCB-(192)	2023/04/04		106	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		111	%	N/A
			22'33'44'56-OctaCB-(195)	2023/04/04		110	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		110	%	N/A
			22'33'44'66'OctaCB-(197)	2023/04/04		104	%	N/A
			OctaCB-(198)+(199)	2023/04/04		112	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		110	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		101	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		102	%	60 - 145
			22'344'55'6-OctaCB-(203)	2023/04/04		115	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		104	%	N/A
			233'44'55'6-OctaCB-(205)	2023/04/04		102	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2023/04/04		101	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		97	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		104	%	60 - 145
			DecaCB-(209)	2023/04/04		123	%	60 - 145
8576352	CXU	Spiked Blank DUP	C13-2,44'-TriCB-(28)	2023/04/04		45	%	15 - 145
			C13-22'33'44'55'6-NonaCB-(206)	2023/04/04		84	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/04		84	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/04		79	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		74	%	40 - 145
			C13-22'33'55'6-HeptaCB-(178)	2023/04/04		70	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		80	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		57	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		40	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		43	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		25	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		29	%	15 - 145
			C13-22'-DiCB-(4)	2023/04/04		24	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2023/04/04		87	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		88	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		89	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		69	%	40 - 145
			C13-23'44'55'-HexaCB-(167)	2023/04/04		76	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/04/04		83	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/04/04		88	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/04/04		87	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		24	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		86	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/04/04		98	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		77	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/04/04		81	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		59	%	15 - 145
			C13-44'-DiCB-(15)	2023/04/04		38	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		26	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		74	%	40 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-HexaCB-(156)+(157)	2023/04/04		79	%	40 - 145
			4,4'-DiCB-(15)	2023/04/04		122	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		75	%	N/A
			22'4-TriCB-(17)	2023/04/04		75	%	N/A
			TriCB-(18)+(30)	2023/04/04		72	%	N/A
			22'6-TriCB-(19)	2023/04/04		108	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		91	%	N/A
			TriCB-(21)+(33)	2023/04/04		98	%	N/A
			234'-TriCB-(22)	2023/04/04		97	%	N/A
			235-TriCB-(23)	2023/04/04		86	%	N/A
			236-TriCB-(24)	2023/04/04		78	%	N/A
			23'4-TriCB-(25)	2023/04/04		102	%	N/A
			TriCB-(26)+(29)	2023/04/04		87	%	N/A
			23'6-TriCB-(27)	2023/04/04		77	%	N/A
			24'5-TriCB-(31)	2023/04/04		92	%	N/A
			24'6-TriCB-(32)	2023/04/04		79	%	N/A
			23'5'-TriCB-(34)	2023/04/04		86	%	N/A
			33'4-TriCB-(35)	2023/04/04		121	%	N/A
			33'5-TriCB-(36)	2023/04/04		110	%	N/A
			344'-TriCB-(37)	2023/04/04		113	%	60 - 145
			345-TriCB-(38)	2023/04/04		111	%	N/A
			34'5-TriCB-(39)	2023/04/04		123	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		93	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		93	%	N/A
			22'35-TetraCB-(43)	2023/04/04		79	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		81	%	N/A
			TetraCB-(45)+(51)	2023/04/04		64	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		67	%	N/A
			22'45-TetraCB-(48)	2023/04/04		75	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		75	%	N/A
			TetraCB-(50)+(53)	2023/04/04		63	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		77	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		126	%	60 - 145
			233'4-TetraCB-(55)	2023/04/04		94	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		99	%	N/A
			233'5-TetraCB-(57)	2023/04/04		87	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		89	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		76	%	N/A
			2344'-TetraCB -(60)	2023/04/04		97	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		96	%	N/A
			234'5-TetraCB-(63)	2023/04/04		93	%	N/A
			234'6-TetraCB-(64)	2023/04/04		92	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		95	%	N/A
			23'45-TetraCB-(67)	2023/04/04		89	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		88	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		86	%	N/A
			23'5'6-TetraCB-(73)	2023/04/04		67	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		101	%	60 - 145
			33'45-TetraCB-(78)	2023/04/04		120	%	N/A
			33'45'-TetraCB(79)	2023/04/04		113	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		97	%	N/A
			344'5-TetraCB-(81)	2023/04/04		105	%	60 - 145
			22'33'4-PentaCB-(82)	2023/04/04		125	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			PentaCB-(83)+(99)	2023/04/04		99	%	N/A
			22'33'6-PentaCB-(84)	2023/04/04		88	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		97	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		96	%	N/A
			PentaCB-(88)+(91)	2023/04/04		89	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		107	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		96	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		104	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		81	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		82	%	N/A
			22'35'6-PentaCB-(95)	2023/04/04		100	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		84	%	N/A
			22'45'6-PentaCB-(103)	2023/04/04		88	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		107	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		115	%	60 - 145
			233'45-PentaCB-(106)	2023/04/04		118	%	N/A
			233'4'5-PentaCB-(107)	2023/04/04		102	%	N/A
			PentaCB-(108)+(124)	2023/04/04		106	%	N/A
			PentaCB-(110)+(115)	2023/04/04		110	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		103	%	N/A
			233'56-PentaCB-(112)	2023/04/04		102	%	N/A
			2344'5-PentaCB-(114)	2023/04/04		112	%	60 - 145
			23'44'5-PentaCB-(118)	2023/04/04		106	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		114	%	N/A
			23'45'6-PentaCB-(121)	2023/04/04		89	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		138	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		108	%	60 - 145
			33'44'5-PentaCB-(126)	2023/04/04		108	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		118	%	N/A
			HexaCB-(128)+(166)	2023/04/04		13	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		110	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		100	%	N/A
			22'33'46-HexaCB-(131)	2023/04/04		113	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		94	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		103	%	N/A
			HexaCB-(134)+(143)	2023/04/04		105	%	N/A
			HexaCB-(135)+(151)	2023/04/04		99	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		94	%	N/A
			22'344'5-HexaCB-(137)	2023/04/04		97	%	N/A
			HexaCB-(139)+(140)	2023/04/04		94	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		104	%	N/A
			22'3456-HexaCB-(142)	2023/04/04		102	%	N/A
			22'345'6-HexaCB-(144)	2023/04/04		13	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		90	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		98	%	N/A
			HexaCB-(147)+(149)	2023/04/04		95	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		95	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		85	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		91	%	N/A
			HexaCB-(153)+(168)	2023/04/04		98	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		96	%	N/A
			22'44'66'-HexaCB-(155)	2023/04/04		110	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		112	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'44'6-HexaCB-(158)	2023/04/04		106	%	N/A
			233'45'5-HexaCB-(159)	2023/04/04		102	%	N/A
			233'45'6-HexaCB-(160)	2023/04/04		110	%	N/A
			233'45'6-HexaCB-(161)	2023/04/04		101	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		100	%	N/A
			233'4'5'6-HexaCB-(164)	2023/04/04		104	%	N/A
			233'55'6-HexaCB-(165)	2023/04/04		97	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		115	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		112	%	60 - 145
			22'33'44'5-HeptaCB-(170)	2023/04/04		94	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		99	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		102	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		104	%	N/A
			22'33'45'6-HeptaCB-(175)	2023/04/04		99	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		97	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		97	%	N/A
			22'33'55'6-HeptaCB-(178)	2023/04/04		102	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		97	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		108	%	N/A
			22'344'56-HeptaCB-(181)	2023/04/04		1.7	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		101	%	N/A
			22'344'5'6-HeptaCB-(183)	2023/04/04		98	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		96	%	N/A
			22'3455'6-HeptaCB-(185)	2023/04/04		99	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		99	%	N/A
			22'34'55'6-HeptaCB-(187)	2023/04/04		102	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		106	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		110	%	60 - 145
			233'44'56-HeptaCB-(190)	2023/04/04		101	%	N/A
			233'44'5'6-HeptaCB-(191)	2023/04/04		99	%	N/A
			233'455'6-HeptaCB-(192)	2023/04/04		105	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		108	%	N/A
			22'33'44'56-OctaCB-(195)	2023/04/04		107	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		107	%	N/A
			22'33'44'66'OctaCB-(197)	2023/04/04		109	%	N/A
			OctaCB-(198)+(199)	2023/04/04		108	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		107	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		98	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		100	%	60 - 145
			22'344'55'6-OctaCB-(203)	2023/04/04		110	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		101	%	N/A
			233'44'55'6-OctaCB-(205)	2023/04/04		99	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2023/04/04		100	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		96	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		102	%	60 - 145
			DecaCB-(209)	2023/04/04		121	%	60 - 145
8576352	CXU	RPD	4,4'-DiCB-(15)	2023/04/04	1.8		%	30
			22'3-TriCB-(16)	2023/04/04	11		%	30
			22'4-TriCB-(17)	2023/04/04	22		%	30
			TriCB-(18)+(30)	2023/04/04	23		%	30
			22'6-TriCB-(19)	2023/04/04	5.4		%	30
			TriCB-(20) + (28)	2023/04/04	12		%	30
			TriCB-(21)+(33)	2023/04/04	14		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			234'-TriCB-(22)	2023/04/04	12		%	30
			235'-TriCB-(23)	2023/04/04	18		%	30
			236'-TriCB-(24)	2023/04/04	26		%	30
			23'4'-TriCB-(25)	2023/04/04	14		%	30
			TriCB-(26)+(29)	2023/04/04	14		%	30
			23'6'-TriCB-(27)	2023/04/04	20		%	30
			24'5'-TriCB-(31)	2023/04/04	11		%	30
			24'6'-TriCB-(32)	2023/04/04	20		%	30
			23'5'-TriCB-(34)	2023/04/04	15		%	30
			33'4'-TriCB-(35)	2023/04/04	2.1		%	30
			33'5'-TriCB-(36)	2023/04/04	5.0		%	30
			344'-TriCB-(37)	2023/04/04	5.7		%	30
			345'-TriCB-(38)	2023/04/04	6.6		%	30
			34'5'-TriCB-(39)	2023/04/04	4.2		%	30
			TetraCB-(40)+(41)+(71)	2023/04/04	4.6		%	30
			22'34'-TetraCB-(42)	2023/04/04	8.5		%	30
			22'35'-TetraCB-(43)	2023/04/04	17		%	30
			TetraCB-(44)+(47)+(65)	2023/04/04	10		%	30
			TetraCB-(45)+(51)	2023/04/04	19		%	30
			22'36'-TetraCB-(46)	2023/04/04	15		%	30
			22'45'-TetraCB-(48)	2023/04/04	11		%	30
			TetraCB-(49)+TetraCB-(69)	2023/04/04	14		%	30
			TetraCB-(50)+(53)	2023/04/04	18		%	30
			22'55'-TetraCB-(52)	2023/04/04	11		%	30
			22'66'-TetraCB-(54)	2023/04/04	3.3		%	30
			233'4'-TetraCB-(55)	2023/04/04	5.0		%	30
			233'4'-Tetra CB(56)	2023/04/04	3.4		%	30
			233'5'-TetraCB-(57)	2023/04/04	6.0		%	30
			233'5'-TetraCB-(58)	2023/04/04	7.0		%	30
			TetraCB-(59)+(62)+(75)	2023/04/04	11		%	30
			2344'-TetraCB -(60)	2023/04/04	3.3		%	30
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04	4.5		%	30
			234'5'-TetraCB-(63)	2023/04/04	5.5		%	30
			234'6'-TetraCB-(64)	2023/04/04	7.6		%	30
			23'44'-TetraCB-(66)	2023/04/04	5.6		%	30
			23'45'-TetraCB-(67)	2023/04/04	6.3		%	30
			23'45'-TetraCB-(68)	2023/04/04	5.0		%	30
			23'55'-TetraCB-(72)	2023/04/04	6.8		%	30
			23'5'6'-TetraCB-(73)	2023/04/04	10		%	30
			33'44'-TetraCB-(77)	2023/04/04	2.2		%	30
			33'45'-TetraCB-(78)	2023/04/04	0.83		%	30
			33'45'-TetraCB(79)	2023/04/04	0.62		%	30
			33'55'-TetraCB-(80)	2023/04/04	1.5		%	30
			344'5'-TetraCB-(81)	2023/04/04	3.9		%	30
			22'33'4'-PentaCB-(82)	2023/04/04	2.1		%	30
			PentaCB-(83)+(99)	2023/04/04	5.9		%	30
			22'33'6'-PentaCB-(84)	2023/04/04	8.6		%	30
			PentaCB-(85)+(116)+(117)	2023/04/04	5.8		%	30
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04	6.5		%	30
			PentaCB-(88)+(91)	2023/04/04	7.7		%	30
			22'346'-PentaCB-(89)	2023/04/04	4.9		%	30
			PentaCB-(90)+(101)+(113)	2023/04/04	6.6		%	30
			22'355'-PentaCB-(92)	2023/04/04	5.2		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347690

Report Date: 2023/06/06

Apex Laboratories

Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04	11		%	30
			22'356'-PentaCB-(94)	2023/04/04	12		%	30
			22'35'6-PentaCB-(95)	2023/04/04	8.0		%	30
			22'366'-PentaCB-(96)	2023/04/04	12		%	30
			22'45'6-PentaCB-(103)	2023/04/04	9.8		%	30
			22'466'-PentaCB-(104)	2023/04/04	3.3		%	30
			233'44'-PentaCB-(105)	2023/04/04	0.087		%	30
			233'45-PentaCB-(106)	2023/04/04	0.51		%	30
			233'4'5-PentaCB-(107)	2023/04/04	2.6		%	30
			PentaCB-(108)+(124)	2023/04/04	2.1		%	30
			PentaCB-(110)+(115)	2023/04/04	3.4		%	30
			233'55'-PentaCB-(111)	2023/04/04	3.9		%	30
			233'56-PentaCB-(112)	2023/04/04	3.9		%	30
			2344'5-PentaCB-(114)	2023/04/04	1.4		%	30
			23'44'5-PentaCB-(118)	2023/04/04	2.7		%	30
			23'455'-PentaCB-(120)	2023/04/04	3.6		%	30
			23'45'6-PentaCB-(121)	2023/04/04	5.8		%	30
			233'4'5'-PentaCB-(122)	2023/04/04	1.9		%	30
			23'44'5'-PentaCB-(123)	2023/04/04	4.8		%	30
			33'44'5-PentaCB-(126)	2023/04/04	2.6		%	30
			33'455'-PentaCB-(127)	2023/04/04	0.25		%	30
			HexaCB-(128)+(166)	2023/04/04	157 (4)		%	30
			HexaCB-(129)+(138)+(163)	2023/04/04	0.64		%	30
			22'33'45'-HexaCB-(130)	2023/04/04	0.30		%	30
			22'33'46-HexaCB-(131)	2023/04/04	1.8		%	30
			22'33'46'-HexaCB-(132)	2023/04/04	0.32		%	30
			22'33'55'-HexaCB-(133)	2023/04/04	1.1		%	30
			HexaCB-(134)+(143)	2023/04/04	0.48		%	30
			HexaCB-(135)+(151)	2023/04/04	1.5		%	30
			22'33'66'-HexaCB-(136)	2023/04/04	4.0		%	30
			22'344'5-HexaCB-(137)	2023/04/04	8.0		%	30
			HexaCB-(139)+(140)	2023/04/04	1.0		%	30
			22'3455'-HexaCB-(141)	2023/04/04	5.2		%	30
			22'3456-HexaCB-(142)	2023/04/04	2.0		%	30
			22'345'6-HexaCB-(144)	2023/04/04	156 (4)		%	30
			22'3466'-HexaCB-(145)	2023/04/04	2.4		%	30
			22'34'55'-HexaCB-(146)	2023/04/04	2.0		%	30
			HexaCB-(147)+(149)	2023/04/04	0.11		%	30
			22'34'56'-HexaCB-(148)	2023/04/04	2.5		%	30
			22'34'66'-HexaCB-(150)	2023/04/04	7.1		%	30
			22'3566'-HexaCB-(152)	2023/04/04	2.0		%	30
			HexaCB-(153)+(168)	2023/04/04	1.3		%	30
			22'44'56'-HexaCB-(154)	2023/04/04	0.93		%	30
			22'44'66'-HexaCB-(155)	2023/04/04	0.99		%	30
			HexaCB-(156)+(157)	2023/04/04	0.76		%	30
			233'44'6-HexaCB-(158)	2023/04/04	2.5		%	30
			233'455'-HexaCB-(159)	2023/04/04	0.59		%	30
			233'456-HexaCB-(160)	2023/04/04	1.4		%	30
			233'45'6-HexaCB-(161)	2023/04/04	0.60		%	30
			233'4'55'-HexaCB-(162)	2023/04/04	2.9		%	30
			233'4'5'6-HexaCB-(164)	2023/04/04	5.5		%	30
			233'55'6-HexaCB-(165)	2023/04/04	2.8		%	30
			23'44'55'-HexaCB-(167)	2023/04/04	3.3		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			33'44'55'-HexaCB-(169)	2023/04/04	3.0		%	30
			22'33'44'5'-HeptaCB-(170)	2023/04/04	2.3		%	30
			HeptaCB-(171)+(173)	2023/04/04	3.0		%	30
			22'33'455'-HeptaCB-(172)	2023/04/04	0.39		%	30
			22'33'456'-HeptaCB-(174)	2023/04/04	0		%	30
			22'33'45'6-HeptaCB-(175)	2023/04/04	0.41		%	30
			22'33'466'-HeptaCB-(176)	2023/04/04	2.3		%	30
			22'33'45'6'-HeptaCB-(177)	2023/04/04	3.0		%	30
			22'33'55'6-HeptaCB-(178)	2023/04/04	0.30		%	30
			22'33'566'-HeptaCB-(179)	2023/04/04	2.2		%	30
			HeptaCB-(180)+(193)	2023/04/04	1.9		%	30
			22'344'56-HeptaCB-(181)	2023/04/04	194 (4)		%	30
			22'344'56'-HeptaCB-(182)	2023/04/04	3.1		%	30
			22'344'5'6-HeptaCB-(183)	2023/04/04	4.7		%	30
			22'344'66'-HeptaCB-(184)	2023/04/04	1.4		%	30
			22'3455'6-HeptaCB-(185)	2023/04/04	11		%	30
			22'34566'-HeptaCB-(186)	2023/04/04	1.9		%	30
			22'34'55'6-HeptaCB-(187)	2023/04/04	2.0		%	30
			22'34'566'-HeptaCB-(188)	2023/04/04	7.2		%	30
			233'44'55'-HeptaCB-(189)	2023/04/04	3.7		%	30
			233'44'56-HeptaCB-(190)	2023/04/04	2.3		%	30
			233'44'5'6-HeptaCB-(191)	2023/04/04	2.9		%	30
			233'455'6-HeptaCB-(192)	2023/04/04	1.0		%	30
			22'33'44'55'-OctaCB-(194)	2023/04/04	2.8		%	30
			22'33'44'56-OctaCB-(195)	2023/04/04	2.9		%	30
			22'33'44'56'-OctaCB-(196)	2023/04/04	3.1		%	30
			22'33'44'66'OctaCB-(197)	2023/04/04	5.1		%	30
			OctaCB-(198)+(199)	2023/04/04	3.6		%	30
			22'33'4566'-OctaCB-(200)	2023/04/04	3.2		%	30
			22'33'45'66'-OctaCB-(201)	2023/04/04	3.7		%	30
			22'33'55'66'-OctaCB-(202)	2023/04/04	2.3		%	30
			22'344'55'6-OctaCB-(203)	2023/04/04	4.1		%	30
			22'344'566'-OctaCB-(204)	2023/04/04	2.8		%	30
			233'44'55'6-OctaCB-(205)	2023/04/04	2.1		%	30
			22'33'44'55'6-NonaCB-(206)	2023/04/04	0.99		%	30
			22'33'44'566'-NonaCB-(207)	2023/04/04	1.9		%	30
			22'33'455'66'-NonaCB-(208)	2023/04/04	1.7		%	30
			DecaCB-(209)	2023/04/04	1.9		%	30
8576352	CXU	Method Blank	C13-2,44'-TriCB-(28)	2023/04/05		46	%	15 - 145
			C13-22'33'44'55'6-NonaCB-(206)	2023/04/05		87	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/05		85	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/05		80	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/05		74	%	40 - 145
			C13-22'33'55'6-HeptaCB-(178)	2023/04/05		60	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/05		81	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/05		51	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/05		37 (5)	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/05		45	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/05		27	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/05		35	%	15 - 145
			C13-22'-DiCB-(4)	2023/04/05		26	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2023/04/05		84	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/05		69	%	40 - 145



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-233'44'-PentaCB-(105)	2023/04/05		88	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/05		68	%	40 - 145
			C13-23'44'55'-HexaCB-(167)	2023/04/05		60	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/04/05		79	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/04/05		85	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/04/05		84	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/05		27	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/05		68	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/04/05		95	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/05		82	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/04/05		77	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/05		55	%	15 - 145
			C13-44'-DiCB-(15)	2023/04/05		46	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/05		30	%	15 - 145
			C13-DecaCB-(209)	2023/04/05		73	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/05		63	%	40 - 145
			4,4'-DiCB-(15)	2023/04/05	0.00021 U, EDL=0.00021		ng/g	
			22'3-TriCB-(16)	2023/04/05	0.00043 U, EDL=0.00043		ng/g	
			22'4-TriCB-(17)	2023/04/05	0.00035 U, EDL=0.00035		ng/g	
			TriCB-(18)+(30)	2023/04/05	0.00030 U, EDL=0.00030		ng/g	
			22'6-TriCB-(19)	2023/04/05	0.00061 U, EDL=0.00061		ng/g	
			TriCB-(20) + (28)	2023/04/05	0.00020 J, EDL=0.00018		ng/g	
			TriCB-(21)+(33)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			234'-TriCB-(22)	2023/04/05	0.00019 U, EDL=0.00019		ng/g	
			235-TriCB-(23)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			236-TriCB-(24)	2023/04/05	0.00027 U, EDL=0.00027		ng/g	
			23'4-TriCB-(25)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			TriCB-(26)+(29)	2023/04/05	0.00018 U, EDL=0.00018		ng/g	
			23'6-TriCB-(27)	2023/04/05	0.00025 U, EDL=0.00025		ng/g	
			24'5-TriCB-(31)	2023/04/05	0.00020 J, EDL=0.00018		ng/g	
			24'6-TriCB-(32)	2023/04/05	0.00024 U, EDL=0.00024		ng/g	
			23'5'-TriCB-(34)	2023/04/05	0.00019 U, EDL=0.00019		ng/g	
			33'4-TriCB-(35)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			33'5-TriCB-(36)	2023/04/05	0.00017 U, EDL=0.00017		ng/g	
			344'-TriCB-(37)	2023/04/05	0.00018 U, EDL=0.00018		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			345-TriCB-(38)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			34'5-TriCB-(39)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			TetraCB-(40)+(41)+(71)	2023/04/05	0.00045 U, EDL=0.00045		ng/g	
			22'34'-TetraCB-(42)	2023/04/05	0.00059 U, EDL=0.00059		ng/g	
			22'35'-TetraCB-(43)	2023/04/05	0.00063 U, EDL=0.00063		ng/g	
			TetraCB-(44)+(47)+(65)	2023/04/05	0.00050 J, EDL=0.00044		ng/g	
			TetraCB-(45)+(51)	2023/04/05	0.00048 U, EDL=0.00048		ng/g	
			22'36'-TetraCB-(46)	2023/04/05	0.00051 U, EDL=0.00051		ng/g	
			22'45'-TetraCB-(48)	2023/04/05	0.00046 U, EDL=0.00046		ng/g	
			TetraCB-(49)+TetraCB-(69)	2023/04/05	0.00040 U, EDL=0.00040		ng/g	
			TetraCB-(50)+(53)	2023/04/05	0.00047 U, EDL=0.00047		ng/g	
			22'55'-TetraCB-(52)	2023/04/05	0.00045 U, EDL=0.00045		ng/g	
			22'66'-TetraCB-(54)	2023/04/05	0.0014 U, EDL=0.0014		ng/g	
			233'4'-TetraCB-(55)	2023/04/05	0.00031 U, EDL=0.00031		ng/g	
			233'4'-Tetra CB(56)	2023/04/05	0.00030 U, EDL=0.00030		ng/g	
			233'5'-TetraCB-(57)	2023/04/05	0.00030 U, EDL=0.00030		ng/g	
			233'5'-TetraCB-(58)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			TetraCB-(59)+(62)+(75)	2023/04/05	0.00033 U, EDL=0.00033		ng/g	
			2344'-TetraCB -(60)	2023/04/05	0.00030 U, EDL=0.00030		ng/g	
			TetraCB-(61)+(70)+(74)+(76)	2023/04/05	0.00030 U, EDL=0.00030		ng/g	
			234'5'-TetraCB-(63)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			234'6'-TetraCB-(64)	2023/04/05	0.00038 U, EDL=0.00038		ng/g	
			23'44'-TetraCB-(66)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			23'45'-TetraCB-(67)	2023/04/05	0.00025 U, EDL=0.00025		ng/g	
			23'45'-TetraCB-(68)	2023/04/05	0.00027 U, EDL=0.00027		ng/g	
			23'55'-TetraCB-(72)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			23'5'6'-TetraCB-(73)	2023/04/05	0.00031 U, EDL=0.00031		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			33'44'-TetraCB-(77)	2023/04/05	0.00027 U, EDL=0.00027		ng/g	
			33'45'-TetraCB-(78)	2023/04/05	0.00033 U, EDL=0.00033		ng/g	
			33'45'-TetraCB(79)	2023/04/05	0.00026 U, EDL=0.00026		ng/g	
			33'55'-TetraCB-(80)	2023/04/05	0.00024 U, EDL=0.00024		ng/g	
			344'5'-TetraCB-(81)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'33'4-PentaCB-(82)	2023/04/05	0.0012 U, EDL=0.0012		ng/g	
			PentaCB-(83)+(99)	2023/04/05	0.00099 U, EDL=0.00099		ng/g	
			22'33'6-PentaCB-(84)	2023/04/05	0.0011 U, EDL=0.0011		ng/g	
			PentaCB-(85)+(116)+(117)	2023/04/05	0.00075 U, EDL=0.00075		ng/g	
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/05	0.00080 U, EDL=0.00080		ng/g	
			PentaCB-(88)+(91)	2023/04/05	0.0010 U, EDL=0.0010		ng/g	
			22'346'-PentaCB-(89)	2023/04/05	0.0012 U, EDL=0.0012		ng/g	
			PentaCB-(90)+(101)+(113)	2023/04/05	0.00082 U, EDL=0.00082		ng/g	
			22'355'-PentaCB-(92)	2023/04/05	0.0011 U, EDL=0.0011		ng/g	
			PentaCB-(93)+(98)+(100)+(102)	2023/04/05	0.00098 U, EDL=0.00098		ng/g	
			22'356'-PentaCB-(94)	2023/04/05	0.0010 U, EDL=0.0010		ng/g	
			22'35'6-PentaCB-(95)	2023/04/05	0.0011 U, EDL=0.0011		ng/g	
			22'366'-PentaCB-(96)	2023/04/05	0.0010 U, EDL=0.0010		ng/g	
			22'45'6-PentaCB-(103)	2023/04/05	0.00097 U, EDL=0.00097		ng/g	
			22'466'-PentaCB-(104)	2023/04/05	0.0012 U, EDL=0.0012		ng/g	
			233'44'-PentaCB-(105)	2023/04/05	0.00038 U, EDL=0.00038		ng/g	
			233'45-PentaCB-(106)	2023/04/05	0.00045 U, EDL=0.00045		ng/g	
			233'4'5-PentaCB-(107)	2023/04/05	0.00035 U, EDL=0.00035		ng/g	
			PentaCB-(108)+(124)	2023/04/05	0.00044 U, EDL=0.00044		ng/g	
			PentaCB-(110)+(115)	2023/04/05	0.00076 U, EDL=0.00076		ng/g	
			233'55'-PentaCB-(111)	2023/04/05	0.00066 U, EDL=0.00066		ng/g	
			233'56-PentaCB-(112)	2023/04/05	0.00064 U, EDL=0.00064		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			2344'5'-PentaCB-(114)	2023/04/05	0.00041 U, EDL=0.00041		ng/g	
			23'44'5'-PentaCB-(118)	2023/04/05	0.00040 J, EDL=0.00037		ng/g	
			23'455'-PentaCB-(120)	2023/04/05	0.00069 U, EDL=0.00069		ng/g	
			23'45'6'-PentaCB-(121)	2023/04/05	0.00069 U, EDL=0.00069		ng/g	
			233'4'5'-PentaCB-(122)	2023/04/05	0.00057 U, EDL=0.00057		ng/g	
			23'44'5'-PentaCB-(123)	2023/04/05	0.00041 U, EDL=0.00041		ng/g	
			33'44'5'-PentaCB-(126)	2023/04/05	0.00038 U, EDL=0.00038		ng/g	
			33'455'-PentaCB-(127)	2023/04/05	0.00045 U, EDL=0.00045		ng/g	
			HexaCB-(128)+(166)	2023/04/05	0.00025 U, EDL=0.00025		ng/g	
			HexaCB-(129)+(138)+(163)	2023/04/05	0.00160 J, EDL=0.00028		ng/g	
			22'33'45'-HexaCB-(130)	2023/04/05	0.00032 U, EDL=0.00032		ng/g	
			22'33'46'-HexaCB-(131)	2023/04/05	0.00040 U, EDL=0.00040		ng/g	
			22'33'46'-HexaCB-(132)	2023/04/05	0.00040 J, EDL=0.00031		ng/g	
			22'33'55'-HexaCB-(133)	2023/04/05	0.00032 U, EDL=0.00032		ng/g	
			HexaCB-(134)+(143)	2023/04/05	0.00035 U, EDL=0.00035		ng/g	
			HexaCB-(135)+(151)	2023/04/05	0.00071 U, EDL=0.00071		ng/g	
			22'33'66'-HexaCB-(136)	2023/04/05	0.00051 U, EDL=0.00051		ng/g	
			22'344'5'-HexaCB-(137)	2023/04/05	0.00030 U, EDL=0.00030		ng/g	
			HexaCB-(139)+(140)	2023/04/05	0.00027 U, EDL=0.00027		ng/g	
			22'3455'-HexaCB-(141)	2023/04/05	0.00030 J, EDL=0.00027		ng/g	
			22'3456'-HexaCB-(142)	2023/04/05	0.00034 U, EDL=0.00034		ng/g	
			22'345'6'-HexaCB-(144)	2023/04/05	0.00069 U, EDL=0.00069		ng/g	
			22'3466'-HexaCB-(145)	2023/04/05	0.00051 U, EDL=0.00051		ng/g	
			22'34'55'-HexaCB-(146)	2023/04/05	0.00025 U, EDL=0.00025		ng/g	
			HexaCB-(147)+(149)	2023/04/05	0.00100 J, EDL=0.00024		ng/g	
			22'34'56'-HexaCB-(148)	2023/04/05	0.00070 U, EDL=0.00070		ng/g	
			22'34'66'-HexaCB-(150)	2023/04/05	0.00047 U, EDL=0.00047		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'3566'-HexaCB-(152)	2023/04/05	0.00053 U, EDL=0.00053		ng/g	
			HexaCB-(153)+(168)	2023/04/05	0.00110 J, EDL=0.00023		ng/g	
			22'44'56'-HexaCB-(154)	2023/04/05	0.00054 U, EDL=0.00054		ng/g	
			22'44'66'-HexaCB-(155)	2023/04/05	0.00059 U, EDL=0.00059		ng/g	
			HexaCB-(156)+(157)	2023/04/05	0.00019 U, EDL=0.00019		ng/g	
			233'44'6'-HexaCB-(158)	2023/04/05	0.00019 U, EDL=0.00019		ng/g	
			233'455'-HexaCB-(159)	2023/04/05	0.00019 U, EDL=0.00019		ng/g	
			233'456'-HexaCB-(160)	2023/04/05	0.00023 U, EDL=0.00023		ng/g	
			233'45'6'-HexaCB-(161)	2023/04/05	0.00022 U, EDL=0.00022		ng/g	
			233'4'55'-HexaCB-(162)	2023/04/05	0.00018 U, EDL=0.00018		ng/g	
			233'4'5'6'-HexaCB-(164)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			233'55'6'-HexaCB-(165)	2023/04/05	0.00023 U, EDL=0.00023		ng/g	
			23'44'55'-HexaCB-(167)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			33'44'55'-HexaCB-(169)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			22'33'44'5'-HeptaCB-(170)	2023/04/05	0.00050 J, EDL=0.00025		ng/g	
			HeptaCB-(171)+(173)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'33'455'-HeptaCB-(172)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'33'456'-HeptaCB-(174)	2023/04/05	0.00050 J, EDL=0.00026		ng/g	
			22'33'45'6'-HeptaCB-(175)	2023/04/05	0.00044 U, EDL=0.00044		ng/g	
			22'33'466'-HeptaCB-(176)	2023/04/05	0.00033 U, EDL=0.00033		ng/g	
			22'33'45'6'-HeptaCB-(177)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'33'55'6'-HeptaCB-(178)	2023/04/05	0.00047 U, EDL=0.00047		ng/g	
			22'33'566'-HeptaCB-(179)	2023/04/05	0.00032 U, EDL=0.00032		ng/g	
			HeptaCB-(180)+(193)	2023/04/05	0.00130 J, EDL=0.00025		ng/g	
			22'344'56'-HeptaCB-(181)	2023/04/05	0.00027 U, EDL=0.00027		ng/g	
			22'344'56'-HeptaCB-(182)	2023/04/05	0.00041 U, EDL=0.00041		ng/g	
			22'344'5'6'-HeptaCB-(183)	2023/04/05	0.00023 U, EDL=0.00023		ng/g	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'344'66'-HeptaCB-(184)	2023/04/05	0.00031 U, EDL=0.00031		ng/g	
			22'3455'6'-HeptaCB-(185)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'34566'-HeptaCB-(186)	2023/04/05	0.00033 U, EDL=0.00033		ng/g	
			22'34'55'6'-HeptaCB-(187)	2023/04/05	0.00060 J, EDL=0.00042		ng/g	
			22'34'566'-HeptaCB-(188)	2023/04/05	0.00040 U, EDL=0.00040		ng/g	
			233'44'55'-HeptaCB-(189)	2023/04/05	0.00021 U, EDL=0.00021		ng/g	
			233'44'56'-HeptaCB-(190)	2023/04/05	0.00021 U, EDL=0.00021		ng/g	
			233'44'5'6'-HeptaCB-(191)	2023/04/05	0.00020 U, EDL=0.00020		ng/g	
			233'455'6'-HeptaCB-(192)	2023/04/05	0.00022 U, EDL=0.00022		ng/g	
			22'33'44'55'-OctaCB-(194)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'33'44'56'-OctaCB-(195)	2023/04/05	0.00032 U, EDL=0.00032		ng/g	
			22'33'44'56'-OctaCB-(196)	2023/04/05	0.00037 U, EDL=0.00037		ng/g	
			22'33'44'66'-OctaCB-(197)	2023/04/05	0.00025 U, EDL=0.00025		ng/g	
			OctaCB-(198)+(199)	2023/04/05	0.00039 U, EDL=0.00039		ng/g	
			22'33'4566'-OctaCB-(200)	2023/04/05	0.00029 U, EDL=0.00029		ng/g	
			22'33'45'66'-OctaCB-(201)	2023/04/05	0.00026 U, EDL=0.00026		ng/g	
			22'33'55'66'-OctaCB-(202)	2023/04/05	0.00031 U, EDL=0.00031		ng/g	
			22'344'55'6'-OctaCB-(203)	2023/04/05	0.00036 U, EDL=0.00036		ng/g	
			22'344'566'-OctaCB-(204)	2023/04/05	0.00026 U, EDL=0.00026		ng/g	
			233'44'55'6'-OctaCB-(205)	2023/04/05	0.00021 U, EDL=0.00021		ng/g	
			22'33'44'55'6'-NonaCB-(206)	2023/04/05	0.00047 U, EDL=0.00047		ng/g	
			22'33'44'566'-NonaCB-(207)	2023/04/05	0.00035 U, EDL=0.00035		ng/g	
			22'33'455'66'-NonaCB-(208)	2023/04/05	0.00037 U, EDL=0.00037		ng/g	
			DecaCB-(209)	2023/04/05	0.00019 U, EDL=0.00019		ng/g	



BUREAU
VERITAS

Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Total PCB	2023/04/05	0.0108, EDL=0.0014		ng/g	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

- (1) Recovery outside method acceptance criteria due to matrix effects
- (2) Result from 5x dilution due to matrix interference
- (3) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
- (4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
- (5) Within criteria.



Bureau Veritas Job #: C347690
Report Date: 2023/06/06

Apex Laboratories
Client Project #: A3A1010

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

A handwritten signature in black ink, appearing to read "Angel Guerrero".

Angel Guerrero, Supervisor, Ultra Trace Analysis, HRMS and SVOC

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

SUBCONTRACT ORDER

Apex Laboratories
A3A1010

AKK 2/15/23

RMP 2/16/23

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

BV Labs / Maxxam
C/O FEDEX DEPOT 299 Cayuga Rd
Cheektowaga, NY 14225
Phone : (800) 668-0639
Fax: (905) 332-9169

Sample Name: MFA-B1-2023013-21.9 Sediment Sampled: 01/30/23 16:00 Received 1/31/23@1008 by ESJ (A3A1010-01) ^{acc 2/15/23}

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/09/23 16:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
Containers Supplied: (E)250 mL Poly (WM) - Non Preserved			

Sample Name: MFA-B3-20230131-31.0 Sediment Sampled: 01/31/23 10:50 Received 2/1/23@1200 by SAT (A3A1010-02)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/10/23 10:50	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
Containers Supplied: (E)250 mL Poly (WM) - Non Preserved			

Sample Name: MFA-B2-20230131-23.0 Sediment Sampled: 01/31/23 09:00 Received 2/1/23@1200 by SAT (A3A1010-03)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/10/23 09:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
Containers Supplied: (E)250 mL Poly (WM) - Non Preserved			

Sample Name: MFA-B4-20230202-SL-26.5 Sediment Sampled: 02/02/23 09:10 Received 2/3/23@1120 by SAT (A3A1010-04)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/12/23 09:10	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
Containers Supplied: (E)250 mL Poly (WM) - Non Preserved			

Already Received

17-Feb-23 12:20

Lori Dufour



C347690

Fed Ex (Shipper)

AK0

ENV-1367

Released By Date 2-16-23

Fed Ex (Shipper)

Received By JAGDEEP KATAR

Date 2023/02/17 12:20

Released By _____ Date _____

Received By _____ Date _____
7.2 | 7.2 | 7.8 ice

Date 2023/02/17
Page 1 of 2
temp block n/a 4.2/4.8/4.2

SUBCONTRACT ORDER

Apex Laboratories

A3A1010

AJM 2/15/23

Sample Name: **MFA-B5-20230203-SL-27.0** Sediment Sampled: **02/03/23 15:00** Received 2/6/23@1205 by AJM *AJM 2/15/23*
 (A3A1010-05)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/13/23 15:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

As Received Composite of -01,-02,-03,-04,-05
 Sample Name: **MFA-B1-B5-COMP-SL** Sediment Sampled: **01/30/23 16:00** (A3A1010-06)

Analysis	Due	Expires	Comments
Subcontract Outside	02/23/23 17:00	07/29/23 16:00	PFAS EPA-1633
<i>Containers Supplied:</i> (C)250 mL Poly (WM) - Non Preserved			

Already Received

After Processing
 Sample Name: **MFA-SL-Composite After Processing** Sediment Sampled: **01/30/23 16:00** (A3A1010-07)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	01/30/24 16:00	10g - Use L container
1668C PCB Congeners (SUB)	02/28/23 17:00	01/30/24 16:00	10g - Use M container
<i>Containers Supplied:</i> (L)40 mL VOA - Non Preserved (M)40 mL VOA - Non Preserved			

Standard TAT

** See Analysis comments for volume provided **

*JDK 2023/02/17
 Abtemp block
 JDK 2023/02/17
 13-0132/13-2
 No custody seal*

Released By: *[Signature]* Date: *2-16-23* Received By: **Fed Ex (Shipper)** Date: _____

Released By: _____ Date: _____ Received By: *Jagdy K JAGDEEP KARR* Date: *2023/02/17*
12:20

SUBCONTRACT ORDER

**Apex Laboratories
A3A1010**

17-Feb-23 12:20

Lori Dufour



C347690

ENV-1367

AIR 3/20/23

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

BV Labs / Maxxam
C/O FEDEX DEPOT 299 Cayuga Rd
Cheektowaga, NY 14225
Phone: (800) 668-0639
Fax: (905) 332-9169



Sample Name: MFA-B1-2023013-21.9 **Sediment** **Received 1/31/23@1008 by ESJ** *ack 3/20/23*
Sampled: 01/30/23 16:00 (A3A1010-01)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/09/23 16:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

Sample Name: MFA-B3-20230131-31.0 **Sediment** **Received 2/1/23@1200 by SAT**
Sampled: 01/31/23 10:50 (A3A1010-02)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/10/23 10:50	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

Sample Name: MFA-B2-20230131-23.0 **Sediment** **Received 2/1/23@1200 by SAT**
Sampled: 01/31/23 09:00 (A3A1010-03)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/10/23 09:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

Sample Name: MFA-B4-20230202-SL-26.5 **Sediment** **Received 2/3/23@1120 by SAT**
Sampled: 02/02/23 09:10 (A3A1010-04)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/12/23 09:10	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

*Already received
Standard TAT*

Released By *[Signature]* Date *3/21/23 1255* Fed Ex (Shipper)
Received By *Ashitha Subramanian* Date *2/23/03/22*
ASHITHA SUBRAMANIAN 11:45

Released By _____ Date _____ Received By _____ Date _____
REFER TO ACK Page 1 of 2

SUBCONTRACT ORDER

Apex Laboratories
A3A1010

b

*ARC
3/20/23*

Received 2/6/23@1205 by AJM

Sample Name: MFA-B5-20230203-SL-27.0 **Sediment** **Sampled: 02/03/23 15:00** (A3A1010-05)

Analysis	Due	Expires	Comments
Sample Compositing2	02/01/23 17:00	05/13/23 15:00	BV for PFAS EPA-1633: Composite -01, -02, -03, -04, -05 into -06
<i>Containers Supplied:</i> (E)250 mL Poly (WM) - Non Preserved			

As Received Composite of -01,-02,-03,-04,-05

Sample Name: MFA-B1-B5-COMP-SL **Sediment** **Sampled: 01/30/23 16:00** (A3A1010-06)

Analysis	Due	Expires	Comments
Subcontract Outside	02/23/23 17:00	07/29/23 16:00	PFAS EPA-1633
<i>Containers Supplied:</i> (C)250 mL Poly (WM) - Non Preserved			

Already Received

After Processing

Sample Name: MFA-SL-Composite After Processing **Sediment** **Sampled: 01/30/23 16:00** (A3A1010-07)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	01/30/24 16:00	10g - Use L container
1668C PCB Congeners (SUB)	02/28/23 17:00	01/30/24 16:00	10g - Use M, P containers
<i>Containers Supplied:</i> (L)40 mL VOA - Non Preserved (M)40 mL VOA - Non Preserved (P)40 mL VOA - Non Preserved			

Already Received

Additional volume for PCB Cong.

Standard TAT

Released By *[Signature]* Date *3/21/23* ¹²⁵⁵ Received By *[Signature]* Date _____
 Released By *[Signature]* Date _____ Received By *[Signature]* Date _____

Fed Ex (Shipper)

Fed Ex (Shipper)

See Page 1



Your Project #: A3B0522

Attention: Philip Nerenberg

Apex Laboratories
6700 SW Sandburg St.
Tigard, OR
USA 97223

Report Date: 2023/05/17
Report #: R7632656
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C347713

Received: 2023/02/17, 12:20

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dioxins/Furans in Water (1613B) (1)	5	2023/02/24	2023/02/28	BRL SOP-00410	EPA 1613B m
OC Pesticides in Water by GCTQ	5	2023/02/21	2023/02/24	BRL SOP-00014	EPA Method 1699m
PCB Congeners in Water (1668C)	4	2023/02/23	2023/03/05	BRL SOP-00408	EPA 1668C m
PCB Congeners in Water (1668C)	1	2023/02/23	2023/03/06	BRL SOP-00408	EPA 1668C m
PFAS in water by SPE/LCMS (2)	6	2023/02/23	2023/02/25	CAM SOP-00894	EPA 537.1 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

(2) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Lori Dufour, Project Manager
Email: Lori.Dufour@bureauveritas.com
Phone# (905) 817-5700

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VBZ249	VBZ250	VBZ251			
Sampling Date		2023/02/14 10:05	2023/02/14 10:05	2023/02/14 12:51			
	UNITS	MW3-20230214-GW-35	MW3-20230214-GW-35-DUP	MW5-20230214-GW-40	RDL	MDL	QC Batch
Aldrin	ng/L	0.021 U	0.021 U	0.021 U	0.20	0.021	8513671
alpha-BHC	ng/L	0.024 U	0.024 U	0.024 U	0.20	0.024	8513671
delta-BHC	ng/L	0.029 U	0.029 U	0.114 J	0.20	0.029	8513671
beta-BHC	ng/L	0.029 J	0.021 J	0.095 J	0.20	0.014	8513671
Lindane	ng/L	0.033 U	0.033 U	0.033 U	0.20	0.033	8513671
a-Chlordane	ng/L	0.029 U	0.029 U	0.029 U	0.20	0.029	8513671
g-Chlordane	ng/L	0.029 U	0.029 U	0.029 U	0.20	0.029	8513671
Oxychlordane	ng/L	0.028 U	0.028 U	0.028 U	0.20	0.028	8513671
o,p-DDD	ng/L	0.020 U	0.020 U	0.020 U	0.20	0.020	8513671
p,p-DDD	ng/L	0.020 J	0.060 J	0.039 J	0.20	0.014	8513671
o,p-DDE	ng/L	0.016 U	0.016 U	0.016 U	0.20	0.016	8513671
p,p-DDE	ng/L	0.012 U	0.012 U	0.012 J	0.20	0.012	8513671
o,p-DDT	ng/L	0.040 U	0.040 U	0.040 U	0.20	0.040	8513671
p,p-DDT	ng/L	0.050 U	0.050 U	0.084 J	0.20	0.050	8513671
Dieldrin	ng/L	0.050 U	0.050 U	0.061 J	0.20	0.050	8513671
Endosulfan I	ng/L	0.071 J	0.115 J	0.067 U	0.40	0.067	8513671
Endosulfan II	ng/L	0.074 U	0.074 U	0.089 J	0.40	0.074	8513671
Endosulfan sulfate	ng/L	0.070 U	0.070 U	0.070 U	0.20	0.070	8513671
Endrin	ng/L	0.048 J	0.045 U	0.189 J	0.20	0.045	8513671
Endrin aldehyde	ng/L	0.071 U	0.071 U	0.071 U	0.20	0.071	8513671
Endrin ketone	ng/L	0.034 U	0.034 U	0.034 U	0.20	0.034	8513671
Heptachlor	ng/L	0.029 U	0.029 U	0.036 J	0.20	0.029	8513671
Heptachlor epoxide	ng/L	0.015 U	0.015 U	0.015 U	0.20	0.015	8513671
Hexachlorobenzene	ng/L	0.10 U	0.10 U	0.10 U	0.20	0.10	8513671
Methoxychlor	ng/L	0.085 J	0.065 J	0.079 J	0.20	0.040	8513671
Mirex	ng/L	0.021 U	0.021 U	0.032 J	0.20	0.021	8513671
cis-Nonachlor	ng/L	0.037 U	0.037 U	0.037 U	0.20	0.037	8513671
trans-Nonachlor	ng/L	0.044 U	0.044 U	0.044 U	0.20	0.044	8513671
Surrogate Recovery (%)							
13C10-cis Nonachlor	%	76	85	62	N/A	N/A	8513671
13C10-Heptachlor	%	164 (1)	160 (1)	116	N/A	N/A	8513671
13C10-Heptachlor Epoxide	%	105	102	89	N/A	N/A	8513671
13C10-Oxychlordane	%	97	100	81	N/A	N/A	8513671
13C10-trans Nonachlor	%	90	85	76	N/A	N/A	8513671
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) The extracted internal standard analyte exhibited high recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. For results that were not detected (ND), this potential high bias has no impact.							



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VBZ249	VBZ250	VBZ251			
Sampling Date		2023/02/14 10:05	2023/02/14 10:05	2023/02/14 12:51			
	UNITS	MW3-20230214-GW-35	MW3-20230214-GW-35-DUP	MW5-20230214-GW-40	RDL	MDL	QC Batch
13C12-Endrin	%	115	107	87	N/A	N/A	8513671
13C12-Endrin Ketone	%	69	61	58	N/A	N/A	8513671
13C6-beta BHC	%	70	74	46	N/A	N/A	8513671
13C6-d6-gamma BHC (Lindane)	%	79	84	89	N/A	N/A	8513671
13C-Methoxychlor	%	140 (1)	140 (1)	106	N/A	N/A	8513671
13C-pp-DDD	%	93	87	74	N/A	N/A	8513671
13C-pp-DDE	%	81	78	71	N/A	N/A	8513671
13C-pp-DDT	%	78	71	49	N/A	N/A	8513671
C13-Hexachlorobenzene	%	76	74	60	N/A	N/A	8513671

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) The extracted internal standard analyte exhibited high recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. For results that were not detected (ND), this potential high bias has no impact.



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VBZ251	VBZ252	VBZ253			
Sampling Date		2023/02/14 12:51	2023/02/14 14:37	2023/02/14 16:17			
	UNITS	MW5-20230214-GW-40 Lab-Dup	MW4-20230214-GW-40	MW6-20230214-GW-40.25	RDL	MDL	QC Batch
Aldrin	ng/L	0.054 J	0.021 U	0.034 J	0.20	0.021	8513671
alpha-BHC	ng/L	0.024 U	0.038 J	0.039 J	0.20	0.024	8513671
delta-BHC	ng/L	0.044 J	0.106 J	0.029 U	0.20	0.029	8513671
beta-BHC	ng/L	0.078 J	0.115 J	0.014 U	0.20	0.014	8513671
Lindane	ng/L	0.033 U	0.033 U	0.084 J	0.20	0.033	8513671
a-Chlordane	ng/L	0.029 U	0.029 U	0.029 U	0.20	0.029	8513671
g-Chlordane	ng/L	0.029 U	0.029 U	0.079 J	0.20	0.029	8513671
Oxychlordane	ng/L	0.028 U	0.028 U	0.028 U	0.20	0.028	8513671
o,p-DDD	ng/L	0.020 U	0.043 J	0.089 J	0.20	0.020	8513671
p,p-DDD	ng/L	0.044 J	0.064 J	0.071 J	0.20	0.014	8513671
o,p-DDE	ng/L	0.016 U	0.016 U	0.016 U	0.20	0.016	8513671
p,p-DDE	ng/L	0.018 J	0.012 J	0.019 J	0.20	0.012	8513671
o,p-DDT	ng/L	0.040 U	0.122 J	0.095 J	0.20	0.040	8513671
p,p-DDT	ng/L	0.050 U	0.104 J	0.050 U	0.20	0.050	8513671
Dieldrin	ng/L	0.050 U	0.050 U	0.050 U	0.20	0.050	8513671
Endosulfan I	ng/L	0.067 U	0.075 J	0.124 J	0.40	0.067	8513671
Endosulfan II	ng/L	0.074 U	0.165 J	0.074 U	0.40	0.074	8513671
Endosulfan sulfate	ng/L	0.070 U	0.070 U	0.070 U	0.20	0.070	8513671
Endrin	ng/L	0.118 J	0.101 J	0.133 J	0.20	0.045	8513671
Endrin aldehyde	ng/L	0.071 U	0.071 U	0.071 U	0.20	0.071	8513671
Endrin ketone	ng/L	0.034 U	0.034 U	0.034 U	0.20	0.034	8513671
Heptachlor	ng/L	0.039 J	0.036 J	0.041 J	0.20	0.029	8513671
Heptachlor epoxide	ng/L	0.015 U	0.015 U	0.015 U	0.20	0.015	8513671
Hexachlorobenzene	ng/L	0.10 U	0.10 U	0.10 U	0.20	0.10	8513671
Methoxychlor	ng/L	0.040 U	0.122 J	0.075 J	0.20	0.040	8513671
Mirex	ng/L	0.030 J	0.021 U	0.021 U	0.20	0.021	8513671
cis-Nonachlor	ng/L	0.037 U	0.037 U	0.037 U	0.20	0.037	8513671
trans-Nonachlor	ng/L	0.044 U	0.044 U	0.044 U	0.20	0.044	8513671
Surrogate Recovery (%)							
13C10-cis Nonachlor	%	64	72	65	N/A	N/A	8513671
13C10-Heptachlor	%	111	125 (1)	117	N/A	N/A	8513671
13C10-Heptachlor Epoxide	%	88	99	91	N/A	N/A	8513671
13C10-Oxychlordane	%	82	90	84	N/A	N/A	8513671
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) The extracted internal standard analyte exhibited high recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. For results that were not detected (ND), this potential high bias has no impact.							



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VBZ251	VBZ252	VBZ253			
Sampling Date		2023/02/14 12:51	2023/02/14 14:37	2023/02/14 16:17			
	UNITS	MW5-20230214-GW-40 Lab-Dup	MW4-20230214-GW-40	MW6-20230214-GW-40.25	RDL	MDL	QC Batch
13C10-trans Nonachlor	%	74	83	77	N/A	N/A	8513671
13C12-Endrin	%	85	97	95	N/A	N/A	8513671
13C12-Endrin Ketone	%	61	71	68	N/A	N/A	8513671
13C6-beta BHC	%	45	52	78	N/A	N/A	8513671
13C6-d6-gamma BHC (Lindane)	%	50	57	84	N/A	N/A	8513671
13C-Methoxychlor	%	113	120	119	N/A	N/A	8513671
13C-pp-DDD	%	73	85	75	N/A	N/A	8513671
13C-pp-DDE	%	72	82	75	N/A	N/A	8513671
13C-pp-DDT	%	51	59	53	N/A	N/A	8513671
C13-Hexachlorobenzene	%	56	70	61	N/A	N/A	8513671
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VBZ249	VBZ250	VBZ251			
Sampling Date		2023/02/14 10:05	2023/02/14 10:05	2023/02/14 12:51			
	UNITS	MW3-20230214-GW-35	MW3-20230214-GW-35-DUP	MW5-20230214-GW-40	RDL	MDL	QC Batch
Perfluorobutanoic acid (PFBA)	ug/L	0.023	0.022	0.015 J	0.020	0.0015	8519276
Perfluoropentanoic acid (PFPeA)	ug/L	0.033	0.031	0.026	0.020	0.0025	8519276
Perfluorohexanoic acid (PFHxA)	ug/L	0.046	0.044	0.13	0.020	0.0038	8519276
Perfluoroheptanoic acid (PFHpA)	ug/L	0.068	0.067	0.042	0.020	0.0018	8519276
Perfluorooctanoic acid (PFOA)	ug/L	0.10	0.096	0.060	0.020	0.0030	8519276
Perfluorononanoic acid (PFNA)	ug/L	0.056	0.053	0.017 J	0.020	0.0021	8519276
Perfluorodecanoic acid (PFDA)	ug/L	0.021	0.018 J	0.0057 J	0.020	0.0016	8519276
Perfluoroundecanoic acid (PFUnA)	ug/L	0.0024 U	0.0024 U	0.0024 U	0.020	0.0024	8519276
Perfluorododecanoic acid (PFDoA)	ug/L	0.0029 U	0.0029 U	0.0029 U	0.020	0.0029	8519276
Perfluorotridecanoic acid (PFTRDA)	ug/L	0.0026 U	0.0026 U	0.0026 U	0.020	0.0026	8519276
Perfluorotetradecanoic acid (PFTEDA)	ug/L	0.0016 U	0.0016 U	0.0016 U	0.020	0.0016	8519276
Perfluorobutanesulfonic acid (PFBS)	ug/L	0.0021 U	0.0021 U	0.0021 U	0.020	0.0021	8519276
Perfluoropentanesulfonic acid (PFPS)	ug/L	0.0023 U	0.0023 U	0.0023 U	0.020	0.0023	8519276
Perfluorohexanesulfonic acid (PFHxS)	ug/L	0.0022 U	0.0022 U	0.0022 U	0.020	0.0022	8519276
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	0.0039 U	0.0039 U	0.0039 U	0.020	0.0039	8519276
Perfluorooctanesulfonic acid (PFOS)	ug/L	0.0076 J	0.0070 J	0.0035 U	0.020	0.0035	8519276
Perfluorononanesulfonic acid (PFNS)	ug/L	0.0037 U	0.0037 U	0.0037 U	0.020	0.0037	8519276
Perfluorodecanesulfonic acid (PFDS)	ug/L	0.0048 U	0.0048 U	0.0048 U	0.020	0.0048	8519276
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0034 U	0.0034 U	0.0034 U	0.020	0.0034	8519276
EtFOSA	ug/L	0.0095 U	0.0095 U	0.0095 U	0.020	0.0095	8519276
MeFOSA	ug/L	0.0084 U	0.0084 U	0.0084 U	0.020	0.0084	8519276
EtFOSE	ug/L	0.0070 U	0.0070 U	0.0070 U	0.020	0.0070	8519276
MeFOSE	ug/L	0.0073 U	0.0073 U	0.0073 U	0.020	0.0073	8519276
EtFOSAA	ug/L	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	8519276
MeFOSAA	ug/L	0.0045 U	0.0045 U	0.0045 U	0.020	0.0045	8519276
4:2 Fluorotelomer sulfonic acid	ug/L	0.0033 U	0.0033 U	0.0033 U	0.020	0.0033	8519276
6:2 Fluorotelomer sulfonic acid	ug/L	0.0015 U	0.0015 U	0.0015 U	0.020	0.0015	8519276
8:2 Fluorotelomer sulfonic acid	ug/L	0.0031 U	0.0031 U	0.0031 U	0.020	0.0031	8519276
Hexafluoropropyleneoxide dimer acid	ug/L	0.0052 U	0.0052 U	0.0052 U	0.020	0.0052	8519276
4,8-Dioxa-3H-perfluorononanoic acid	ug/L	0.0027 U	0.0027 U	0.0027 U	0.020	0.0027	8519276
9CI-PF3ONS (F-53B Major)	ug/L	0.0043 U	0.0043 U	0.0043 U	0.020	0.0043	8519276
11CI-PF3OUds (F-53B Minor)	ug/L	0.0035 U	0.0035 U	0.0035 U	0.020	0.0035	8519276
Surrogate Recovery (%)							
13C2-4:2-Fluorotelomersulfonic Acid	%	86	87	86	N/A	N/A	8519276
13C2-6:2-Fluorotelomersulfonic Acid	%	88	88	86	N/A	N/A	8519276
13C2-8:2-Fluorotelomersulfonic Acid	%	83	86	78	N/A	N/A	8519276
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VBZ249	VBZ250	VBZ251			
Sampling Date		2023/02/14 10:05	2023/02/14 10:05	2023/02/14 12:51			
	UNITS	MW3-20230214-GW-35	MW3-20230214-GW-35-DUP	MW5-20230214-GW-40	RDL	MDL	QC Batch
13C2-Perfluorodecanoic acid	%	81	81	74	N/A	N/A	8519276
13C2-Perfluorododecanoic acid	%	73	74	63	N/A	N/A	8519276
13C2-Perfluorohexanoic acid	%	83	85	81	N/A	N/A	8519276
13C2-perfluorotetradecanoic acid	%	68	69	58	N/A	N/A	8519276
13C2-Perfluoroundecanoic acid	%	74	76	65	N/A	N/A	8519276
13C3-HFPO-DA	%	83	83	82	N/A	N/A	8519276
13C3-Perfluorobutanesulfonic acid	%	84	86	82	N/A	N/A	8519276
13C4-Perfluorobutanoic acid	%	87	88	87	N/A	N/A	8519276
13C4-Perfluoroheptanoic acid	%	84	86	84	N/A	N/A	8519276
13C4-Perfluorooctanesulfonic acid	%	83	83	76	N/A	N/A	8519276
13C4-Perfluorooctanoic acid	%	81	85	81	N/A	N/A	8519276
13C5-Perfluorononanoic acid	%	82	85	79	N/A	N/A	8519276
13C5-Perfluoropentanoic acid	%	85	87	84	N/A	N/A	8519276
13C8-Perfluorooctane Sulfonamide	%	73	73	61	N/A	N/A	8519276
18O2-Perfluorohexanesulfonic acid	%	84	87	81	N/A	N/A	8519276
D3-MeFOSA	%	54	52	44 (1)	N/A	N/A	8519276
D3-MeFOSAA	%	72	75	64	N/A	N/A	8519276
D5-EtFOSA	%	56	51	43 (2)	N/A	N/A	8519276
D5-EtFOSAA	%	73	71	60	N/A	N/A	8519276
D7-MeFOSE	%	66	62	57	N/A	N/A	8519276
D9-EtFOSE	%	65	66	56	N/A	N/A	8519276

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (MeFOSA).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (EtFOSA).



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VBZ252	VBZ253	VBZ254			
Sampling Date		2023/02/14 14:37	2023/02/14 16:17	2023/02/14 16:10			
	UNITS	MW4-20230214-GW-40	MW6-20230214-GW-40.25	FIELD BLANK-02	RDL	MDL	QC Batch
Perfluorobutanoic acid (PFBA)	ug/L	0.0015 U	0.0098 J	0.0015 U	0.020	0.0015	8519276
Perfluoropentanoic acid (PFPeA)	ug/L	0.012 J	0.022	0.0025 U	0.020	0.0025	8519276
Perfluorohexanoic acid (PFHxA)	ug/L	0.16	0.076	0.0038 U	0.020	0.0038	8519276
Perfluoroheptanoic acid (PFHpA)	ug/L	0.0087 J	0.049	0.0018 U	0.020	0.0018	8519276
Perfluorooctanoic acid (PFOA)	ug/L	0.025	0.083	0.0030 U	0.020	0.0030	8519276
Perfluorononanoic acid (PFNA)	ug/L	0.0030 J	0.038	0.0021 U	0.020	0.0021	8519276
Perfluorodecanoic acid (PFDA)	ug/L	0.0016 U	0.012 J	0.0016 U	0.020	0.0016	8519276
Perfluoroundecanoic acid (PFUnA)	ug/L	0.0024 U	0.0024 U	0.0024 U	0.020	0.0024	8519276
Perfluorododecanoic acid (PFDoA)	ug/L	0.0029 U	0.0029 U	0.0029 U	0.020	0.0029	8519276
Perfluorotridecanoic acid (PFTRDA)	ug/L	0.0026 U	0.0026 U	0.0026 U	0.020	0.0026	8519276
Perfluorotetradecanoic acid (PFTEDA)	ug/L	0.0016 U	0.0016 U	0.0016 U	0.020	0.0016	8519276
Perfluorobutanesulfonic acid (PFBS)	ug/L	0.0037 J	0.0028 J	0.0021 U	0.020	0.0021	8519276
Perfluoropentanesulfonic acid PFPes	ug/L	0.0023 U	0.0023 U	0.0023 U	0.020	0.0023	8519276
Perfluorohexanesulfonic acid (PFHxS)	ug/L	0.0022 U	0.0022 U	0.0022 U	0.020	0.0022	8519276
Perfluoroheptanesulfonic acid PFHpS	ug/L	0.0039 U	0.0039 U	0.0039 U	0.020	0.0039	8519276
Perfluorooctanesulfonic acid (PFOS)	ug/L	0.0035 U	0.012 J	0.0035 U	0.020	0.0035	8519276
Perfluorononanesulfonic acid (PFNS)	ug/L	0.0037 U	0.0037 U	0.0037 U	0.020	0.0037	8519276
Perfluorodecanesulfonic acid (PFDS)	ug/L	0.0048 U	0.0048 U	0.0048 U	0.020	0.0048	8519276
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0034 U	0.0034 U	0.0034 U	0.020	0.0034	8519276
EtFOSA	ug/L	0.0095 U	0.0095 U	0.0095 U	0.020	0.0095	8519276
MeFOSA	ug/L	0.0084 U	0.0084 U	0.0084 U	0.020	0.0084	8519276
EtFOSE	ug/L	0.0070 U	0.0070 U	0.0070 U	0.020	0.0070	8519276
MeFOSE	ug/L	0.0073 U	0.0073 U	0.0073 U	0.020	0.0073	8519276
EtFOSAA	ug/L	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	8519276
MeFOSAA	ug/L	0.0045 U	0.0045 U	0.0045 U	0.020	0.0045	8519276
4:2 Fluorotelomer sulfonic acid	ug/L	0.0033 U	0.0033 U	0.0033 U	0.020	0.0033	8519276
6:2 Fluorotelomer sulfonic acid	ug/L	0.0015 U	0.0021 J	0.0015 U	0.020	0.0015	8519276
8:2 Fluorotelomer sulfonic acid	ug/L	0.0031 U	0.0059 J	0.0031 U	0.020	0.0031	8519276
Hexafluoropropyleneoxide dimer acid	ug/L	0.0052 U	0.0052 U	0.0052 U	0.020	0.0052	8519276
4,8-Dioxa-3H-perfluorononanoic acid	ug/L	0.0027 U	0.0027 U	0.0027 U	0.020	0.0027	8519276
9CI-PF3ONS (F-53B Major)	ug/L	0.0043 U	0.0043 U	0.0043 U	0.020	0.0043	8519276
11CI-PF3OUdS (F-53B Minor)	ug/L	0.0035 U	0.0035 U	0.0035 U	0.020	0.0035	8519276
Surrogate Recovery (%)							
13C2-4:2-Fluorotelomersulfonic Acid	%	83	93	94	N/A	N/A	8519276
13C2-6:2-Fluorotelomersulfonic Acid	%	87	96	93	N/A	N/A	8519276
13C2-8:2-Fluorotelomersulfonic Acid	%	82	88	84	N/A	N/A	8519276
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VBZ252	VBZ253	VBZ254			
Sampling Date		2023/02/14 14:37	2023/02/14 16:17	2023/02/14 16:10			
	UNITS	MW4-20230214-GW-40	MW6-20230214-GW-40.25	FIELD BLANK-02	RDL	MDL	QC Batch
13C2-Perfluorodecanoic acid	%	77	82	82	N/A	N/A	8519276
13C2-Perfluorododecanoic acid	%	69	71	74	N/A	N/A	8519276
13C2-Perfluorohexanoic acid	%	80	88	85	N/A	N/A	8519276
13C2-perfluorotetradecanoic acid	%	65	66	73	N/A	N/A	8519276
13C2-Perfluoroundecanoic acid	%	71	74	76	N/A	N/A	8519276
13C3-HFPO-DA	%	79	85	83	N/A	N/A	8519276
13C3-Perfluorobutanesulfonic acid	%	80	89	79	N/A	N/A	8519276
13C4-Perfluorobutanoic acid	%	86	93	87	N/A	N/A	8519276
13C4-Perfluoroheptanoic acid	%	83	90	87	N/A	N/A	8519276
13C4-Perfluorooctanesulfonic acid	%	78	87	81	N/A	N/A	8519276
13C4-Perfluorooctanoic acid	%	82	89	84	N/A	N/A	8519276
13C5-Perfluorononanoic acid	%	80	87	83	N/A	N/A	8519276
13C5-Perfluoropentanoic acid	%	83	84	87	N/A	N/A	8519276
13C8-Perfluorooctane Sulfonamide	%	63	70	75	N/A	N/A	8519276
18O2-Perfluorohexanesulfonic acid	%	82	91	82	N/A	N/A	8519276
D3-MeFOSA	%	47 (1)	51	56	N/A	N/A	8519276
D3-MeFOSAA	%	74	72	72	N/A	N/A	8519276
D5-EtFOSA	%	47 (2)	53	58	N/A	N/A	8519276
D5-EtFOSAA	%	70	66	70	N/A	N/A	8519276
D7-MeFOSE	%	60	64	67	N/A	N/A	8519276
D9-EtFOSE	%	60	64	70	N/A	N/A	8519276

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (MeFOSA).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (EtFOSA).



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ249								
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of		
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
2,3,7,8-Tetra CDD *	pg/L	1.37 U	1.37	9.26	1.45	1.00	1.37	0	8524619	
1,2,3,7,8-Penta CDD *	pg/L	0.983 U	0.983	46.3	1.86	1.00	0.983	0	8524619	
1,2,3,4,7,8-Hexa CDD *	pg/L	0.979 U	0.979	46.3	2.25	0.100	0.0979	0	8524619	
1,2,3,6,7,8-Hexa CDD *	pg/L	1.01 U	1.01	46.3	1.40	0.100	0.101	0	8524619	
1,2,3,7,8,9-Hexa CDD *	pg/L	0.924 U	0.924	46.3	1.13	0.100	0.0924	0	8524619	
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.00 U	1.00	46.3	1.90	0.0100	0.0100	0	8524619	
Octa CDD *	pg/L	2.11 J	0.995	92.6	3.13	0.000300	0.000633	1	8524619	
Total Tetra CDD *	pg/L	1.37 U	1.37	9.26	4.00	N/A	N/A	0	8524619	
Total Penta CDD *	pg/L	0.983 U	0.983	46.3	4.00	N/A	N/A	0	8524619	
Total Hexa CDD *	pg/L	0.969 U	0.969	46.3	4.00	N/A	N/A	0	8524619	
Total Hepta CDD *	pg/L	1.00 U	1.00	46.3	4.00	N/A	N/A	0	8524619	
2,3,7,8-Tetra CDF **	pg/L	0.994 U	0.994	9.26	1.68	0.100	0.0994	0	8524619	
1,2,3,7,8-Penta CDF **	pg/L	1.19 U	1.19	46.3	1.33	0.0300	0.0357	0	8524619	
2,3,4,7,8-Penta CDF **	pg/L	1.02 U	1.02	46.3	1.23	0.300	0.306	0	8524619	
1,2,3,4,7,8-Hexa CDF **	pg/L	0.815 U	0.815	46.3	1.85	0.100	0.0815	0	8524619	
1,2,3,6,7,8-Hexa CDF **	pg/L	0.817 U	0.817	46.3	1.52	0.100	0.0817	0	8524619	
2,3,4,6,7,8-Hexa CDF **	pg/L	0.738 U	0.738	46.3	1.97	0.100	0.0738	0	8524619	
1,2,3,7,8,9-Hexa CDF **	pg/L	0.894 U	0.894	46.3	1.66	0.100	0.0894	0	8524619	
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.815 U	0.815	46.3	2.00	0.0100	0.00815	0	8524619	
1,2,3,4,7,8,9-Hepta CDF **	pg/L	0.888 U	0.888	46.3	1.87	0.0100	0.00888	0	8524619	
Octa CDF **	pg/L	0.840 U	0.840	92.6	3.99	0.000300	0.000252	0	8524619	
Total Tetra CDF **	pg/L	0.994 U	0.994	9.26	4.00	N/A	N/A	0	8524619	
Total Penta CDF **	pg/L	1.10 U	1.10	46.3	4.00	N/A	N/A	0	8524619	
Total Hexa CDF **	pg/L	0.813 U	0.813	46.3	4.00	N/A	N/A	0	8524619	
Total Hepta CDF **	pg/L	0.849 U	0.849	46.3	4.00	N/A	N/A	0	8524619	
TOTAL TOXIC EQUIVALENC	pg/L	N/A	N/A	N/A	N/A	N/A	3.44	N/A	N/A	
Surrogate Recovery (%)										
37CL4 2378 Tetra CDD *	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDF **	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch * CDD = Chloro Dibenzo-p-Dioxin N/A = Not Applicable ** CDF = Chloro Dibenzo-p-Furan										



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-123478 HexaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	106	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	80	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	103	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 * CDD = Chloro Dibenzo-p-Dioxin
 N/A = Not Applicable
 ** CDF = Chloro Dibenzo-p-Furan



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ250								
Sampling Date		2023/02/14 10:05					TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
2,3,7,8-Tetra CDD *	pg/L	1.42 U	1.42	9.35	1.45	1.00	1.42	0	8524619	
1,2,3,7,8-Penta CDD *	pg/L	1.10 U	1.10	46.7	1.86	1.00	1.10	0	8524619	
1,2,3,4,7,8-Hexa CDD *	pg/L	1.04 U	1.04	46.7	2.25	0.100	0.104	0	8524619	
1,2,3,6,7,8-Hexa CDD *	pg/L	1.03 U	1.03	46.7	1.40	0.100	0.103	0	8524619	
1,2,3,7,8,9-Hexa CDD *	pg/L	0.964 U	0.964	46.7	1.13	0.100	0.0964	0	8524619	
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.03 U	1.03	46.7	1.90	0.0100	0.0103	0	8524619	
Octa CDD *	pg/L	3.24 J	1.12	93.5	3.13	0.000300	0.000972	1	8524619	
Total Tetra CDD *	pg/L	1.42 U	1.42	9.35	4.00	N/A	N/A	0	8524619	
Total Penta CDD *	pg/L	1.10 U	1.10	46.7	4.00	N/A	N/A	0	8524619	
Total Hexa CDD *	pg/L	1.06 U	1.06	46.7	4.00	N/A	N/A	0	8524619	
Total Hepta CDD *	pg/L	1.43 U	1.43	46.7	4.00	N/A	N/A	0	8524619	
2,3,7,8-Tetra CDF **	pg/L	1.02 U	1.02	9.35	1.68	0.100	0.102	0	8524619	
1,2,3,7,8-Penta CDF **	pg/L	1.29 U	1.29	46.7	1.33	0.0300	0.0387	0	8524619	
2,3,4,7,8-Penta CDF **	pg/L	1.08 U	1.08	46.7	1.23	0.300	0.324	0	8524619	
1,2,3,4,7,8-Hexa CDF **	pg/L	0.879 U	0.879	46.7	1.85	0.100	0.0879	0	8524619	
1,2,3,6,7,8-Hexa CDF **	pg/L	0.908 U	0.908	46.7	1.52	0.100	0.0908	0	8524619	
2,3,4,6,7,8-Hexa CDF **	pg/L	0.805 U	0.805	46.7	1.97	0.100	0.0805	0	8524619	
1,2,3,7,8,9-Hexa CDF **	pg/L	0.973 U	0.973	46.7	1.66	0.100	0.0973	0	8524619	
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.893 U	0.893	46.7	2.00	0.0100	0.00893	0	8524619	
1,2,3,4,7,8,9-Hepta CDF **	pg/L	0.955 U	0.955	46.7	1.87	0.0100	0.00955	0	8524619	
Octa CDF **	pg/L	0.989 U	0.989	93.5	3.99	0.000300	0.000297	0	8524619	
Total Tetra CDF **	pg/L	1.02 U	1.02	9.35	4.00	N/A	N/A	0	8524619	
Total Penta CDF **	pg/L	1.18 U	1.18	46.7	4.00	N/A	N/A	0	8524619	
Total Hexa CDF **	pg/L	0.888 U	0.888	46.7	4.00	N/A	N/A	0	8524619	
Total Hepta CDF **	pg/L	0.923 U	0.923	46.7	4.00	N/A	N/A	0	8524619	
TOTAL TOXIC EQUIVALENC	pg/L	N/A	N/A	N/A	N/A	N/A	3.67	N/A	N/A	
Surrogate Recovery (%)										
37CL4 2378 Tetra CDD *	%	86	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch * CDD = Chloro Dibenzo-p-Dioxin N/A = Not Applicable ** CDF = Chloro Dibenzo-p-Furan										



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-123478 HexaCDD *	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	104	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 * CDD = Chloro Dibenzo-p-Dioxin
 N/A = Not Applicable
 ** CDF = Chloro Dibenzo-p-Furan



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ251								
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of		
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
2,3,7,8-Tetra CDD *	pg/L	1.47 U	1.47	9.26	1.45	1.00	1.47	0	8524619	
1,2,3,7,8-Penta CDD *	pg/L	1.08 U	1.08	46.3	1.86	1.00	1.08	0	8524619	
1,2,3,4,7,8-Hexa CDD *	pg/L	1.05 U	1.05	46.3	2.25	0.100	0.105	0	8524619	
1,2,3,6,7,8-Hexa CDD *	pg/L	1.04 U	1.04	46.3	1.40	0.100	0.104	0	8524619	
1,2,3,7,8,9-Hexa CDD *	pg/L	0.972 U	0.972	46.3	1.13	0.100	0.0972	0	8524619	
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.01 U	1.01	46.3	1.90	0.0100	0.0101	0	8524619	
Octa CDD *	pg/L	1.44 U	1.44	92.6	3.13	0.000300	0.000432	0	8524619	
Total Tetra CDD *	pg/L	1.47 U	1.47	9.26	4.00	N/A	N/A	0	8524619	
Total Penta CDD *	pg/L	1.08 U	1.08	46.3	4.00	N/A	N/A	0	8524619	
Total Hexa CDD *	pg/L	1.02 U	1.02	46.3	4.00	N/A	N/A	0	8524619	
Total Hepta CDD *	pg/L	1.01 U	1.01	46.3	4.00	N/A	N/A	0	8524619	
2,3,7,8-Tetra CDF **	pg/L	1.02 U	1.02	9.26	1.68	0.100	0.102	0	8524619	
1,2,3,7,8-Penta CDF **	pg/L	1.30 U	1.30	46.3	1.33	0.0300	0.0390	0	8524619	
2,3,4,7,8-Penta CDF **	pg/L	1.11 U	1.11	46.3	1.23	0.300	0.333	0	8524619	
1,2,3,4,7,8-Hexa CDF **	pg/L	0.944 U	0.944	46.3	1.85	0.100	0.0944	0	8524619	
1,2,3,6,7,8-Hexa CDF **	pg/L	0.944 U	0.944	46.3	1.52	0.100	0.0944	0	8524619	
2,3,4,6,7,8-Hexa CDF **	pg/L	0.830 U	0.830	46.3	1.97	0.100	0.0830	0	8524619	
1,2,3,7,8,9-Hexa CDF **	pg/L	1.03 U	1.03	46.3	1.66	0.100	0.103	0	8524619	
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.893 U	0.893	46.3	2.00	0.0100	0.00893	0	8524619	
1,2,3,4,7,8,9-Hepta CDF **	pg/L	0.975 U	0.975	46.3	1.87	0.0100	0.00975	0	8524619	
Octa CDF **	pg/L	0.959 U	0.959	92.6	3.99	0.000300	0.000288	0	8524619	
Total Tetra CDF **	pg/L	1.02 U	1.02	9.26	4.00	N/A	N/A	0	8524619	
Total Penta CDF **	pg/L	1.20 U	1.20	46.3	4.00	N/A	N/A	0	8524619	
Total Hexa CDF **	pg/L	0.933 U	0.933	46.3	4.00	N/A	N/A	0	8524619	
Total Hepta CDF **	pg/L	0.932 U	0.932	46.3	4.00	N/A	N/A	0	8524619	
TOTAL TOXIC EQUIVALENC	pg/L	N/A	N/A	N/A	N/A	N/A	3.73	N/A	N/A	
Surrogate Recovery (%)										
37CL4 2378 Tetra CDD *	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDD *	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDF **	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch * CDD = Chloro Dibenzo-p-Dioxin N/A = Not Applicable ** CDF = Chloro Dibenzo-p-Furan										



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-123478 HexaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	73	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 * CDD = Chloro Dibenzo-p-Dioxin
 N/A = Not Applicable
 ** CDF = Chloro Dibenzo-p-Furan



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ252								
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY			# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
2,3,7,8-Tetra CDD *	pg/L	1.50 U	1.50	9.80	1.45	1.00	1.50	0	8524619	
1,2,3,7,8-Penta CDD *	pg/L	1.15 U	1.15	49.0	1.86	1.00	1.15	0	8524619	
1,2,3,4,7,8-Hexa CDD *	pg/L	1.05 U	1.05	49.0	2.25	0.100	0.105	0	8524619	
1,2,3,6,7,8-Hexa CDD *	pg/L	1.01 U	1.01	49.0	1.40	0.100	0.101	0	8524619	
1,2,3,7,8,9-Hexa CDD *	pg/L	0.959 U	0.959	49.0	1.13	0.100	0.0959	0	8524619	
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.06 U	1.06	49.0	1.90	0.0100	0.0106	0	8524619	
Octa CDD *	pg/L	4.17 U (1)	4.17	98.0	3.13	0.000300	0.00125	0	8524619	
Total Tetra CDD *	pg/L	1.50 U	1.50	9.80	4.00	N/A	N/A	0	8524619	
Total Penta CDD *	pg/L	1.15 U	1.15	49.0	4.00	N/A	N/A	0	8524619	
Total Hexa CDD *	pg/L	1.01 U	1.01	49.0	4.00	N/A	N/A	0	8524619	
Total Hepta CDD *	pg/L	1.06 U	1.06	49.0	4.00	N/A	N/A	0	8524619	
2,3,7,8-Tetra CDF **	pg/L	1.07 U	1.07	9.80	1.68	0.100	0.107	0	8524619	
1,2,3,7,8-Penta CDF **	pg/L	1.33 U	1.33	49.0	1.33	0.0300	0.0399	0	8524619	
2,3,4,7,8-Penta CDF **	pg/L	1.10 U	1.10	49.0	1.23	0.300	0.330	0	8524619	
1,2,3,4,7,8-Hexa CDF **	pg/L	0.937 U	0.937	49.0	1.85	0.100	0.0937	0	8524619	
1,2,3,6,7,8-Hexa CDF **	pg/L	0.922 U	0.922	49.0	1.52	0.100	0.0922	0	8524619	
2,3,4,6,7,8-Hexa CDF **	pg/L	0.827 U	0.827	49.0	1.97	0.100	0.0827	0	8524619	
1,2,3,7,8,9-Hexa CDF **	pg/L	0.995 U	0.995	49.0	1.66	0.100	0.0995	0	8524619	
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.880 U	0.880	49.0	2.00	0.0100	0.00880	0	8524619	
1,2,3,4,7,8,9-Hepta CDF **	pg/L	0.954 U	0.954	49.0	1.87	0.0100	0.00954	0	8524619	
Octa CDF **	pg/L	1.03 U	1.03	98.0	3.99	0.000300	0.000309	0	8524619	
Total Tetra CDF **	pg/L	1.07 U	1.07	9.80	4.00	N/A	N/A	0	8524619	
Total Penta CDF **	pg/L	1.21 U	1.21	49.0	4.00	N/A	N/A	0	8524619	
Total Hexa CDF **	pg/L	0.917 U	0.917	49.0	4.00	N/A	N/A	0	8524619	
Total Hepta CDF **	pg/L	0.915 U	0.915	49.0	4.00	N/A	N/A	0	8524619	
TOTAL TOXIC EQUIVALENC	pg/L	N/A	N/A	N/A	N/A	N/A	3.83	N/A	N/A	
Surrogate Recovery (%)										
37CL4 2378 Tetra CDD *	%	78	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDD *	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619	

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	69	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 ** CDF = Chloro Dibenzo-p-Furan
 N/A = Not Applicable
 * CDD = Chloro Dibenzo-p-Dioxin



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ253								
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of		
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
2,3,7,8-Tetra CDD *	pg/L	1.54 U	1.54	10.5	1.45	1.00	1.54	0	8524619	
1,2,3,7,8-Penta CDD *	pg/L	1.34 U	1.34	52.6	1.86	1.00	1.34	0	8524619	
1,2,3,4,7,8-Hexa CDD *	pg/L	1.25 U	1.25	52.6	2.25	0.100	0.125	0	8524619	
1,2,3,6,7,8-Hexa CDD *	pg/L	1.21 U	1.21	52.6	1.40	0.100	0.121	0	8524619	
1,2,3,7,8,9-Hexa CDD *	pg/L	1.14 U	1.14	52.6	1.13	0.100	0.114	0	8524619	
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.39 U	1.39	52.6	1.90	0.0100	0.0139	0	8524619	
Octa CDD *	pg/L	7.62 J	1.38	105	3.13	0.000300	0.00229	1	8524619	
Total Tetra CDD *	pg/L	1.54 U	1.54	10.5	4.00	N/A	N/A	0	8524619	
Total Penta CDD *	pg/L	1.34 U	1.34	52.6	4.00	N/A	N/A	0	8524619	
Total Hexa CDD *	pg/L	1.20 U	1.20	52.6	4.00	N/A	N/A	0	8524619	
Total Hepta CDD *	pg/L	1.45 U	1.45	52.6	4.00	N/A	N/A	0	8524619	
2,3,7,8-Tetra CDF **	pg/L	1.03 U	1.03	10.5	1.68	0.100	0.103	0	8524619	
1,2,3,7,8-Penta CDF **	pg/L	1.43 U	1.43	52.6	1.33	0.0300	0.0429	0	8524619	
2,3,4,7,8-Penta CDF **	pg/L	1.23 U	1.23	52.6	1.23	0.300	0.369	0	8524619	
1,2,3,4,7,8-Hexa CDF **	pg/L	0.994 U	0.994	52.6	1.85	0.100	0.0994	0	8524619	
1,2,3,6,7,8-Hexa CDF **	pg/L	0.986 U	0.986	52.6	1.52	0.100	0.0986	0	8524619	
2,3,4,6,7,8-Hexa CDF **	pg/L	0.898 U	0.898	52.6	1.97	0.100	0.0898	0	8524619	
1,2,3,7,8,9-Hexa CDF **	pg/L	1.12 U	1.12	52.6	1.66	0.100	0.112	0	8524619	
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.975 U	0.975	52.6	2.00	0.0100	0.00975	0	8524619	
1,2,3,4,7,8,9-Hepta CDF **	pg/L	1.05 U	1.05	52.6	1.87	0.0100	0.0105	0	8524619	
Octa CDF **	pg/L	1.21 U	1.21	105	3.99	0.000300	0.000363	0	8524619	
Total Tetra CDF **	pg/L	1.03 U	1.03	10.5	4.00	N/A	N/A	0	8524619	
Total Penta CDF **	pg/L	1.32 U	1.32	52.6	4.00	N/A	N/A	0	8524619	
Total Hexa CDF **	pg/L	0.995 U	0.995	52.6	4.00	N/A	N/A	0	8524619	
Total Hepta CDF **	pg/L	1.01 U	1.01	52.6	4.00	N/A	N/A	0	8524619	
TOTAL TOXIC EQUIVALENC	pg/L	N/A	N/A	N/A	N/A	N/A	4.19	N/A	N/A	
Surrogate Recovery (%)										
37CL4 2378 Tetra CDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDD *	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
C13-1234678 HeptaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619	
EDL = Estimated Detection Limit										
RDL = Reportable Detection Limit										
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,										
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.										
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds										
QC Batch = Quality Control Batch										
* CDD = Chloro Dibenzo-p-Dioxin										
N/A = Not Applicable										
** CDF = Chloro Dibenzo-p-Furan										



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VBZ253							
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of	
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-123478 HexaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	103	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	105	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 * CDD = Chloro Dibenzo-p-Dioxin
 N/A = Not Applicable
 ** CDF = Chloro Dibenzo-p-Furan



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.013 J	0.011	0.020	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.011 U	0.011	0.020	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.0095 U	0.0095	0.050	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.0100 J	0.0074	0.050	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0032 U	0.0032	0.050	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0031 U	0.0031	0.020	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0031 U	0.0031	0.020	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0030 U	0.0030	0.050	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0031 U	0.0031	0.020	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.0039 U	0.0039	0.050	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.0032 U	0.0032	0.20	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0029 U	0.0029	0.050	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0032 U	0.0032	0.020	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0027 U	0.0027	0.050	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.0071 U	0.0071	0.050	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.0057 U	0.0057	0.020	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.0049 U	0.0049	0.050	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.0090 U	0.0090	0.020	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0033 U	0.0033	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0036 U	0.0036	0.050	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0037 U	0.0037	0.020	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0037 U	0.0037	0.020	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0045 U	0.0045	0.020	0.0043	N/A	N/A	1	8533813
2,3',4-TriCB-(25)	ng/L	0.0037 U	0.0037	0.020	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0034 U	0.0034	0.050	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0042 U	0.0042	0.020	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0032 U	0.0032	0.050	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0040 U	0.0040	0.020	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0036 U	0.0036	0.020	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0035 U	0.0035	0.020	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0032 U	0.0032	0.020	0.0052	N/A	N/A	1	8533813
3,4,4'-TriCB-(37)	ng/L	0.0032 U	0.0032	0.020	0.0041	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
345-TriCB-(38)	ng/L	0.0034 U	0.0034	0.020	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0036 U	0.0036	0.020	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.011 U	0.011	0.10	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.015 U	0.015	0.050	0.011	N/A	N/A	1	8533813
22'35-TetraCB-(43)	ng/L	0.014 U	0.014	0.050	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.019 J	0.010	0.10	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.011 U	0.011	0.050	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.012 U	0.012	0.020	0.014	N/A	N/A	1	8533813
22'45-TetraCB-(48)	ng/L	0.011 U	0.011	0.050	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.0097 U	0.0097	0.10	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.011 U	0.011	0.10	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.011 U	0.011	0.050	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.018 U	0.018	0.050	0.020	N/A	N/A	1	8533813
233'4-TetraCB-(55)	ng/L	0.0077 U	0.0077	0.050	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.0075 U	0.0075	0.050	0.018	N/A	N/A	1	8533813
233'5-TetraCB-(57)	ng/L	0.0074 U	0.0074	0.050	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.0073 U	0.0073	0.050	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.0077 U	0.0077	0.10	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.0072 U	0.0072	0.050	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.0074 U	0.0074	0.20	0.035	N/A	N/A	1	8533813
234'5-TetraCB-(63)	ng/L	0.0071 U	0.0071	0.050	0.0080	N/A	N/A	1	8533813
234'6-TetraCB-(64)	ng/L	0.0090 U	0.0090	0.050	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.0070 U	0.0070	0.050	0.0084	N/A	N/A	1	8533813
23'45-TetraCB-(67)	ng/L	0.0061 U	0.0061	0.050	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.0066 U	0.0066	0.050	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.0071 U	0.0071	0.050	0.0082	N/A	N/A	1	8533813
23'5'6-TetraCB-(73)	ng/L	0.0075 U	0.0075	0.050	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.0055 U	0.0055	0.050	0.011	0.000100	0.000000550	1	8533813
33'45-TetraCB-(78)	ng/L	0.0077 U	0.0077	0.050	0.013	N/A	N/A	1	8533813
33'45'-TetraCB(79)	ng/L	0.0061 U	0.0061	0.050	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.0060 U	0.0060	0.050	0.0087	N/A	N/A	1	8533813
344'5-TetraCB-(81)	ng/L	0.0060 U	0.0060	0.050	0.0079	0.000300	0.00000180	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'4-PentaCB-(82)	ng/L	0.011 U	0.011	0.050	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.0087 U	0.0087	0.10	0.033	N/A	N/A	1	8533813
22'33'6-PentaCB-(84)	ng/L	0.0096 U	0.0096	0.020	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.0068 U	0.0068	0.10	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.0073 U	0.0073	0.20	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.0093 U	0.0093	0.050	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.011 U	0.011	0.050	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.0074 U	0.0074	0.20	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.010 U	0.010	0.050	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.0091 U	0.0091	0.20	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.0095 U	0.0095	0.050	0.017	N/A	N/A	1	8533813
22'35'6-PentaCB-(95)	ng/L	0.0099 U	0.0099	0.050	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.0080 U	0.0080	0.050	0.014	N/A	N/A	1	8533813
22'45'6-PentaCB-(103)	ng/L	0.0089 U	0.0089	0.050	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.0087 U	0.0087	0.050	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.0045 U	0.0045	0.050	0.0052	0.0000300	0.000000135	1	8533813
233'45-PentaCB-(106)	ng/L	0.0059 U	0.0059	0.050	0.018	N/A	N/A	1	8533813
233'4'5-PentaCB-(107)	ng/L	0.0045 U	0.0045	0.050	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.0056 U	0.0056	0.10	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.0067 U	0.0067	0.10	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.0060 U	0.0060	0.050	0.012	N/A	N/A	1	8533813
233'56-PentaCB-(112)	ng/L	0.0057 U	0.0057	0.050	0.018	N/A	N/A	1	8533813
2344'5-PentaCB-(114)	ng/L	0.0052 U	0.0052	0.050	0.0084	0.0000300	0.000000156	1	8533813
23'44'5-PentaCB-(118)	ng/L	0.0048 U	0.0048	0.10	0.0071	0.0000300	0.000000144	1	8533813
23'455'-PentaCB-(120)	ng/L	0.0061 U	0.0061	0.050	0.014	N/A	N/A	1	8533813
23'45'6-PentaCB-(121)	ng/L	0.0063 U	0.0063	0.050	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.0073 U	0.0073	0.050	0.011	N/A	N/A	1	8533813
23'44'5'-PentaCB-(123)	ng/L	0.0054 U	0.0054	0.050	0.014	0.0000300	0.000000162	1	8533813
33'44'5-PentaCB-(126)	ng/L	0.0047 U	0.0047	0.050	0.0061	0.100	0.000470	1	8533813
33'455'-PentaCB-(127)	ng/L	0.0055 U	0.0055	0.050	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.0066 U	0.0066	0.10	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.0075 U	0.0075	0.20	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'45'-HexaCB-(130)	ng/L	0.0082 U	0.0082	0.050	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.010 U	0.010	0.050	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.0089 U	0.0089	0.050	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.0088 U	0.0088	0.050	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.0094 U	0.0094	0.10	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.010 U	0.010	0.10	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.0074 U	0.0074	0.050	0.014	N/A	N/A	1	8533813
22'344'5-HexaCB-(137)	ng/L	0.0078 U	0.0078	0.10	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.0072 U	0.0072	0.10	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.0074 U	0.0074	0.050	0.018	N/A	N/A	1	8533813
22'3456'-HexaCB-(142)	ng/L	0.0092 U	0.0092	0.050	0.018	N/A	N/A	1	8533813
22'345'6-HexaCB-(144)	ng/L	0.0099 U	0.0099	0.050	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.0072 U	0.0072	0.050	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.0068 U	0.0068	0.050	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.0071 U	0.0071	0.10	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.010 U	0.010	0.050	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.0071 U	0.0071	0.050	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.0074 U	0.0074	0.050	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.0060 U	0.0060	0.10	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.0078 U	0.0078	0.050	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.0077 U	0.0077	0.050	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.0049 U	0.0049	0.10	0.015	0.0000300	0.000000147	1	8533813
233'44'6-HexaCB-(158)	ng/L	0.0049 U	0.0049	0.050	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.0047 U	0.0047	0.050	0.015	N/A	N/A	1	8533813
233'456-HexaCB-(160)	ng/L	0.0062 U	0.0062	0.050	0.013	N/A	N/A	1	8533813
233'45'6-HexaCB-(161)	ng/L	0.0057 U	0.0057	0.050	0.022	N/A	N/A	1	8533813
233'4'55'-HexaCB-(162)	ng/L	0.0046 U	0.0046	0.050	0.016	N/A	N/A	1	8533813
233'4'5'6-HexaCB-(164)	ng/L	0.0053 U	0.0053	0.050	0.020	N/A	N/A	1	8533813
233'55'6-HexaCB-(165)	ng/L	0.0063 U	0.0063	0.050	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.0049 U	0.0049	0.050	0.0096	0.0000300	0.000000147	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.0051 U	0.0051	0.050	0.0092	0.0300	0.000153	1	8533813
22'33'44'5-HeptaCB-(170)	ng/L	0.0051 U	0.0051	0.050	0.011	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HeptaCB-(171)+(173)	ng/L	0.0063 U	0.0063	0.10	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.0062 U	0.0062	0.050	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.0059 U	0.0059	0.050	0.017	N/A	N/A	1	8533813
22'33'45'6-HeptaCB-(175)	ng/L	0.0072 U	0.0072	0.050	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.0052 U	0.0052	0.050	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.0064 U	0.0064	0.050	0.013	N/A	N/A	1	8533813
22'33'55'6-HeptaCB-(178)	ng/L	0.0073 U	0.0073	0.050	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.0052 U	0.0052	0.050	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.0048 U	0.0048	0.10	0.018	N/A	N/A	1	8533813
22'344'56-HeptaCB-(181)	ng/L	0.0061 U	0.0061	0.050	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.0065 U	0.0065	0.050	0.0066	N/A	N/A	1	8533813
22'344'5'6-HeptaCB-(183)	ng/L	0.0055 U	0.0055	0.050	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.0050 U	0.0050	0.050	0.0065	N/A	N/A	1	8533813
22'3455'6-HeptaCB-(185)	ng/L	0.0066 U	0.0066	0.050	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.0054 U	0.0054	0.050	0.0095	N/A	N/A	1	8533813
22'34'55'6-HeptaCB-(187)	ng/L	0.0065 U	0.0065	0.050	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.0056 U	0.0056	0.050	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.0042 U	0.0042	0.050	0.014	0.0000300	0.000000126	1	8533813
233'44'56-HeptaCB-(190)	ng/L	0.0044 U	0.0044	0.050	0.016	N/A	N/A	1	8533813
233'44'5'6-HeptaCB-(191)	ng/L	0.0044 U	0.0044	0.050	0.014	N/A	N/A	1	8533813
233'455'6-HeptaCB-(192)	ng/L	0.0048 U	0.0048	0.050	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.011 U	0.011	0.050	0.024	N/A	N/A	1	8533813
22'33'44'56-OctaCB-(195)	ng/L	0.012 U	0.012	0.050	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.012 U	0.012	0.050	0.017	N/A	N/A	1	8533813
22'33'44'66'-OctaCB-(197)	ng/L	0.0086 U	0.0086	0.050	0.033	N/A	N/A	1	8533813
OctaCB-(198)+(199)	ng/L	0.013 U	0.013	0.10	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.010 U	0.010	0.050	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.0088 U	0.0088	0.050	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.0097 U	0.0097	0.050	0.013	N/A	N/A	1	8533813
22'344'55'6-OctaCB-(203)	ng/L	0.012 U	0.012	0.050	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.0076 U	0.0076	0.050	0.018	N/A	N/A	1	8533813
233'44'55'6-OctaCB-(205)	ng/L	0.0077 U	0.0077	0.050	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'55'6'-NonaCB-(206)	ng/L	0.014 U	0.014	0.050	0.020	N/A	N/A	1	8533813
22'33'44'566'-NonaCB-(207)	ng/L	0.013 U	0.013	0.050	0.018	N/A	N/A	1	8533813
22'33'455'66'-NonaCB-(208)	ng/L	0.012 U	0.012	0.050	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.018 U	0.018	0.050	0.015	N/A	N/A	1	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.000626	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	37	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	123	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'455'66'-NonaCB-(208)	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'-OctaCB-(202)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'-HeptaCB-(180)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'-HeptaCB-(188)	%	80	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'-HexaCB-(155)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'-PentaCB-(104)	%	55	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'-TetraCB-(54)	%	46	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6-TriCB-(19)	%	46	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	38	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'-HeptaCB-(189)	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'-PentaCB-(105)	%	70	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'-PentaCB-(111)	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'-HexaCB-(167)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	59	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	60	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	22	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'-HexaCB-(169)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	72	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'-TetraCB-(77)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'5'-TetraCB-(81)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ249							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-344'-TriCB-(37)	%	46	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	43	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	26	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	141	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.017 U	0.017	0.020	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.017 U	0.017	0.020	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.014 U	0.014	0.051	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.020 U	0.020	0.051	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0084 U	0.0084	0.051	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0082 U	0.0082	0.020	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0083 U	0.0083	0.020	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0080 U	0.0080	0.051	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0081 U	0.0081	0.020	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.010 U	0.010	0.051	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.118 J	0.0084	0.20	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0076 U	0.0076	0.051	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0083 U	0.0083	0.020	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0070 U	0.0070	0.051	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.012 U	0.012	0.051	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.0094 U	0.0094	0.020	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.0081 U	0.0081	0.051	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.017 U	0.017	0.020	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0125 J	0.0054	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0078 J	0.0060	0.051	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0060 U	0.0060	0.020	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0061 U	0.0061	0.020	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0074 U	0.0074	0.020	0.0043	N/A	N/A	1	8533813
2,3,4'-TriCB-(25)	ng/L	0.0061 U	0.0061	0.020	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0056 U	0.0056	0.051	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0069 U	0.0069	0.020	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0120 J	0.0053	0.051	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0066 U	0.0066	0.020	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0060 U	0.0060	0.020	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0058 U	0.0058	0.020	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0053 U	0.0053	0.020	0.0052	N/A	N/A	1	8533813
3,4,4'-TriCB-(37)	ng/L	0.0051 U	0.0051	0.020	0.0041	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
345-TriCB-(38)	ng/L	0.0056 U	0.0056	0.020	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0059 U	0.0059	0.020	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.014 U	0.014	0.10	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.019 U	0.019	0.051	0.011	N/A	N/A	1	8533813
22'35'-TetraCB-(43)	ng/L	0.018 U	0.018	0.051	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.029 J	0.013	0.10	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.015 U	0.015	0.051	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.016 U	0.016	0.020	0.014	N/A	N/A	1	8533813
22'45'-TetraCB-(48)	ng/L	0.014 U	0.014	0.051	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.012 U	0.012	0.10	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.014 U	0.014	0.10	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.020 J	0.014	0.051	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.026 U	0.026	0.051	0.020	N/A	N/A	1	8533813
233'4'-TetraCB-(55)	ng/L	0.0099 U	0.0099	0.051	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.0095 U	0.0095	0.051	0.018	N/A	N/A	1	8533813
233'5'-TetraCB-(57)	ng/L	0.0094 U	0.0094	0.051	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.0093 U	0.0093	0.051	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.0098 U	0.0098	0.10	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.0093 U	0.0093	0.051	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.0260 J	0.0095	0.20	0.035	N/A	N/A	1	8533813
234'5'-TetraCB-(63)	ng/L	0.0091 U	0.0091	0.051	0.0080	N/A	N/A	1	8533813
234'6'-TetraCB-(64)	ng/L	0.011 U	0.011	0.051	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.0093 J	0.0089	0.051	0.0084	N/A	N/A	1	8533813
23'45'-TetraCB-(67)	ng/L	0.0078 U	0.0078	0.051	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.0085 U	0.0085	0.051	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.0091 U	0.0091	0.051	0.0082	N/A	N/A	1	8533813
23'5'6'-TetraCB-(73)	ng/L	0.0096 U	0.0096	0.051	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.0068 U	0.0068	0.051	0.011	0.000100	0.000000680	1	8533813
33'45'-TetraCB-(78)	ng/L	0.0098 U	0.0098	0.051	0.013	N/A	N/A	1	8533813
33'45'-TetraCB(79)	ng/L	0.0078 U	0.0078	0.051	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.0077 U	0.0077	0.051	0.0087	N/A	N/A	1	8533813
344'5'-TetraCB-(81)	ng/L	0.0076 U	0.0076	0.051	0.0079	0.000300	0.00000228	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'4-PentaCB-(82)	ng/L	0.013 U	0.013	0.051	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.011 U	0.011	0.10	0.033	N/A	N/A	1	8533813
22'33'6-PentaCB-(84)	ng/L	0.012 U	0.012	0.020	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.0084 U	0.0084	0.10	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.0152 J	0.0091	0.20	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.012 U	0.012	0.051	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.014 U	0.014	0.051	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.0361 J	0.0092	0.20	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.012 U	0.012	0.051	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.011 U	0.011	0.20	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.012 U	0.012	0.051	0.017	N/A	N/A	1	8533813
22'35'6-PentaCB-(95)	ng/L	0.033 J	0.012	0.051	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.010 U	0.010	0.051	0.014	N/A	N/A	1	8533813
22'45'6-PentaCB-(103)	ng/L	0.011 U	0.011	0.051	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.011 U	0.011	0.051	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.0056 U	0.0056	0.051	0.0052	0.0000300	0.00000168	1	8533813
233'45-PentaCB-(106)	ng/L	0.0073 U	0.0073	0.051	0.018	N/A	N/A	1	8533813
233'4'5-PentaCB-(107)	ng/L	0.0056 U	0.0056	0.051	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.0069 U	0.0069	0.10	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.0241 J	0.0084	0.10	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.0074 U	0.0074	0.051	0.012	N/A	N/A	1	8533813
233'56-PentaCB-(112)	ng/L	0.0071 U	0.0071	0.051	0.018	N/A	N/A	1	8533813
2344'5-PentaCB-(114)	ng/L	0.0063 U	0.0063	0.051	0.0084	0.0000300	0.00000189	1	8533813
23'44'5-PentaCB-(118)	ng/L	0.0144 J	0.0060	0.10	0.0071	0.0000300	0.00000432	1	8533813
23'455'-PentaCB-(120)	ng/L	0.0076 U	0.0076	0.051	0.014	N/A	N/A	1	8533813
23'45'6-PentaCB-(121)	ng/L	0.0078 U	0.0078	0.051	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.0091 U	0.0091	0.051	0.011	N/A	N/A	1	8533813
23'44'5'-PentaCB-(123)	ng/L	0.0067 U	0.0067	0.051	0.014	0.0000300	0.00000201	1	8533813
33'44'5-PentaCB-(126)	ng/L	0.0060 U	0.0060	0.051	0.0061	0.100	0.000600	1	8533813
33'455'-PentaCB-(127)	ng/L	0.0068 U	0.0068	0.051	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.0090 U	0.0090	0.10	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.025 J	0.010	0.20	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'45'-HexaCB-(130)	ng/L	0.011 U	0.011	0.051	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.014 U	0.014	0.051	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.012 U	0.012	0.051	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.012 U	0.012	0.051	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.013 U	0.013	0.10	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.014 U	0.014	0.10	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.010 U	0.010	0.051	0.014	N/A	N/A	1	8533813
22'344'5'-HexaCB-(137)	ng/L	0.010 U	0.010	0.10	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.0096 U	0.0096	0.10	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.010 U	0.010	0.051	0.018	N/A	N/A	1	8533813
22'3456'-HexaCB-(142)	ng/L	0.012 U	0.012	0.051	0.018	N/A	N/A	1	8533813
22'345'6'-HexaCB-(144)	ng/L	0.013 U	0.013	0.051	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.0097 U	0.0097	0.051	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.0092 U	0.0092	0.051	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.0323 J	0.0095	0.10	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.014 U	0.014	0.051	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.0096 U	0.0096	0.051	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.0099 U	0.0099	0.051	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.0253 J	0.0081	0.10	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.011 U	0.011	0.051	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.0098 U	0.0098	0.051	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.0062 U	0.0062	0.10	0.015	0.0000300	0.000000186	1	8533813
233'44'6'-HexaCB-(158)	ng/L	0.0066 U	0.0066	0.051	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.0063 U	0.0063	0.051	0.015	N/A	N/A	1	8533813
233'456'-HexaCB-(160)	ng/L	0.0083 U	0.0083	0.051	0.013	N/A	N/A	1	8533813
233'45'6'-HexaCB-(161)	ng/L	0.0077 U	0.0077	0.051	0.022	N/A	N/A	1	8533813
233'4'55'-HexaCB-(162)	ng/L	0.0062 U	0.0062	0.051	0.016	N/A	N/A	1	8533813
233'4'5'6'-HexaCB-(164)	ng/L	0.0072 U	0.0072	0.051	0.020	N/A	N/A	1	8533813
233'55'6'-HexaCB-(165)	ng/L	0.0084 U	0.0084	0.051	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.0064 U	0.0064	0.051	0.0096	0.0000300	0.000000192	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.0082 U	0.0082	0.051	0.0092	0.0300	0.000246	1	8533813
22'33'44'5'-HeptaCB-(170)	ng/L	0.0068 U	0.0068	0.051	0.011	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HeptaCB-(171)+(173)	ng/L	0.0083 U	0.0083	0.10	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.0082 U	0.0082	0.051	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.0077 U	0.0077	0.051	0.017	N/A	N/A	1	8533813
22'33'45'6-HeptaCB-(175)	ng/L	0.0094 U	0.0094	0.051	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.0068 U	0.0068	0.051	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.0085 U	0.0085	0.051	0.013	N/A	N/A	1	8533813
22'33'55'6-HeptaCB-(178)	ng/L	0.0096 U	0.0096	0.051	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.0068 U	0.0068	0.051	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.0089 J	0.0062	0.10	0.018	N/A	N/A	1	8533813
22'344'56-HeptaCB-(181)	ng/L	0.0080 U	0.0080	0.051	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.0085 U	0.0085	0.051	0.0066	N/A	N/A	1	8533813
22'344'5'6-HeptaCB-(183)	ng/L	0.0073 U	0.0073	0.051	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.0065 U	0.0065	0.051	0.0065	N/A	N/A	1	8533813
22'3455'6-HeptaCB-(185)	ng/L	0.0087 U	0.0087	0.051	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.0071 U	0.0071	0.051	0.0095	N/A	N/A	1	8533813
22'34'55'6-HeptaCB-(187)	ng/L	0.0085 U	0.0085	0.051	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.0069 U	0.0069	0.051	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.0058 U	0.0058	0.051	0.014	0.0000300	0.000000174	1	8533813
233'44'56-HeptaCB-(190)	ng/L	0.0057 U	0.0057	0.051	0.016	N/A	N/A	1	8533813
233'44'5'6-HeptaCB-(191)	ng/L	0.0057 U	0.0057	0.051	0.014	N/A	N/A	1	8533813
233'455'6-HeptaCB-(192)	ng/L	0.0063 U	0.0063	0.051	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.015 U	0.015	0.051	0.024	N/A	N/A	1	8533813
22'33'44'56-OctaCB-(195)	ng/L	0.017 U	0.017	0.051	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.017 U	0.017	0.051	0.017	N/A	N/A	1	8533813
22'33'44'66'OctaCB-(197)	ng/L	0.012 U	0.012	0.051	0.033	N/A	N/A	1	8533813
OctaCB-(198)+(199)	ng/L	0.018 U	0.018	0.10	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.014 U	0.014	0.051	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.012 U	0.012	0.051	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.013 U	0.013	0.051	0.013	N/A	N/A	1	8533813
22'344'55'6-OctaCB-(203)	ng/L	0.017 U	0.017	0.051	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.010 U	0.010	0.051	0.018	N/A	N/A	1	8533813
233'44'55'6-OctaCB-(205)	ng/L	0.011 U	0.011	0.051	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'55'6'-NonaCB-(206)	ng/L	0.020 U	0.020	0.051	0.020	N/A	N/A	1	8533813
22'33'44'566'6'-NonaCB-(207)	ng/L	0.018 U	0.018	0.051	0.018	N/A	N/A	1	8533813
22'33'455'66'6'-NonaCB-(208)	ng/L	0.016 U	0.016	0.051	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.024 U	0.024	0.051	0.015	N/A	N/A	1	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.000851	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	36	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	115	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'455'66'6'-NonaCB-(208)	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'6'-OctaCB-(202)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	101	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'6'-HeptaCB-(180)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'6'-HeptaCB-(188)	%	79	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'6'-HexaCB-(155)	%	72	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'6'-PentaCB-(104)	%	47	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'6'-TetraCB-(54)	%	35	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6'-TriCB-(19)	%	35 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	29	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-HeptaCB-(189)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'5'-PentaCB-(105)	%	62	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'6'-PentaCB-(111)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'6'-HexaCB-(167)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	54	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	54	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	54	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	15	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'6'-HexaCB-(169)	%	55	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	62	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-TetraCB-(77)	%	79	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Within criteria.



SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ250							
Sampling Date		2023/02/14 10:05				TOXIC EQUIVALENCY		# of	
	UNITS	MW3-20230214-GW-35-DUP	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-344'5-TetraCB-(81)	%	72	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'-TriCB-(37)	%	41	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	34	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	19	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	125	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	63	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.018 J	0.015	0.021	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.016 U	0.016	0.021	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.014 U	0.014	0.053	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.022 U	0.022	0.053	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0090 U	0.0090	0.053	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0089 U	0.0089	0.021	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0089 U	0.0089	0.021	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0086 J	0.0086	0.053	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0087 U	0.0087	0.021	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.011 U	0.011	0.053	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.117 J	0.0090	0.21	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0082 U	0.0082	0.053	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0090 U	0.0090	0.021	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0075 U	0.0075	0.053	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.013 U	0.013	0.053	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.011 U	0.011	0.021	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.0091 U	0.0091	0.053	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.017 U	0.017	0.021	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0084 J	0.0060	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0067 U	0.0067	0.053	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0068 U	0.0068	0.021	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0068 U	0.0068	0.021	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0083 U	0.0083	0.021	0.0043	N/A	N/A	1	8533813
2,3',4-TriCB-(25)	ng/L	0.0069 U	0.0069	0.021	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0063 U	0.0063	0.053	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0078 U	0.0078	0.021	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0060 U	0.0060	0.053	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0074 U	0.0074	0.021	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0067 U	0.0067	0.021	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0065 U	0.0065	0.021	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0060 U	0.0060	0.021	0.0052	N/A	N/A	1	8533813
3,4,4'-TriCB-(37)	ng/L	0.0058 U	0.0058	0.021	0.0041	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
345-TriCB-(38)	ng/L	0.0063 U	0.0063	0.021	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0067 U	0.0067	0.021	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.019 U	0.019	0.11	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.026 U	0.026	0.053	0.011	N/A	N/A	1	8533813
22'35-TetraCB-(43)	ng/L	0.025 U	0.025	0.053	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.020 J	0.018	0.11	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.020 U	0.020	0.053	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.022 U	0.022	0.021	0.014	N/A	N/A	1	8533813
22'45-TetraCB-(48)	ng/L	0.019 U	0.019	0.053	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.017 U	0.017	0.11	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.020 U	0.020	0.11	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.019 U	0.019	0.053	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.029 U	0.029	0.053	0.020	N/A	N/A	1	8533813
233'4-TetraCB-(55)	ng/L	0.014 U	0.014	0.053	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.013 U	0.013	0.053	0.018	N/A	N/A	1	8533813
233'5-TetraCB-(57)	ng/L	0.013 U	0.013	0.053	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.013 U	0.013	0.053	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.014 U	0.014	0.11	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.013 U	0.013	0.053	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.013 U	0.013	0.21	0.035	N/A	N/A	1	8533813
234'5-TetraCB-(63)	ng/L	0.013 U	0.013	0.053	0.0080	N/A	N/A	1	8533813
234'6-TetraCB-(64)	ng/L	0.016 U	0.016	0.053	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.012 U	0.012	0.053	0.0084	N/A	N/A	1	8533813
23'45-TetraCB-(67)	ng/L	0.011 U	0.011	0.053	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.012 U	0.012	0.053	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.013 U	0.013	0.053	0.0082	N/A	N/A	1	8533813
23'5'6-TetraCB-(73)	ng/L	0.013 U	0.013	0.053	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.0098 U	0.0098	0.053	0.011	0.000100	0.000000980	1	8533813
33'45-TetraCB-(78)	ng/L	0.014 U	0.014	0.053	0.013	N/A	N/A	1	8533813
33'45'-TetraCB(79)	ng/L	0.011 U	0.011	0.053	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.011 U	0.011	0.053	0.0087	N/A	N/A	1	8533813
344'5-TetraCB-(81)	ng/L	0.011 U	0.011	0.053	0.0079	0.000300	0.00000330	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'4-PentaCB-(82)	ng/L	0.018 U	0.018	0.053	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.015 U	0.015	0.11	0.033	N/A	N/A	1	8533813
22'33'6-PentaCB-(84)	ng/L	0.017 U	0.017	0.021	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.012 U	0.012	0.11	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.013 U	0.013	0.21	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.016 U	0.016	0.053	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.019 U	0.019	0.053	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.013 J	0.013	0.21	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.017 U	0.017	0.053	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.016 U	0.016	0.21	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.016 U	0.016	0.053	0.017	N/A	N/A	1	8533813
22'35'6-PentaCB-(95)	ng/L	0.017 U	0.017	0.053	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.014 U	0.014	0.053	0.014	N/A	N/A	1	8533813
22'45'6-PentaCB-(103)	ng/L	0.015 U	0.015	0.053	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.015 U	0.015	0.053	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.0076 U	0.0076	0.053	0.0052	0.0000300	0.000000228	1	8533813
233'45-PentaCB-(106)	ng/L	0.010 U	0.010	0.053	0.018	N/A	N/A	1	8533813
233'4'5-PentaCB-(107)	ng/L	0.0077 U	0.0077	0.053	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.0096 U	0.0096	0.11	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.012 U	0.012	0.11	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.010 U	0.010	0.053	0.012	N/A	N/A	1	8533813
233'56-PentaCB-(112)	ng/L	0.0098 U	0.0098	0.053	0.018	N/A	N/A	1	8533813
2344'5-PentaCB-(114)	ng/L	0.0089 U	0.0089	0.053	0.0084	0.0000300	0.000000267	1	8533813
23'44'5-PentaCB-(118)	ng/L	0.0084 U	0.0084	0.11	0.0071	0.0000300	0.000000252	1	8533813
23'455'-PentaCB-(120)	ng/L	0.010 U	0.010	0.053	0.014	N/A	N/A	1	8533813
23'45'6-PentaCB-(121)	ng/L	0.011 U	0.011	0.053	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.013 U	0.013	0.053	0.011	N/A	N/A	1	8533813
23'44'5'-PentaCB-(123)	ng/L	0.0093 U	0.0093	0.053	0.014	0.0000300	0.000000279	1	8533813
33'44'5-PentaCB-(126)	ng/L	0.0084 U	0.0084	0.053	0.0061	0.100	0.000840	1	8533813
33'455'-PentaCB-(127)	ng/L	0.0094 U	0.0094	0.053	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.011 U	0.011	0.11	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.012 U	0.012	0.21	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'45'-HexaCB-(130)	ng/L	0.014 U	0.014	0.053	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.017 U	0.017	0.053	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.015 U	0.015	0.053	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.015 U	0.015	0.053	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.016 U	0.016	0.11	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.017 U	0.017	0.11	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.012 U	0.012	0.053	0.014	N/A	N/A	1	8533813
22'344'5-HexaCB-(137)	ng/L	0.013 U	0.013	0.11	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.012 U	0.012	0.11	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.012 U	0.012	0.053	0.018	N/A	N/A	1	8533813
22'3456'-HexaCB-(142)	ng/L	0.015 U	0.015	0.053	0.018	N/A	N/A	1	8533813
22'345'6-HexaCB-(144)	ng/L	0.016 U	0.016	0.053	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.012 U	0.012	0.053	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.011 U	0.011	0.053	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.012 U	0.012	0.11	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.017 U	0.017	0.053	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.012 U	0.012	0.053	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.012 U	0.012	0.053	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.0099 U	0.0099	0.11	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.013 U	0.013	0.053	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.014 U	0.014	0.053	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.0078 U	0.0078	0.11	0.015	0.0000300	0.000000234	1	8533813
233'44'6-HexaCB-(158)	ng/L	0.0081 U	0.0081	0.053	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.0077 U	0.0077	0.053	0.015	N/A	N/A	1	8533813
233'456-HexaCB-(160)	ng/L	0.010 U	0.010	0.053	0.013	N/A	N/A	1	8533813
233'45'6-HexaCB-(161)	ng/L	0.0095 U	0.0095	0.053	0.022	N/A	N/A	1	8533813
233'4'55'-HexaCB-(162)	ng/L	0.0075 U	0.0075	0.053	0.016	N/A	N/A	1	8533813
233'4'5'6-HexaCB-(164)	ng/L	0.0088 U	0.0088	0.053	0.020	N/A	N/A	1	8533813
233'55'6-HexaCB-(165)	ng/L	0.010 U	0.010	0.053	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.0080 U	0.0080	0.053	0.0096	0.0000300	0.000000240	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.0083 U	0.0083	0.053	0.0092	0.0300	0.000249	1	8533813
22'33'44'5-HeptaCB-(170)	ng/L	0.0089 U	0.0089	0.053	0.011	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HeptaCB-(171)+(173)	ng/L	0.011 U	0.011	0.11	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.011 U	0.011	0.053	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.010 U	0.010	0.053	0.017	N/A	N/A	1	8533813
22'33'45'6-HeptaCB-(175)	ng/L	0.012 U	0.012	0.053	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.0090 U	0.0090	0.053	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.011 U	0.011	0.053	0.013	N/A	N/A	1	8533813
22'33'55'6-HeptaCB-(178)	ng/L	0.013 U	0.013	0.053	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.0090 U	0.0090	0.053	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.0083 U	0.0083	0.11	0.018	N/A	N/A	1	8533813
22'344'56-HeptaCB-(181)	ng/L	0.011 U	0.011	0.053	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.011 U	0.011	0.053	0.0066	N/A	N/A	1	8533813
22'344'5'6-HeptaCB-(183)	ng/L	0.0096 U	0.0096	0.053	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.0086 U	0.0086	0.053	0.0065	N/A	N/A	1	8533813
22'3455'6-HeptaCB-(185)	ng/L	0.011 U	0.011	0.053	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.0094 U	0.0094	0.053	0.0095	N/A	N/A	1	8533813
22'34'55'6-HeptaCB-(187)	ng/L	0.011 U	0.011	0.053	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.011 U	0.011	0.053	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.0067 U	0.0067	0.053	0.014	0.0000300	0.000000201	1	8533813
233'44'56-HeptaCB-(190)	ng/L	0.0076 U	0.0076	0.053	0.016	N/A	N/A	1	8533813
233'44'5'6-HeptaCB-(191)	ng/L	0.0076 U	0.0076	0.053	0.014	N/A	N/A	1	8533813
233'455'6-HeptaCB-(192)	ng/L	0.0084 U	0.0084	0.053	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.0063 U	0.0063	0.053	0.024	N/A	N/A	1	8533813
22'33'44'56-OctaCB-(195)	ng/L	0.0071 U	0.0071	0.053	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.0072 U	0.0072	0.053	0.017	N/A	N/A	1	8533813
22'33'44'66'-OctaCB-(197)	ng/L	0.0050 U	0.0050	0.053	0.033	N/A	N/A	1	8533813
OctaCB-(198)+(199)	ng/L	0.0077 U	0.0077	0.11	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.0060 U	0.0060	0.053	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.0051 U	0.0051	0.053	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.0059 U	0.0059	0.053	0.013	N/A	N/A	1	8533813
22'344'55'6-OctaCB-(203)	ng/L	0.0072 U	0.0072	0.053	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.0044 U	0.0044	0.053	0.018	N/A	N/A	1	8533813
233'44'55'6-OctaCB-(205)	ng/L	0.0043 U	0.0043	0.053	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'55'6'-NonaCB-(206)	ng/L	0.0078 U	0.0078	0.053	0.020	N/A	N/A	1	8533813
22'33'44'56'6'-NonaCB-(207)	ng/L	0.0071 U	0.0071	0.053	0.018	N/A	N/A	1	8533813
22'33'45'56'6'-NonaCB-(208)	ng/L	0.0068 U	0.0068	0.053	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.0063 U	0.0063	0.053	0.015	N/A	N/A	1	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.00109	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	48	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	115	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'45'56'6'-NonaCB-(208)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'-OctaCB-(202)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'-HeptaCB-(180)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'-HeptaCB-(188)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'-HexaCB-(155)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'-PentaCB-(104)	%	60	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'-TetraCB-(54)	%	51	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6-TriCB-(19)	%	48	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	44	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'-HeptaCB-(189)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'-PentaCB-(105)	%	77	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'-PentaCB-(111)	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'-HexaCB-(167)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	64	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	30	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'-HexaCB-(169)	%	79	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'-TetraCB-(77)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'5'-TetraCB-(81)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ251							
Sampling Date		2023/02/14 12:51				TOXIC EQUIVALENCY		# of	
	UNITS	MW5-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-344'-TriCB-(37)	%	55	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	51	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	33	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	131	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.024	0.019	0.022	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.019 U	0.019	0.022	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.017 U	0.017	0.056	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.022 U	0.022	0.056	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0098 U	0.0098	0.056	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0096 U	0.0096	0.022	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0097 U	0.0097	0.022	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0093 U	0.0093	0.056	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0095 U	0.0095	0.022	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.012 U	0.012	0.056	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.0738 J	0.0098	0.22	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0090 U	0.0090	0.056	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0098 U	0.0098	0.022	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0084 U	0.0084	0.056	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.015 U	0.015	0.056	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.012 U	0.012	0.022	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.010 U	0.010	0.056	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.019 U	0.019	0.022	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0095 J	0.0068	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0076 U	0.0076	0.056	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0076 U	0.0076	0.022	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0077 U	0.0077	0.022	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0094 U	0.0094	0.022	0.0043	N/A	N/A	1	8533813
2,3',4-TriCB-(25)	ng/L	0.0078 U	0.0078	0.022	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0071 U	0.0071	0.056	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0088 U	0.0088	0.022	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0076 J	0.0067	0.056	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0084 U	0.0084	0.022	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0076 U	0.0076	0.022	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0074 U	0.0074	0.022	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0068 U	0.0068	0.022	0.0052	N/A	N/A	1	8533813
3,4,4'-TriCB-(37)	ng/L	0.0067 U	0.0067	0.022	0.0041	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
345-TriCB-(38)	ng/L	0.0071 U	0.0071	0.022	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0075 U	0.0075	0.022	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.019 U	0.019	0.11	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.026 U	0.026	0.056	0.011	N/A	N/A	1	8533813
22'35-TetraCB-(43)	ng/L	0.025 U	0.025	0.056	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.018 U	0.018	0.11	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.020 U	0.020	0.056	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.022 U	0.022	0.022	0.014	N/A	N/A	1	8533813
22'45-TetraCB-(48)	ng/L	0.019 U	0.019	0.056	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.017 U	0.017	0.11	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.020 U	0.020	0.11	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.019 U	0.019	0.056	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.034 U	0.034	0.056	0.020	N/A	N/A	1	8533813
233'4-TetraCB-(55)	ng/L	0.014 U	0.014	0.056	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.013 U	0.013	0.056	0.018	N/A	N/A	1	8533813
233'5-TetraCB-(57)	ng/L	0.013 U	0.013	0.056	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.013 U	0.013	0.056	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.014 U	0.014	0.11	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.013 U	0.013	0.056	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.013 U	0.013	0.22	0.035	N/A	N/A	1	8533813
234'5-TetraCB-(63)	ng/L	0.013 U	0.013	0.056	0.0080	N/A	N/A	1	8533813
234'6-TetraCB-(64)	ng/L	0.016 U	0.016	0.056	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.012 U	0.012	0.056	0.0084	N/A	N/A	1	8533813
23'45-TetraCB-(67)	ng/L	0.011 U	0.011	0.056	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.012 U	0.012	0.056	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.013 U	0.013	0.056	0.0082	N/A	N/A	1	8533813
23'5'6-TetraCB-(73)	ng/L	0.013 U	0.013	0.056	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.0097 U	0.0097	0.056	0.011	0.000100	0.000000970	1	8533813
33'45-TetraCB-(78)	ng/L	0.014 U	0.014	0.056	0.013	N/A	N/A	1	8533813
33'45'-TetraCB(79)	ng/L	0.011 U	0.011	0.056	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.011 U	0.011	0.056	0.0087	N/A	N/A	1	8533813
344'5-TetraCB-(81)	ng/L	0.011 U	0.011	0.056	0.0079	0.000300	0.00000330	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'4-PentaCB-(82)	ng/L	0.018 U	0.018	0.056	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.015 U	0.015	0.11	0.033	N/A	N/A	1	8533813
22'33'6-PentaCB-(84)	ng/L	0.016 U	0.016	0.022	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.012 U	0.012	0.11	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.012 U	0.012	0.22	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.016 U	0.016	0.056	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.019 U	0.019	0.056	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.018 J	0.013	0.22	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.017 U	0.017	0.056	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.016 U	0.016	0.22	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.016 U	0.016	0.056	0.017	N/A	N/A	1	8533813
22'35'6-PentaCB-(95)	ng/L	0.017 U	0.017	0.056	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.014 U	0.014	0.056	0.014	N/A	N/A	1	8533813
22'45'6-PentaCB-(103)	ng/L	0.015 U	0.015	0.056	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.016 U	0.016	0.056	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.0077 U	0.0077	0.056	0.0052	0.0000300	0.000000231	1	8533813
233'45-PentaCB-(106)	ng/L	0.010 U	0.010	0.056	0.018	N/A	N/A	1	8533813
233'4'5-PentaCB-(107)	ng/L	0.0077 U	0.0077	0.056	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.0095 U	0.0095	0.11	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.015 J	0.012	0.11	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.010 U	0.010	0.056	0.012	N/A	N/A	1	8533813
233'56-PentaCB-(112)	ng/L	0.0098 U	0.0098	0.056	0.018	N/A	N/A	1	8533813
2344'5-PentaCB-(114)	ng/L	0.0085 U	0.0085	0.056	0.0084	0.0000300	0.000000255	1	8533813
23'44'5-PentaCB-(118)	ng/L	0.0082 U	0.0082	0.11	0.0071	0.0000300	0.000000246	1	8533813
23'455'-PentaCB-(120)	ng/L	0.010 U	0.010	0.056	0.014	N/A	N/A	1	8533813
23'45'6-PentaCB-(121)	ng/L	0.011 U	0.011	0.056	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.012 U	0.012	0.056	0.011	N/A	N/A	1	8533813
23'44'5'-PentaCB-(123)	ng/L	0.0091 U	0.0091	0.056	0.014	0.0000300	0.000000273	1	8533813
33'44'5-PentaCB-(126)	ng/L	0.0083 U	0.0083	0.056	0.0061	0.100	0.000830	1	8533813
33'455'-PentaCB-(127)	ng/L	0.0094 U	0.0094	0.056	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.0099 U	0.0099	0.11	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.011 U	0.011	0.22	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'45'-HexaCB-(130)	ng/L	0.012 U	0.012	0.056	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.015 U	0.015	0.056	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.013 U	0.013	0.056	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.013 U	0.013	0.056	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.014 U	0.014	0.11	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.015 U	0.015	0.11	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.011 U	0.011	0.056	0.014	N/A	N/A	1	8533813
22'344'5-HexaCB-(137)	ng/L	0.012 U	0.012	0.11	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.011 U	0.011	0.11	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.011 U	0.011	0.056	0.018	N/A	N/A	1	8533813
22'3456'-HexaCB-(142)	ng/L	0.014 U	0.014	0.056	0.018	N/A	N/A	1	8533813
22'345'6-HexaCB-(144)	ng/L	0.015 U	0.015	0.056	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.011 U	0.011	0.056	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.010 U	0.010	0.056	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.013 J	0.011	0.11	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.015 U	0.015	0.056	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.011 U	0.011	0.056	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.011 U	0.011	0.056	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.0128 J	0.0090	0.11	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.012 U	0.012	0.056	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.014 U	0.014	0.056	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.0063 U	0.0063	0.11	0.015	0.0000300	0.000000189	1	8533813
233'44'6-HexaCB-(158)	ng/L	0.0073 U	0.0073	0.056	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.0070 U	0.0070	0.056	0.015	N/A	N/A	1	8533813
233'456-HexaCB-(160)	ng/L	0.0092 U	0.0092	0.056	0.013	N/A	N/A	1	8533813
233'45'6-HexaCB-(161)	ng/L	0.0086 U	0.0086	0.056	0.022	N/A	N/A	1	8533813
233'4'55'-HexaCB-(162)	ng/L	0.0068 U	0.0068	0.056	0.016	N/A	N/A	1	8533813
233'4'5'6-HexaCB-(164)	ng/L	0.0080 U	0.0080	0.056	0.020	N/A	N/A	1	8533813
233'55'6-HexaCB-(165)	ng/L	0.0094 U	0.0094	0.056	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.0071 U	0.0071	0.056	0.0096	0.0000300	0.000000213	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.0098 U	0.0098	0.056	0.0092	0.0300	0.000294	1	8533813
22'33'44'5-HeptaCB-(170)	ng/L	0.0092 U	0.0092	0.056	0.011	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HeptaCB-(171)+(173)	ng/L	0.011 U	0.011	0.11	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.011 U	0.011	0.056	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.010 U	0.010	0.056	0.017	N/A	N/A	1	8533813
22'33'45'6-HeptaCB-(175)	ng/L	0.013 U	0.013	0.056	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.0093 U	0.0093	0.056	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.012 U	0.012	0.056	0.013	N/A	N/A	1	8533813
22'33'55'6-HeptaCB-(178)	ng/L	0.013 U	0.013	0.056	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.0092 U	0.0092	0.056	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.0085 U	0.0085	0.11	0.018	N/A	N/A	1	8533813
22'344'56-HeptaCB-(181)	ng/L	0.011 U	0.011	0.056	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.012 U	0.012	0.056	0.0066	N/A	N/A	1	8533813
22'344'5'6-HeptaCB-(183)	ng/L	0.0099 U	0.0099	0.056	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.0088 U	0.0088	0.056	0.0065	N/A	N/A	1	8533813
22'3455'6-HeptaCB-(185)	ng/L	0.012 U	0.012	0.056	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.0096 U	0.0096	0.056	0.0095	N/A	N/A	1	8533813
22'34'55'6-HeptaCB-(187)	ng/L	0.012 U	0.012	0.056	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.0098 U	0.0098	0.056	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.0076 U	0.0076	0.056	0.014	0.0000300	0.000000228	1	8533813
233'44'56-HeptaCB-(190)	ng/L	0.0078 U	0.0078	0.056	0.016	N/A	N/A	1	8533813
233'44'5'6-HeptaCB-(191)	ng/L	0.0078 U	0.0078	0.056	0.014	N/A	N/A	1	8533813
233'455'6-HeptaCB-(192)	ng/L	0.0086 U	0.0086	0.056	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.019 U	0.019	0.056	0.024	N/A	N/A	1	8533813
22'33'44'56-OctaCB-(195)	ng/L	0.022 U	0.022	0.056	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.022 U	0.022	0.056	0.017	N/A	N/A	1	8533813
22'33'44'66'-OctaCB-(197)	ng/L	0.015 U	0.015	0.056	0.033	N/A	N/A	1	8533813
OctaCB-(198)+(199)	ng/L	0.023 U	0.023	0.11	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.018 U	0.018	0.056	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.015 U	0.015	0.056	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.015 U	0.015	0.056	0.013	N/A	N/A	1	8533813
22'344'55'6-OctaCB-(203)	ng/L	0.022 U	0.022	0.056	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.013 U	0.013	0.056	0.018	N/A	N/A	1	8533813
233'44'55'6-OctaCB-(205)	ng/L	0.015 U	0.015	0.056	0.014	N/A	N/A	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252								
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of		
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
22'33'44'55'6'-NonaCB-(206)	ng/L	0.029 U	0.029	0.056	0.020	N/A	N/A	1	8533813	
22'33'44'56'6'-NonaCB-(207)	ng/L	0.025 U	0.025	0.056	0.018	N/A	N/A	1	8533813	
22'33'45'56'6'-NonaCB-(208)	ng/L	0.023 U	0.023	0.056	0.021	N/A	N/A	1	8533813	
DecaCB-(209)	ng/L	0.027 U	0.027	0.056	0.015	N/A	N/A	1	8533813	
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.00113	N/A	N/A	
Surrogate Recovery (%)										
C13-2,44'-TriCB-(28)	%	34	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'33'44'55'6'-NonaCB-(206)	%	115	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'33'44'5'-HeptaCB-(170)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'33'45'56'6'-NonaCB-(208)	%	104	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'33'55'66'-OctaCB-(202)	%	124	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'33'55'6'-HeptaCB-(178)	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'344'55'-HeptaCB-(180)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'34'566'-HeptaCB-(188)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'44'66'-HexaCB-(155)	%	67	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'466'-PentaCB-(104)	%	47	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'66'-TetraCB-(54)	%	37	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'6-TriCB-(19)	%	39 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-22'-DiCB-(4)	%	34	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-233'44'55'6'-OctaCB-(205)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-233'44'55'-HeptaCB-(189)	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-233'44'-PentaCB-(105)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-233'55'-PentaCB-(111)	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-23'44'55'-HexaCB-(167)	%	73	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-2344'5'-PentaCB-(114)	%	57	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-23'44'5'-PentaCB-(118)	%	56	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-2'344'5'-PentaCB-(123)	%	57	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-2-MonoCB-(1)	%	20	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-33'44'55'-HexaCB-(169)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-33'44'5'-PentaCB-(126)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813	
C13-33'44'-TetraCB-(77)	%	78	N/A	N/A	N/A	N/A	N/A	N/A	8533813	

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Within criteria.



SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ252							
Sampling Date		2023/02/14 14:37				TOXIC EQUIVALENCY		# of	
	UNITS	MW4-20230214-GW-40	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-344'5-TetraCB-(81)	%	73	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'-TriCB-(37)	%	41	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	35	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	23	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	126	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253							
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of	
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.042	0.013	0.020	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.013 U	0.013	0.020	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.011 U	0.011	0.050	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.017 J	0.014	0.050	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0063 U	0.0063	0.050	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0062 U	0.0062	0.020	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0062 U	0.0062	0.020	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0203 J	0.0060	0.050	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0061 U	0.0061	0.020	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.0078 U	0.0078	0.050	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.139 J	0.0063	0.20	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0058 U	0.0058	0.050	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0063 U	0.0063	0.020	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0092 J	0.0053	0.050	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.010 U	0.010	0.050	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.0084 U	0.0084	0.020	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.0131 J	0.0073	0.050	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.014 U	0.014	0.020	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0048 U	0.0048	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0168 J	0.0053	0.050	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0054 U	0.0054	0.020	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0054 U	0.0054	0.020	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0066 U	0.0066	0.020	0.0043	N/A	N/A	1	8533813
2,3',4-TriCB-(25)	ng/L	0.0055 U	0.0055	0.020	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0050 U	0.0050	0.050	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0062 U	0.0062	0.020	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0048 U	0.0048	0.050	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0059 U	0.0059	0.020	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0053 U	0.0053	0.020	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0052 U	0.0052	0.020	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0048 U	0.0048	0.020	0.0052	N/A	N/A	1	8533813
3,4,4'-TriCB-(37)	ng/L	0.0101 J	0.0046	0.020	0.0041	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253							
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of	
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
345-TriCB-(38)	ng/L	0.0050 U	0.0050	0.020	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0053 U	0.0053	0.020	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.014 U	0.014	0.10	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.020 U	0.020	0.050	0.011	N/A	N/A	1	8533813
22'35'-TetraCB-(43)	ng/L	0.019 U	0.019	0.050	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.037 J	0.014	0.10	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.015 U	0.015	0.050	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.017 U	0.017	0.020	0.014	N/A	N/A	1	8533813
22'45'-TetraCB-(48)	ng/L	0.015 U	0.015	0.050	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.017 J	0.013	0.10	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.015 U	0.015	0.10	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.038 J	0.015	0.050	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.023 U	0.023	0.050	0.020	N/A	N/A	1	8533813
233'4'-TetraCB-(55)	ng/L	0.010 U	0.010	0.050	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.010 U	0.010	0.050	0.018	N/A	N/A	1	8533813
233'5'-TetraCB-(57)	ng/L	0.010 U	0.010	0.050	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.0099 U	0.0099	0.050	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.010 U	0.010	0.10	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.0098 U	0.0098	0.050	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.047 J	0.010	0.20	0.035	N/A	N/A	1	8533813
234'5'-TetraCB-(63)	ng/L	0.0096 U	0.0096	0.050	0.0080	N/A	N/A	1	8533813
234'6'-TetraCB-(64)	ng/L	0.012 U	0.012	0.050	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.0204 J	0.0095	0.050	0.0084	N/A	N/A	1	8533813
23'45'-TetraCB-(67)	ng/L	0.0083 U	0.0083	0.050	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.0090 U	0.0090	0.050	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.0097 U	0.0097	0.050	0.0082	N/A	N/A	1	8533813
23'5'6'-TetraCB-(73)	ng/L	0.010 U	0.010	0.050	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.0090 J	0.0074	0.050	0.011	0.000100	0.000000900	1	8533813
33'45'-TetraCB-(78)	ng/L	0.010 U	0.010	0.050	0.013	N/A	N/A	1	8533813
33'45'-TetraCB(79)	ng/L	0.0083 U	0.0083	0.050	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.0081 U	0.0081	0.050	0.0087	N/A	N/A	1	8533813
344'5'-TetraCB-(81)	ng/L	0.0083 U	0.0083	0.050	0.0079	0.000300	0.00000249	1	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253								
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of		
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
22'33'4-PentaCB-(82)	ng/L	0.014 U	0.014	0.050	0.014	N/A	N/A	1	8533813	
PentaCB-(83)+(99)	ng/L	0.012 U	0.012	0.10	0.033	N/A	N/A	1	8533813	
22'33'6-PentaCB-(84)	ng/L	0.013 U	0.013	0.020	0.0088	N/A	N/A	1	8533813	
PentaCB-(85)+(116)+(117)	ng/L	0.0091 U	0.0091	0.10	0.040	N/A	N/A	1	8533813	
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.0098 U	0.0098	0.20	0.080	N/A	N/A	1	8533813	
PentaCB-(88)+(91)	ng/L	0.012 U	0.012	0.050	0.025	N/A	N/A	1	8533813	
22'346'-PentaCB-(89)	ng/L	0.015 U	0.015	0.050	0.0040	N/A	N/A	1	8533813	
PentaCB-(90)+(101)+(113)	ng/L	0.0692 J	0.0099	0.20	0.0080	N/A	N/A	1	8533813	
22'355'-PentaCB-(92)	ng/L	0.013 U	0.013	0.050	0.010	N/A	N/A	1	8533813	
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.012 U	0.012	0.20	0.051	N/A	N/A	1	8533813	
22'356'-PentaCB-(94)	ng/L	0.013 U	0.013	0.050	0.017	N/A	N/A	1	8533813	
22'35'6-PentaCB-(95)	ng/L	0.058	0.013	0.050	0.011	N/A	N/A	1	8533813	
22'366'-PentaCB-(96)	ng/L	0.011 U	0.011	0.050	0.014	N/A	N/A	1	8533813	
22'45'6-PentaCB-(103)	ng/L	0.012 U	0.012	0.050	0.012	N/A	N/A	1	8533813	
22'466'-PentaCB-(104)	ng/L	0.011 U	0.011	0.050	0.022	N/A	N/A	1	8533813	
233'44'-PentaCB-(105)	ng/L	0.0178 J	0.0060	0.050	0.0052	0.0000300	0.000000534	1	8533813	
233'45-PentaCB-(106)	ng/L	0.0079 U	0.0079	0.050	0.018	N/A	N/A	1	8533813	
233'4'5-PentaCB-(107)	ng/L	0.0060 U	0.0060	0.050	0.014	N/A	N/A	1	8533813	
PentaCB-(108)+(124)	ng/L	0.0075 U	0.0075	0.10	0.023	N/A	N/A	1	8533813	
PentaCB-(110)+(115)	ng/L	0.0521 J	0.0090	0.10	0.022	N/A	N/A	1	8533813	
233'55'-PentaCB-(111)	ng/L	0.0080 U	0.0080	0.050	0.012	N/A	N/A	1	8533813	
233'56-PentaCB-(112)	ng/L	0.0076 U	0.0076	0.050	0.018	N/A	N/A	1	8533813	
2344'5-PentaCB-(114)	ng/L	0.0070 U	0.0070	0.050	0.0084	0.0000300	0.000000210	1	8533813	
23'44'5-PentaCB-(118)	ng/L	0.0314 J	0.0066	0.10	0.0071	0.0000300	0.000000942	1	8533813	
23'455'-PentaCB-(120)	ng/L	0.0082 U	0.0082	0.050	0.014	N/A	N/A	1	8533813	
23'45'6-PentaCB-(121)	ng/L	0.0084 U	0.0084	0.050	0.0040	N/A	N/A	1	8533813	
233'4'5'-PentaCB-(122)	ng/L	0.0098 U	0.0098	0.050	0.011	N/A	N/A	1	8533813	
23'44'5'-PentaCB-(123)	ng/L	0.0073 U	0.0073	0.050	0.014	0.0000300	0.000000219	1	8533813	
33'44'5-PentaCB-(126)	ng/L	0.0067 U	0.0067	0.050	0.0061	0.100	0.000670	1	8533813	
33'455'-PentaCB-(127)	ng/L	0.0073 U	0.0073	0.050	0.017	N/A	N/A	1	8533813	
HexaCB-(128)+(166)	ng/L	0.0099 U	0.0099	0.10	0.026	N/A	N/A	1	8533813	
HexaCB-(129)+(138)+(163)	ng/L	0.056 J	0.011	0.20	0.014	N/A	N/A	1	8533813	

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253								
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of		
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
22'33'45'-HexaCB-(130)	ng/L	0.012 U	0.012	0.050	0.020	N/A	N/A	1	8533813	
22'33'46'-HexaCB-(131)	ng/L	0.015 U	0.015	0.050	0.019	N/A	N/A	1	8533813	
22'33'46'-HexaCB-(132)	ng/L	0.019 J	0.013	0.050	0.019	N/A	N/A	1	8533813	
22'33'55'-HexaCB-(133)	ng/L	0.013 U	0.013	0.050	0.017	N/A	N/A	1	8533813	
HexaCB-(134)+(143)	ng/L	0.014 U	0.014	0.10	0.028	N/A	N/A	1	8533813	
HexaCB-(135)+(151)	ng/L	0.038 J	0.015	0.10	0.038	N/A	N/A	1	8533813	
22'33'66'-HexaCB-(136)	ng/L	0.011 U	0.011	0.050	0.014	N/A	N/A	1	8533813	
22'344'5'-HexaCB-(137)	ng/L	0.012 U	0.012	0.10	0.014	N/A	N/A	1	8533813	
HexaCB-(139)+(140)	ng/L	0.011 U	0.011	0.10	0.032	N/A	N/A	1	8533813	
22'3455'-HexaCB-(141)	ng/L	0.014 J	0.011	0.050	0.018	N/A	N/A	1	8533813	
22'3456'-HexaCB-(142)	ng/L	0.014 U	0.014	0.050	0.018	N/A	N/A	1	8533813	
22'345'6'-HexaCB-(144)	ng/L	0.015 U	0.015	0.050	0.011	N/A	N/A	1	8533813	
22'3466'-HexaCB-(145)	ng/L	0.011 U	0.011	0.050	0.022	N/A	N/A	1	8533813	
22'34'55'-HexaCB-(146)	ng/L	0.010 U	0.010	0.050	0.014	N/A	N/A	1	8533813	
HexaCB-(147)+(149)	ng/L	0.063 J	0.010	0.10	0.027	N/A	N/A	1	8533813	
22'34'56'-HexaCB-(148)	ng/L	0.015 U	0.015	0.050	0.013	N/A	N/A	1	8533813	
22'34'66'-HexaCB-(150)	ng/L	0.011 U	0.011	0.050	0.022	N/A	N/A	1	8533813	
22'3566'-HexaCB-(152)	ng/L	0.011 U	0.011	0.050	0.020	N/A	N/A	1	8533813	
HexaCB-(153)+(168)	ng/L	0.0594 J	0.0089	0.10	0.028	N/A	N/A	1	8533813	
22'44'56'-HexaCB-(154)	ng/L	0.012 U	0.012	0.050	0.014	N/A	N/A	1	8533813	
22'44'66'-HexaCB-(155)	ng/L	0.011 U	0.011	0.050	0.013	N/A	N/A	1	8533813	
HexaCB-(156)+(157)	ng/L	0.0071 U	0.0071	0.10	0.015	0.0000300	0.000000213	1	8533813	
233'44'6'-HexaCB-(158)	ng/L	0.0073 U	0.0073	0.050	0.017	N/A	N/A	1	8533813	
233'455'-HexaCB-(159)	ng/L	0.0069 U	0.0069	0.050	0.015	N/A	N/A	1	8533813	
233'456'-HexaCB-(160)	ng/L	0.0092 U	0.0092	0.050	0.013	N/A	N/A	1	8533813	
233'45'6'-HexaCB-(161)	ng/L	0.0085 U	0.0085	0.050	0.022	N/A	N/A	1	8533813	
233'4'55'-HexaCB-(162)	ng/L	0.0068 U	0.0068	0.050	0.016	N/A	N/A	1	8533813	
233'4'5'6'-HexaCB-(164)	ng/L	0.0079 U	0.0079	0.050	0.020	N/A	N/A	1	8533813	
233'55'6'-HexaCB-(165)	ng/L	0.0093 U	0.0093	0.050	0.022	N/A	N/A	1	8533813	
23'44'55'-HexaCB-(167)	ng/L	0.0072 U	0.0072	0.050	0.0096	0.0000300	0.000000216	1	8533813	
33'44'55'-HexaCB-(169)	ng/L	0.0083 U	0.0083	0.050	0.0092	0.0300	0.000249	1	8533813	
22'33'44'5'-HeptaCB-(170)	ng/L	0.0078 U	0.0078	0.050	0.011	N/A	N/A	1	8533813	

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253								
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of		
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	
HeptaCB-(171)+(173)	ng/L	0.0095 U	0.0095	0.10	0.027	N/A	N/A	1	8533813	
22'33'455'-HeptaCB-(172)	ng/L	0.0093 U	0.0093	0.050	0.012	N/A	N/A	1	8533813	
22'33'456'-HeptaCB-(174)	ng/L	0.0101 J	0.0088	0.050	0.017	N/A	N/A	1	8533813	
22'33'45'6-HeptaCB-(175)	ng/L	0.011 U	0.011	0.050	0.0064	N/A	N/A	1	8533813	
22'33'466'-HeptaCB-(176)	ng/L	0.0078 U	0.0078	0.050	0.0079	N/A	N/A	1	8533813	
22'33'45'6'-HeptaCB-(177)	ng/L	0.0097 U	0.0097	0.050	0.013	N/A	N/A	1	8533813	
22'33'55'6-HeptaCB-(178)	ng/L	0.011 U	0.011	0.050	0.0071	N/A	N/A	1	8533813	
22'33'566'-HeptaCB-(179)	ng/L	0.0090 J	0.0078	0.050	0.010	N/A	N/A	1	8533813	
HeptaCB-(180)+(193)	ng/L	0.0180 J	0.0071	0.10	0.018	N/A	N/A	1	8533813	
22'344'56-HeptaCB-(181)	ng/L	0.0091 U	0.0091	0.050	0.015	N/A	N/A	1	8533813	
22'344'56'-HeptaCB-(182)	ng/L	0.0097 U	0.0097	0.050	0.0066	N/A	N/A	1	8533813	
22'344'5'6-HeptaCB-(183)	ng/L	0.0090 J	0.0083	0.050	0.017	N/A	N/A	1	8533813	
22'344'66'-HeptaCB-(184)	ng/L	0.0074 U	0.0074	0.050	0.0065	N/A	N/A	1	8533813	
22'3455'6-HeptaCB-(185)	ng/L	0.0099 U	0.0099	0.050	0.017	N/A	N/A	1	8533813	
22'34566'-HeptaCB-(186)	ng/L	0.0081 U	0.0081	0.050	0.0095	N/A	N/A	1	8533813	
22'34'55'6-HeptaCB-(187)	ng/L	0.0191 J	0.0097	0.050	0.0047	N/A	N/A	1	8533813	
22'34'566'-HeptaCB-(188)	ng/L	0.0080 U	0.0080	0.050	0.015	N/A	N/A	1	8533813	
233'44'55'-HeptaCB-(189)	ng/L	0.0063 U	0.0063	0.050	0.014	0.0000300	0.000000189	1	8533813	
233'44'56-HeptaCB-(190)	ng/L	0.0065 U	0.0065	0.050	0.016	N/A	N/A	1	8533813	
233'44'5'6-HeptaCB-(191)	ng/L	0.0065 U	0.0065	0.050	0.014	N/A	N/A	1	8533813	
233'455'6-HeptaCB-(192)	ng/L	0.0072 U	0.0072	0.050	0.0088	N/A	N/A	1	8533813	
22'33'44'55'-OctaCB-(194)	ng/L	0.011 U	0.011	0.050	0.024	N/A	N/A	1	8533813	
22'33'44'56-OctaCB-(195)	ng/L	0.012 U	0.012	0.050	0.019	N/A	N/A	1	8533813	
22'33'44'56'-OctaCB-(196)	ng/L	0.012 U	0.012	0.050	0.017	N/A	N/A	1	8533813	
22'33'44'66'OctaCB-(197)	ng/L	0.0085 U	0.0085	0.050	0.033	N/A	N/A	1	8533813	
OctaCB-(198)+(199)	ng/L	0.013 U	0.013	0.10	0.028	N/A	N/A	1	8533813	
22'33'4566'-OctaCB-(200)	ng/L	0.010 U	0.010	0.050	0.031	N/A	N/A	1	8533813	
22'33'45'66'-OctaCB-(201)	ng/L	0.0088 U	0.0088	0.050	0.014	N/A	N/A	1	8533813	
22'33'55'66'-OctaCB-(202)	ng/L	0.0094 U	0.0094	0.050	0.013	N/A	N/A	1	8533813	
22'344'55'6-OctaCB-(203)	ng/L	0.012 U	0.012	0.050	0.021	N/A	N/A	1	8533813	
22'344'566'-OctaCB-(204)	ng/L	0.0076 U	0.0076	0.050	0.018	N/A	N/A	1	8533813	
233'44'55'6-OctaCB-(205)	ng/L	0.0078 U	0.0078	0.050	0.014	N/A	N/A	1	8533813	

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253							
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of	
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'55'6'-NonaCB-(206)	ng/L	0.026 U	0.026	0.050	0.020	N/A	N/A	1	8533813
22'33'44'566'-NonaCB-(207)	ng/L	0.023 U	0.023	0.050	0.018	N/A	N/A	1	8533813
22'33'455'66'-NonaCB-(208)	ng/L	0.021 U	0.021	0.050	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.025 U	0.025	0.050	0.015	N/A	N/A	1	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.000925	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	38	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	109	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'455'66'-NonaCB-(208)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'-OctaCB-(202)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'-HeptaCB-(180)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'-HeptaCB-(188)	%	77	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'-HexaCB-(155)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'-PentaCB-(104)	%	57	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'-TetraCB-(54)	%	43	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6-TriCB-(19)	%	42	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	37	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'-HeptaCB-(189)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'-PentaCB-(105)	%	68	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'-PentaCB-(111)	%	82	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'-HexaCB-(167)	%	62	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	56	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	57	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	57	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	21	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'-HexaCB-(169)	%	62	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	65	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'-TetraCB-(77)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'5'-TetraCB-(81)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VBZ253							
Sampling Date		2023/02/14 16:17				TOXIC EQUIVALENCY		# of	
	UNITS	MW6-20230214-GW-40.25	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-344'-TriCB-(37)	%	48	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	41	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	25	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	122	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	64	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



TEST SUMMARY

Bureau Veritas ID: VBZ249
Sample ID: MW3-20230214-GW-35
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8513671	2023/02/21	2023/02/24	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/03/05	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8519276	2023/02/23	2023/02/25	Erik Slemper

Bureau Veritas ID: VBZ250
Sample ID: MW3-20230214-GW-35-DUP
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8513671	2023/02/21	2023/02/24	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/03/05	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8519276	2023/02/23	2023/02/25	Erik Slemper

Bureau Veritas ID: VBZ251
Sample ID: MW5-20230214-GW-40
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8513671	2023/02/21	2023/02/24	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/03/06	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8519276	2023/02/23	2023/02/25	Erik Slemper

Bureau Veritas ID: VBZ251 Dup
Sample ID: MW5-20230214-GW-40
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
OC Pesticides in Water by GCTQ	GCTQ/MS	8513671	2023/02/21	2023/02/24	Chau Ting (Ruth) Chan

Bureau Veritas ID: VBZ252
Sample ID: MW4-20230214-GW-40
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8513671	2023/02/21	2023/02/24	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/03/05	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8519276	2023/02/23	2023/02/25	Erik Slemper



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

TEST SUMMARY

Bureau Veritas ID: VBZ253
Sample ID: MW6-20230214-GW-40.25
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8513671	2023/02/21	2023/02/24	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/03/05	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8519276	2023/02/23	2023/02/25	Erik Slemper

Bureau Veritas ID: VBZ254
Sample ID: FIELD BLANK-02
Matrix: Water

Collected: 2023/02/14
Shipped:
Received: 2023/02/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	8519276	2023/02/23	2023/02/25	Erik Slemper



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.0°C
Package 2	3.1°C
Package 3	4.5°C
Package 4	4.9°C

Revised Report (2023/5/17): Added additional parameters (full list) for PFAS.

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

PCB Congeners in Water (1668C): Worksheet Blank contains some traces of PCB congeners natives that are above the RDL. However, all samples in worksheet (8533813) shows trace concentration levels below RDL. Results should be reviewed with caution.

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8513671	CTC	Matrix Spike(VBZ250)	13C10-cis Nonachlor	2023/02/23	77	%	36 - 139		
			13C10-Heptachlor	2023/02/23	161 (1)	%	5 - 120		
			13C10-Heptachlor Epoxide	2023/02/23	105	%	27 - 137		
			13C10-Oxychlordane	2023/02/23	101	%	23 - 135		
			13C10-trans Nonachlor	2023/02/23	88	%	14 - 136		
			13C12-Endrin	2023/02/23	117	%	35 - 155		
			13C12-Endrin Ketone	2023/02/23	57	%	35 - 155		
			13C6-beta BHC	2023/02/23	71	%	32 - 130		
			13C6-d6-gamma BHC (Lindane)	2023/02/23	78	%	11 - 120		
			13C-Methoxychlor	2023/02/23	132 (1)	%	5 - 120		
			13C-pp-DDD	2023/02/23	94	%	5 - 120		
			13C-pp-DDE	2023/02/23	78	%	47 - 160		
			13C-pp-DDT	2023/02/23	73	%	5 - 120		
			C13-Hexachlorobenzene	2023/02/23	75	%	5 - 120		
			Aldrin	2023/02/23	51	%	50 - 200		
			alpha-BHC	2023/02/23	119	%	50 - 200		
			delta-BHC	2023/02/23	118	%	50 - 200		
			beta-BHC	2023/02/23	125	%	50 - 200		
			Lindane	2023/02/23	118	%	50 - 200		
			a-Chlordane	2023/02/23	138	%	50 - 200		
			g-Chlordane	2023/02/23	134	%	50 - 200		
			Oxychlordane	2023/02/23	104	%	50 - 200		
			o,p-DDD	2023/02/23	122	%	50 - 200		
			p,p-DDD	2023/02/23	124	%	50 - 200		
			o,p-DDE	2023/02/23	112	%	50 - 200		
			p,p-DDE	2023/02/23	112	%	50 - 200		
			o,p-DDT	2023/02/23	136	%	50 - 200		
			p,p-DDT	2023/02/23	150	%	50 - 200		
			Dieldrin	2023/02/23	144	%	50 - 200		
			Endosulfan I	2023/02/23	124	%	50 - 200		
			Endosulfan II	2023/02/23	127	%	50 - 200		
			Endosulfan sulfate	2023/02/23	145	%	50 - 200		
			Endrin	2023/02/23	112	%	50 - 200		
			Endrin aldehyde	2023/02/23	140	%	50 - 200		
			Endrin ketone	2023/02/23	112	%	50 - 200		
			Heptachlor	2023/02/23	119	%	50 - 200		
			Heptachlor epoxide	2023/02/23	113	%	50 - 200		
			Hexachlorobenzene	2023/02/23	109	%	50 - 200		
			Methoxychlor	2023/02/23	116	%	50 - 200		
			Mirex	2023/02/23	66	%	50 - 200		
cis-Nonachlor	2023/02/23	121	%	50 - 200					
trans-Nonachlor	2023/02/23	117	%	50 - 200					
8513671	CTC	Spiked Blank	13C10-cis Nonachlor	2023/02/23	60	%	36 - 139		
			13C10-Heptachlor	2023/02/23	82	%	5 - 120		
			13C10-Heptachlor Epoxide	2023/02/23	83	%	27 - 137		
			13C10-Oxychlordane	2023/02/23	74	%	23 - 135		
			13C10-trans Nonachlor	2023/02/23	71	%	14 - 136		
			13C12-Endrin	2023/02/23	63	%	35 - 155		
			13C12-Endrin Ketone	2023/02/23	43	%	35 - 155		
			13C6-beta BHC	2023/02/23	68	%	32 - 130		
13C6-d6-gamma BHC (Lindane)	2023/02/23	79	%	11 - 120					
13C-Methoxychlor	2023/02/23	77	%	5 - 120					
13C-pp-DDD	2023/02/23	57	%	5 - 120					



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C-pp-DDE	2023/02/23		74	%	47 - 160
			13C-pp-DDT	2023/02/23		55	%	5 - 120
			C13-Hexachlorobenzene	2023/02/23		61	%	5 - 120
			Aldrin	2023/02/23		91	%	50 - 200
			alpha-BHC	2023/02/23		132	%	50 - 200
			delta-BHC	2023/02/23		127	%	50 - 200
			beta-BHC	2023/02/23		117	%	50 - 200
			Lindane	2023/02/23		124	%	50 - 200
			a-Chlordane	2023/02/23		128	%	50 - 200
			g-Chlordane	2023/02/23		117	%	50 - 200
			Oxychlordane	2023/02/23		110	%	50 - 200
			o,p-DDD	2023/02/23		149	%	50 - 200
			p,p-DDD	2023/02/23		128	%	50 - 200
			o,p-DDE	2023/02/23		110	%	50 - 200
			p,p-DDE	2023/02/23		110	%	50 - 200
			o,p-DDT	2023/02/23		123	%	50 - 200
			p,p-DDT	2023/02/23		124	%	50 - 200
			Dieldrin	2023/02/23		136	%	50 - 200
			Endosulfan I	2023/02/23		140	%	50 - 200
			Endosulfan II	2023/02/23		112	%	50 - 200
			Endosulfan sulfate	2023/02/23		150	%	50 - 200
			Endrin	2023/02/23		113	%	50 - 200
			Endrin aldehyde	2023/02/23		145	%	50 - 200
			Endrin ketone	2023/02/23		123	%	50 - 200
			Heptachlor	2023/02/23		109	%	50 - 200
			Heptachlor epoxide	2023/02/23		115	%	50 - 200
			Hexachlorobenzene	2023/02/23		109	%	50 - 200
			Methoxychlor	2023/02/23		118	%	50 - 200
			Mirex	2023/02/23		75	%	50 - 200
			cis-Nonachlor	2023/02/23		127	%	50 - 200
			trans-Nonachlor	2023/02/23		119	%	50 - 200
8513671	CTC	Method Blank	13C10-cis Nonachlor	2023/02/23		62	%	36 - 139
			13C10-Heptachlor	2023/02/23		97	%	5 - 120
			13C10-Heptachlor Epoxide	2023/02/23		88	%	27 - 137
			13C10-Oxychlordane	2023/02/23		78	%	23 - 135
			13C10-trans Nonachlor	2023/02/23		70	%	14 - 136
			13C12-Endrin	2023/02/23		74	%	35 - 155
			13C12-Endrin Ketone	2023/02/23		53	%	35 - 155
			13C6-beta BHC	2023/02/23		74	%	32 - 130
			13C6-d6-gamma BHC (Lindane)	2023/02/23		92	%	11 - 120
			13C-Methoxychlor	2023/02/23		82	%	5 - 120
			13C-pp-DDD	2023/02/23		57	%	5 - 120
			13C-pp-DDE	2023/02/23		77	%	47 - 160
			13C-pp-DDT	2023/02/23		57	%	5 - 120
			C13-Hexachlorobenzene	2023/02/23		65	%	5 - 120
			Aldrin	2023/02/23	0.021 U, MDL=0.021		ng/L	
			alpha-BHC	2023/02/23	0.024 U, MDL=0.024		ng/L	
			delta-BHC	2023/02/23	0.029 U, MDL=0.029		ng/L	
			beta-BHC	2023/02/23	0.014 U, MDL=0.014		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Lindane	2023/02/23	0.033 U, MDL=0.033		ng/L	
			a-Chlordane	2023/02/23	0.029 U, MDL=0.029		ng/L	
			g-Chlordane	2023/02/23	0.029 U, MDL=0.029		ng/L	
			Oxychlordane	2023/02/23	0.028 U, MDL=0.028		ng/L	
			o,p-DDD	2023/02/23	0.020 U, MDL=0.020		ng/L	
			p,p-DDD	2023/02/23	0.014 U, MDL=0.014		ng/L	
			o,p-DDE	2023/02/23	0.016 U, MDL=0.016		ng/L	
			p,p-DDE	2023/02/23	0.012 J, MDL=0.012		ng/L	
			o,p-DDT	2023/02/23	0.040 U, MDL=0.040		ng/L	
			p,p-DDT	2023/02/23	0.050 U, MDL=0.050		ng/L	
			Dieldrin	2023/02/23	0.050 U, MDL=0.050		ng/L	
			Endosulfan I	2023/02/23	0.067 U, MDL=0.067		ng/L	
			Endosulfan II	2023/02/23	0.074 U, MDL=0.074		ng/L	
			Endosulfan sulfate	2023/02/23	0.070 U, MDL=0.070		ng/L	
			Endrin	2023/02/23	0.083 J, MDL=0.045		ng/L	
			Endrin aldehyde	2023/02/23	0.071 U, MDL=0.071		ng/L	
			Endrin ketone	2023/02/23	0.034 U, MDL=0.034		ng/L	
			Heptachlor	2023/02/23	0.029 U, MDL=0.029		ng/L	
			Heptachlor epoxide	2023/02/23	0.015 U, MDL=0.015		ng/L	
			Hexachlorobenzene	2023/02/23	0.10 U, MDL=0.10		ng/L	
			Methoxychlor	2023/02/23	0.040 U, MDL=0.040		ng/L	
			Mirex	2023/02/23	0.021 U, MDL=0.021		ng/L	
			cis-Nonachlor	2023/02/23	0.037 U, MDL=0.037		ng/L	
			trans-Nonachlor	2023/02/23	0.044 U, MDL=0.044		ng/L	
8513671	CTC	RPD - Sample/Sample Dup	Aldrin	2023/02/24	NC		%	25
			alpha-BHC	2023/02/24	NC		%	25
			delta-BHC	2023/02/24	NC		%	25
			beta-BHC	2023/02/24	NC		%	25
			Lindane	2023/02/24	NC		%	25
			a-Chlordane	2023/02/24	NC		%	25



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			g-Chlordane	2023/02/24	NC		%	25
			Oxychlordane	2023/02/24	NC		%	25
			o,p-DDD	2023/02/24	NC		%	25
			p,p-DDD	2023/02/24	NC		%	25
			o,p-DDE	2023/02/24	NC		%	25
			p,p-DDE	2023/02/24	NC		%	25
			o,p-DDT	2023/02/24	NC		%	25
			p,p-DDT	2023/02/24	NC		%	25
			Dieldrin	2023/02/24	NC		%	25
			Endosulfan I	2023/02/24	NC		%	25
			Endosulfan II	2023/02/24	NC		%	25
			Endosulfan sulfate	2023/02/24	NC		%	25
			Endrin	2023/02/24	NC		%	25
			Endrin aldehyde	2023/02/24	NC		%	25
			Endrin ketone	2023/02/24	NC		%	25
			Heptachlor	2023/02/24	NC		%	25
			Heptachlor epoxide	2023/02/24	NC		%	25
			Hexachlorobenzene	2023/02/24	NC		%	25
			Methoxychlor	2023/02/24	NC		%	25
			Mirex	2023/02/24	NC		%	25
			cis-Nonachlor	2023/02/24	NC		%	25
			trans-Nonachlor	2023/02/24	NC		%	25
8519276	ESL	Spiked Blank	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/25		91	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/25		90	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/25		87	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/25		88	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/25		80	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/25		89	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/25		77	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/25		82	%	50 - 150
			13C3-HFPO-DA	2023/02/25		87	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/25		89	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/25		92	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/25		90	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/25		88	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/25		90	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/25		88	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/25		90	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/25		79	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/25		91	%	50 - 150
			D3-MeFOSA	2023/02/25		59	%	50 - 150
			D3-MeFOSAA	2023/02/25		75	%	50 - 150
			D5-EtFOSA	2023/02/25		61	%	50 - 150
			D5-EtFOSAA	2023/02/25		74	%	50 - 150
			D7-MeFOSE	2023/02/25		73	%	50 - 150
			D9-EtFOSE	2023/02/25		70	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/25		109	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/02/25		106	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/02/25		107	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/02/25		107	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/02/25		108	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/02/25		110	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/02/25		109	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoroundecanoic acid (PFUnA)	2023/02/25		104	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/02/25		108	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/02/25		108	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/25		108	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/02/25		109	%	70 - 130
			Perfluoropentanesulfonic acid PFPes	2023/02/25		105	%	70 - 130
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/25		107	%	70 - 130
			Perfluoroheptanesulfonic acid PFHpS	2023/02/25		106	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/02/25		109	%	70 - 130
			Perfluorononanesulfonic acid (PFNS)	2023/02/25		104	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/02/25		100	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/25		111	%	70 - 130
			EtFOSA	2023/02/25		114	%	70 - 130
			MeFOSA	2023/02/25		115	%	70 - 130
			EtFOSE	2023/02/25		111	%	70 - 130
			MeFOSE	2023/02/25		109	%	70 - 130
			EtFOSAA	2023/02/25		108	%	70 - 130
			MeFOSAA	2023/02/25		112	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/02/25		109	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/02/25		108	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/02/25		108	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/02/25		112	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/25		107	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/02/25		106	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/02/25		102	%	70 - 130
8519276	ESL	Spiked Blank DUP	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/25		89	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/25		86	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/25		84	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/25		86	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/25		78	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/25		86	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/25		76	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/25		82	%	50 - 150
			13C3-HFPO-DA	2023/02/25		87	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/25		86	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/25		89	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/25		86	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/25		86	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/25		86	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/25		84	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/25		88	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/25		76	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/25		88	%	50 - 150
			D3-MeFOSA	2023/02/25		62	%	50 - 150
			D3-MeFOSAA	2023/02/25		75	%	50 - 150
			D5-EtFOSA	2023/02/25		62	%	50 - 150
			D5-EtFOSAA	2023/02/25		70	%	50 - 150
			D7-MeFOSE	2023/02/25		70	%	50 - 150
			D9-EtFOSE	2023/02/25		73	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/25		108	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/02/25		107	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/02/25		108	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/02/25		107	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorooctanoic acid (PFOA)	2023/02/25		107	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/02/25		111	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/02/25		107	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2023/02/25		104	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/02/25		109	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/02/25		107	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/25		108	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/02/25		108	%	70 - 130
			Perfluoropentanesulfonic acid PFPes	2023/02/25		106	%	70 - 130
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/25		106	%	70 - 130
			Perfluoroheptanesulfonic acid PFHpS	2023/02/25		106	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/02/25		108	%	70 - 130
			Perfluorononanesulfonic acid (PFNS)	2023/02/25		105	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/02/25		102	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/25		113	%	70 - 130
			EtFOSA	2023/02/25		114	%	70 - 130
			MeFOSA	2023/02/25		116	%	70 - 130
			EtFOSE	2023/02/25		106	%	70 - 130
			MeFOSE	2023/02/25		116	%	70 - 130
			EtFOSAA	2023/02/25		113	%	70 - 130
			MeFOSAA	2023/02/25		111	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/02/25		106	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/02/25		108	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/02/25		108	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/02/25		104	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/25		106	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/02/25		106	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/02/25		103	%	70 - 130
8519276	ESL	RPD	Perfluorobutanoic acid (PFBA)	2023/02/25	1.6		%	30
			Perfluoropentanoic acid (PFPeA)	2023/02/25	0.066		%	30
			Perfluorohexanoic acid (PFHxA)	2023/02/25	0.82		%	30
			Perfluoroheptanoic acid (PFHpA)	2023/02/25	0.15		%	30
			Perfluorooctanoic acid (PFOA)	2023/02/25	0.53		%	30
			Perfluorononanoic acid (PFNA)	2023/02/25	1.4		%	30
			Perfluorodecanoic acid (PFDA)	2023/02/25	2.3		%	30
			Perfluoroundecanoic acid (PFUnA)	2023/02/25	0.45		%	30
			Perfluorododecanoic acid (PFDoA)	2023/02/25	1.3		%	30
			Perfluorotridecanoic acid (PFTRDA)	2023/02/25	0.53		%	30
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/25	0.18		%	30
			Perfluorobutanesulfonic acid (PFBS)	2023/02/25	1.3		%	30
			Perfluoropentanesulfonic acid PFPes	2023/02/25	0.63		%	30
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/25	1.1		%	30
			Perfluoroheptanesulfonic acid PFHpS	2023/02/25	0.13		%	30
			Perfluorooctanesulfonic acid (PFOS)	2023/02/25	1.2		%	30
			Perfluorononanesulfonic acid (PFNS)	2023/02/25	1.3		%	30
			Perfluorodecanesulfonic acid (PFDS)	2023/02/25	1.4		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/25	1.4		%	30
			EtFOSA	2023/02/25	0.44		%	30
			MeFOSA	2023/02/25	0.31		%	30
			EtFOSE	2023/02/25	4.1		%	30
			MeFOSE	2023/02/25	5.6		%	30
			EtFOSAA	2023/02/25	4.8		%	30
			MeFOSAA	2023/02/25	0.41		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			4:2 Fluorotelomer sulfonic acid	2023/02/25	2.8		%	30
			6:2 Fluorotelomer sulfonic acid	2023/02/25	0.73		%	30
			8:2 Fluorotelomer sulfonic acid	2023/02/25	0.077		%	30
			Hexafluoropropyleneoxide dimer acid	2023/02/25	7.1		%	30
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/25	0.26		%	30
			9Cl-PF3ONS (F-53B Major)	2023/02/25	0.17		%	30
			11Cl-PF3OUdS (F-53B Minor)	2023/02/25	0.61		%	30
8519276	ESL	Method Blank	13C2-4:2-Fluorotelomersulfonic Acid	2023/02/25		99	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/02/25		96	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/02/25		89	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/02/25		86	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/02/25		79	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/02/25		91	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/02/25		68	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/02/25		80	%	50 - 150
			13C3-HFPO-DA	2023/02/25		87	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/02/25		89	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/02/25		93	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/02/25		91	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/02/25		86	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/02/25		88	%	50 - 150
			13C5-Perfluorononanoic acid	2023/02/25		88	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/02/25		92	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/02/25		79	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/02/25		91	%	50 - 150
			D3-MeFOSA	2023/02/25		57	%	50 - 150
			D3-MeFOSAA	2023/02/25		75	%	50 - 150
			D5-EtFOSA	2023/02/25		57	%	50 - 150
			D5-EtFOSAA	2023/02/25		74	%	50 - 150
			D7-MeFOSE	2023/02/25		73	%	50 - 150
			D9-EtFOSE	2023/02/25		72	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/02/25	0.0015 U, MDL=0.0015		ug/L	
			Perfluoropentanoic acid (PFPeA)	2023/02/25	0.0025 U, MDL=0.0025		ug/L	
			Perfluorohexanoic acid (PFHxA)	2023/02/25	0.0038 U, MDL=0.0038		ug/L	
			Perfluoroheptanoic acid (PFHpA)	2023/02/25	0.0018 U, MDL=0.0018		ug/L	
			Perfluorooctanoic acid (PFOA)	2023/02/25	0.0030 U, MDL=0.0030		ug/L	
			Perfluorononanoic acid (PFNA)	2023/02/25	0.0021 U, MDL=0.0021		ug/L	
			Perfluorodecanoic acid (PFDA)	2023/02/25	0.0016 U, MDL=0.0016		ug/L	
			Perfluoroundecanoic acid (PFUnA)	2023/02/25	0.0024 U, MDL=0.0024		ug/L	
			Perfluorododecanoic acid (PFDoA)	2023/02/25	0.0029 U, MDL=0.0029		ug/L	
			Perfluorotridecanoic acid (PFTRDA)	2023/02/25	0.0026 U, MDL=0.0026		ug/L	
			Perfluorotetradecanoic acid(PFTEDA)	2023/02/25	0.0016 U, MDL=0.0016		ug/L	



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorobutanesulfonic acid (PFBS)	2023/02/25	0.0021 U, MDL=0.0021		ug/L	
			Perfluoropentanesulfonic acid PFPes	2023/02/25	0.0023 U, MDL=0.0023		ug/L	
			Perfluorohexanesulfonic acid(PFHxS)	2023/02/25	0.0022 U, MDL=0.0022		ug/L	
			Perfluoroheptanesulfonic acid PFHpS	2023/02/25	0.0039 U, MDL=0.0039		ug/L	
			Perfluorooctanesulfonic acid (PFOS)	2023/02/25	0.0035 U, MDL=0.0035		ug/L	
			Perfluorononanesulfonic acid (PFNS)	2023/02/25	0.0037 U, MDL=0.0037		ug/L	
			Perfluorodecanesulfonic acid (PFDS)	2023/02/25	0.0048 U, MDL=0.0048		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2023/02/25	0.0034 U, MDL=0.0034		ug/L	
			EtFOSA	2023/02/25	0.0095 U, MDL=0.0095		ug/L	
			MeFOSA	2023/02/25	0.0084 U, MDL=0.0084		ug/L	
			EtFOSE	2023/02/25	0.0070 U, MDL=0.0070		ug/L	
			MeFOSE	2023/02/25	0.0073 U, MDL=0.0073		ug/L	
			EtFOSAA	2023/02/25	0.0046 U, MDL=0.0046		ug/L	
			MeFOSAA	2023/02/25	0.0045 U, MDL=0.0045		ug/L	
			4:2 Fluorotelomer sulfonic acid	2023/02/25	0.0033 U, MDL=0.0033		ug/L	
			6:2 Fluorotelomer sulfonic acid	2023/02/25	0.0015 U, MDL=0.0015		ug/L	
			8:2 Fluorotelomer sulfonic acid	2023/02/25	0.0031 U, MDL=0.0031		ug/L	
			Hexafluoropropyleneoxide dimer acid	2023/02/25	0.0052 U, MDL=0.0052		ug/L	
			4,8-Dioxa-3H-perfluorononanoic acid	2023/02/25	0.0027 U, MDL=0.0027		ug/L	
			9Cl-PF3ONS (F-53B Major)	2023/02/25	0.0043 U, MDL=0.0043		ug/L	
			11Cl-PF3OUds (F-53B Minor)	2023/02/25	0.0035 U, MDL=0.0035		ug/L	
8524619	YQI	Spiked Blank	37CL4 2378 Tetra CDD	2023/02/28		76	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/28		96	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/28		91	%	28 - 143
			C13-123478 HexaCDD	2023/02/28		92	%	32 - 141
			C13-123478 HexaCDF	2023/02/28		88	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/28		93	%	28 - 138
			C13-123678 HexaCDD	2023/02/28		96	%	28 - 130
			C13-123678 HexaCDF	2023/02/28		90	%	26 - 123
			C13-12378 PentaCDD	2023/02/28		91	%	25 - 181
			C13-12378 PentaCDF	2023/02/28		82	%	24 - 185
			C13-123789 HexaCDF	2023/02/28		92	%	29 - 147
			C13-234678 HexaCDF	2023/02/28		99	%	28 - 136



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-23478 PentaCDF	2023/02/28		89	%	21 - 178
			C13-2378 TetraCDD	2023/02/28		72	%	25 - 164
			C13-2378 TetraCDF	2023/02/28		83	%	24 - 169
			C13-OCDD	2023/02/28		96	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/28		105	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/28		96	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/28		97	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/28		97	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2023/02/28		97	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28		100	%	70 - 140
			Octa CDD	2023/02/28		103	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/28		99	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/28		102	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/28		98	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/28		99	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/28		98	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/28		93	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/28		98	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28		102	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2023/02/28		96	%	78 - 138
			Octa CDF	2023/02/28		97	%	63 - 170
8524619	YQI	Spiked Blank DUP	37CL4 2378 Tetra CDD	2023/02/28		74	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/28		93	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/28		90	%	28 - 143
			C13-123478 HexaCDD	2023/02/28		95	%	32 - 141
			C13-123478 HexaCDF	2023/02/28		89	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/28		92	%	28 - 138
			C13-123678 HexaCDD	2023/02/28		98	%	28 - 130
			C13-123678 HexaCDF	2023/02/28		91	%	26 - 123
			C13-12378 PentaCDD	2023/02/28		87	%	25 - 181
			C13-12378 PentaCDF	2023/02/28		81	%	24 - 185
			C13-123789 HexaCDF	2023/02/28		91	%	29 - 147
			C13-234678 HexaCDF	2023/02/28		103	%	28 - 136
			C13-23478 PentaCDF	2023/02/28		84	%	21 - 178
			C13-2378 TetraCDD	2023/02/28		72	%	25 - 164
			C13-2378 TetraCDF	2023/02/28		80	%	24 - 169
			C13-OCDD	2023/02/28		91	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/28		100	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/28		98	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/28		95	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/28		99	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2023/02/28		98	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28		101	%	70 - 140
			Octa CDD	2023/02/28		103	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/28		94	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/28		99	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/28		101	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/28		98	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/28		95	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/28		89	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/28		99	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28		104	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2023/02/28		96	%	78 - 138



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits			
8524619	YQI	RPD	Octa CDF	2023/02/28		98	%	63 - 170			
			2,3,7,8-Tetra CDD	2023/02/28	4.9	%	25				
			1,2,3,7,8-Penta CDD	2023/02/28	2.1	%	25				
			1,2,3,4,7,8-Hexa CDD	2023/02/28	2.1	%	25				
			1,2,3,6,7,8-Hexa CDD	2023/02/28	2.0	%	25				
			1,2,3,7,8,9-Hexa CDD	2023/02/28	1.0	%	25				
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28	1.0	%	25				
			Octa CDD	2023/02/28	0	%	25				
			2,3,7,8-Tetra CDF	2023/02/28	5.2	%	25				
			1,2,3,7,8-Penta CDF	2023/02/28	3.0	%	25				
			2,3,4,7,8-Penta CDF	2023/02/28	3.0	%	25				
			1,2,3,4,7,8-Hexa CDF	2023/02/28	1.0	%	25				
			1,2,3,6,7,8-Hexa CDF	2023/02/28	3.1	%	25				
			2,3,4,6,7,8-Hexa CDF	2023/02/28	4.4	%	25				
			1,2,3,7,8,9-Hexa CDF	2023/02/28	1.0	%	25				
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28	1.9	%	25				
			1,2,3,4,7,8,9-Hepta CDF	2023/02/28	0	%	25				
			Octa CDF	2023/02/28	1.0	%	25				
			8524619	YQI	Method Blank	37CL4 2378 Tetra CDD	2023/02/28		84	%	35 - 197
						C13-1234678 HeptaCDD	2023/02/28		86	%	23 - 140
C13-1234678 HeptaCDF	2023/02/28					83	%	28 - 143			
C13-123478 HexaCDD	2023/02/28					92	%	32 - 141			
C13-123478 HexaCDF	2023/02/28					89	%	26 - 152			
C13-1234789 HeptaCDF	2023/02/28					83	%	28 - 138			
C13-123678 HexaCDD	2023/02/28					95	%	28 - 130			
C13-123678 HexaCDF	2023/02/28					91	%	26 - 123			
C13-12378 PentaCDD	2023/02/28					91	%	25 - 181			
C13-12378 PentaCDF	2023/02/28					85	%	24 - 185			
C13-123789 HexaCDF	2023/02/28					86	%	29 - 147			
C13-234678 HexaCDF	2023/02/28					95	%	28 - 136			
C13-23478 PentaCDF	2023/02/28					93	%	21 - 178			
C13-2378 TetraCDD	2023/02/28					75	%	25 - 164			
C13-2378 TetraCDF	2023/02/28					87	%	24 - 169			
C13-OCDD	2023/02/28					86	%	17 - 157			
2,3,7,8-Tetra CDD	2023/02/28	1.43 U, EDL=1.43					pg/L				
1,2,3,7,8-Penta CDD	2023/02/28	1.04 U, EDL=1.04					pg/L				
1,2,3,4,7,8-Hexa CDD	2023/02/28	1.01 U, EDL=1.01					pg/L				
1,2,3,6,7,8-Hexa CDD	2023/02/28	0.967 U, EDL=0.967					pg/L				
1,2,3,7,8,9-Hexa CDD	2023/02/28	0.919 U, EDL=0.919					pg/L				
1,2,3,4,6,7,8-Hepta CDD	2023/02/28	1.04 U, EDL=1.04					pg/L				
Octa CDD	2023/02/28	2.48 J, EDL=1.19					pg/L				
Total Tetra CDD	2023/02/28	1.43 U, EDL=1.43					pg/L				
Total Penta CDD	2023/02/28	1.04 U, EDL=1.04					pg/L				
Total Hexa CDD	2023/02/28	1.12 U, EDL=1.12					pg/L				



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Total Hepta CDD	2023/02/28	1.04 U, EDL=1.04		pg/L	
			2,3,7,8-Tetra CDF	2023/02/28	1.04 U, EDL=1.04		pg/L	
			1,2,3,7,8-Penta CDF	2023/02/28	1.28 U, EDL=1.28		pg/L	
			2,3,4,7,8-Penta CDF	2023/02/28	1.07 U, EDL=1.07		pg/L	
			1,2,3,4,7,8-Hexa CDF	2023/02/28	0.863 U, EDL=0.863		pg/L	
			1,2,3,6,7,8-Hexa CDF	2023/02/28	0.820 U, EDL=0.820		pg/L	
			2,3,4,6,7,8-Hexa CDF	2023/02/28	0.790 U, EDL=0.790		pg/L	
			1,2,3,7,8,9-Hexa CDF	2023/02/28	0.960 U, EDL=0.960		pg/L	
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28	0.860 U, EDL=0.860		pg/L	
			1,2,3,4,7,8,9-Hepta CDF	2023/02/28	0.950 U, EDL=0.950		pg/L	
			Octa CDF	2023/02/28	1.06 U, EDL=1.06		pg/L	
			Total Tetra CDF	2023/02/28	1.04 U, EDL=1.04		pg/L	
			Total Penta CDF	2023/02/28	1.16 U, EDL=1.16		pg/L	
			Total Hexa CDF	2023/02/28	0.854 U, EDL=0.854		pg/L	
			Total Hepta CDF	2023/02/28	0.902 U, EDL=0.902		pg/L	
8533813	CXU	Spiked Blank	C13-2,44'-TriCB-(28)	2023/04/04		80 (1)	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/04/04		108	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/04		116	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/04		107	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		98	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/04/04		85	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		111	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		77	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		60	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		66	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		40	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		50	%	40 - 145
			C13-22'-DiCB-(4)	2023/04/04		33	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/04/04		115	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		123	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		132 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		94	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/04/04		109	%	40 - 145
			C13-2344'5'-PentaCB-(114)	2023/04/04		121	%	40 - 145
			C13-23'44'5'-PentaCB-(118)	2023/04/04		126 (1)	%	40 - 145
			C13-2'344'5'-PentaCB-(123)	2023/04/04		127 (1)	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		35	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		121	%	40 - 145
			C13-33'44'5'-PentaCB-(126)	2023/04/04		144 (1)	%	40 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-33'44'-TetraCB-(77)	2023/04/04		120	%	40 - 145
			C13-344'5'-TetraCB-(81)	2023/04/04		115	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		98 (1)	%	40 - 145
			C13-44'-DiCB-(15)	2023/04/04		73	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		44	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		96	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		114	%	40 - 145
			2-MonoCB-(1)	2023/04/04		108	%	60 - 145
			3-MonoCB-(2)	2023/04/04		118	%	N/A
			4-MonoCB-(3)	2023/04/04		107	%	60 - 145
			22'-DiCB-(4)	2023/04/04		114	%	60 - 145
			2,3-DiCB-(5)	2023/04/04		92	%	N/A
			2,3'-DiCB-(6)	2023/04/04		95	%	N/A
			2,4-DiCB-(7)	2023/04/04		89	%	N/A
			2,4'-DiCB-(8)	2023/04/04		53	%	N/A
			2,5-DiCB-(9)	2023/04/04		92	%	N/A
			2,6-DiCB-(10)	2023/04/04		71	%	N/A
			3,3'-DiCB-(11)	2023/04/04		126	%	N/A
			DiCB-(12)+(13)	2023/04/04		102	%	N/A
			3,5-DiCB-(14)	2023/04/04		106	%	N/A
			4,4'-DiCB-(15)	2023/04/04		112	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		70	%	N/A
			22'4-TriCB-(17)	2023/04/04		68	%	N/A
			TriCB-(18)+(30)	2023/04/04		59	%	N/A
			22'6-TriCB-(19)	2023/04/04		105	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		92	%	N/A
			TriCB-(21)+(33)	2023/04/04		100	%	N/A
			234'-TriCB-(22)	2023/04/04		101	%	N/A
			235-TriCB-(23)	2023/04/04		90	%	N/A
			236-TriCB-(24)	2023/04/04		81	%	N/A
			23'4-TriCB-(25)	2023/04/04		102	%	N/A
			TriCB-(26)+(29)	2023/04/04		91	%	N/A
			23'6-TriCB-(27)	2023/04/04		60	%	N/A
			24'5-TriCB-(31)	2023/04/04		94	%	N/A
			24'6-TriCB-(32)	2023/04/04		72	%	N/A
			23'5'-TriCB-(34)	2023/04/04		89	%	N/A
			33'4-TriCB-(35)	2023/04/04		115	%	N/A
			33'5-TriCB-(36)	2023/04/04		106	%	N/A
			344'-TriCB-(37)	2023/04/04		107	%	60 - 145
			345-TriCB-(38)	2023/04/04		109	%	N/A
			34'5-TriCB-(39)	2023/04/04		119	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		83	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		94	%	N/A
			22'35-TetraCB-(43)	2023/04/04		84	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		83	%	N/A
			TetraCB-(45)+(51)	2023/04/04		69	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		71	%	N/A
			22'45-TetraCB-(48)	2023/04/04		78	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		77	%	N/A
			TetraCB-(50)+(53)	2023/04/04		68	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		80	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		115	%	60 - 145
			233'4-TetraCB-(55)	2023/04/04		94	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'4'-Tetra CB(56)	2023/04/04		97	%	N/A
			233'5'-TetraCB-(57)	2023/04/04		86	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		88	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		78	%	N/A
			2344'-TetraCB -(60)	2023/04/04		95	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		95	%	N/A
			234'5'-TetraCB-(63)	2023/04/04		92	%	N/A
			234'6'-TetraCB-(64)	2023/04/04		92	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		96	%	N/A
			23'45'-TetraCB-(67)	2023/04/04		89	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		89	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		84	%	N/A
			23'5'6'-TetraCB-(73)	2023/04/04		69	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		94	%	60 - 145
			33'45'-TetraCB-(78)	2023/04/04		114	%	N/A
			33'45'-TetraCB(79)	2023/04/04		103	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		92	%	N/A
			344'5'-TetraCB-(81)	2023/04/04		99	%	60 - 145
			22'33'4'-PentaCB-(82)	2023/04/04		104	%	N/A
			PentaCB-(83)+(99)	2023/04/04		91	%	N/A
			22'33'6'-PentaCB-(84)	2023/04/04		83	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		88	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		87	%	N/A
			PentaCB-(88)+(91)	2023/04/04		84	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		98	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		88	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		97	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		78	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		77	%	N/A
			22'35'6'-PentaCB-(95)	2023/04/04		94	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		83	%	N/A
			22'45'6'-PentaCB-(103)	2023/04/04		84	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		100	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		106	%	60 - 145
			233'45'-PentaCB-(106)	2023/04/04		111	%	N/A
			233'4'5'-PentaCB-(107)	2023/04/04		91	%	N/A
			PentaCB-(108)+(124)	2023/04/04		98	%	N/A
			PentaCB-(110)+(115)	2023/04/04		99	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		92	%	N/A
			233'56'-PentaCB-(112)	2023/04/04		94	%	N/A
			2344'5'-PentaCB-(114)	2023/04/04		104	%	60 - 145
			23'44'5'-PentaCB-(118)	2023/04/04		97	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		100	%	N/A
			23'45'6'-PentaCB-(121)	2023/04/04		83	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		125	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		101	%	60 - 145
			33'44'5'-PentaCB-(126)	2023/04/04		98	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		107	%	N/A
			HexaCB-(128)+(166)	2023/04/04		92	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		98	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		91	%	N/A
			22'33'46'-HexaCB-(131)	2023/04/04		105	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		89	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'55'-HexaCB-(133)	2023/04/04		93	%	N/A
			HexaCB-(134)+(143)	2023/04/04		94	%	N/A
			HexaCB-(135)+(151)	2023/04/04		89	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		84	%	N/A
			22'344'5'-HexaCB-(137)	2023/04/04		86	%	N/A
			HexaCB-(139)+(140)	2023/04/04		86	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		94	%	N/A
			22'3456'-HexaCB-(142)	2023/04/04		94	%	N/A
			22'345'6'-HexaCB-(144)	2023/04/04		96	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		82	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		90	%	N/A
			HexaCB-(147)+(149)	2023/04/04		87	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		86	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		80	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		82	%	N/A
			HexaCB-(153)+(168)	2023/04/04		87	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		85	%	N/A
			22'44'66'-HexaCB-(155)	2023/04/04		98	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		101	%	N/A
			233'44'6'-HexaCB-(158)	2023/04/04		93	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		91	%	N/A
			233'456'-HexaCB-(160)	2023/04/04		97	%	N/A
			233'45'6'-HexaCB-(161)	2023/04/04		88	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		93	%	N/A
			233'4'5'6'-HexaCB-(164)	2023/04/04		95	%	N/A
			233'55'6'-HexaCB-(165)	2023/04/04		89	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		105	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		103	%	60 - 145
			22'33'44'5'-HeptaCB-(170)	2023/04/04		87	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		93	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		94	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		94	%	N/A
			22'33'45'6'-HeptaCB-(175)	2023/04/04		86	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		84	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		90	%	N/A
			22'33'55'6'-HeptaCB-(178)	2023/04/04		88	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		88	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		99	%	N/A
			22'344'56'-HeptaCB-(181)	2023/04/04		93	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		89	%	N/A
			22'344'5'6'-HeptaCB-(183)	2023/04/04		92	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		82	%	N/A
			22'3455'6'-HeptaCB-(185)	2023/04/04		87	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		87	%	N/A
			22'34'55'6'-HeptaCB-(187)	2023/04/04		90	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		100	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		100	%	60 - 145
			233'44'56'-HeptaCB-(190)	2023/04/04		91	%	N/A
			233'44'5'6'-HeptaCB-(191)	2023/04/04		92	%	N/A
			233'455'6'-HeptaCB-(192)	2023/04/04		94	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		100	%	N/A
			22'33'44'56'-OctaCB-(195)	2023/04/04		103	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		97	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'44'66'-OctaCB-(197)	2023/04/04		91	%	N/A
			OctaCB-(198)+(199)	2023/04/04		98	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		100	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		89	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		92	%	60 - 145
			22'344'55'6'-OctaCB-(203)	2023/04/04		101	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		87	%	N/A
			233'44'55'6'-OctaCB-(205)	2023/04/04		92	%	60 - 145
			22'33'44'55'6'-NonaCB-(206)	2023/04/04		91	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		86	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		93	%	60 - 145
			DecaCB-(209)	2023/04/04		108	%	60 - 145
8533813	CXU	Spiked Blank DUP	C13-2,44'-TriCB-(28)	2023/04/04		82	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/04/04		100	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/04		106	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/04		95	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		91	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/04/04		83	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		102	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		71	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		56	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		66	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		41	%	15 - 145
			C13-22'6'-TriCB-(19)	2023/04/04		52	%	40 - 145
			C13-22'-DiCB-(4)	2023/04/04		37	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/04/04		107	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		111	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		125 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		92	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/04/04		101	%	40 - 145
			C13-2344'5'-PentaCB-(114)	2023/04/04		115	%	40 - 145
			C13-23'44'5'-PentaCB-(118)	2023/04/04		116	%	40 - 145
			C13-2'344'5'-PentaCB-(123)	2023/04/04		118	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		39	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		112	%	40 - 145
			C13-33'44'5'-PentaCB-(126)	2023/04/04		134 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		113	%	40 - 145
			C13-344'5'-TetraCB-(81)	2023/04/04		110	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		96	%	40 - 145
			C13-44'-DiCB-(15)	2023/04/04		75	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		49 (1)	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		85	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		103	%	40 - 145
			2-MonoCB-(1)	2023/04/04		107	%	60 - 145
			3-MonoCB-(2)	2023/04/04		116	%	N/A
			4-MonoCB-(3)	2023/04/04		106	%	60 - 145
			22'-DiCB-(4)	2023/04/04		109	%	60 - 145
			2,3-DiCB-(5)	2023/04/04		96	%	N/A
			2,3'-DiCB-(6)	2023/04/04		95	%	N/A
			2,4-DiCB-(7)	2023/04/04		90	%	N/A
			2,4'-DiCB-(8)	2023/04/04		55	%	N/A
			2,5-DiCB-(9)	2023/04/04		94	%	N/A
			2,6-DiCB-(10)	2023/04/04		72	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			3,3'-DiCB-(11)	2023/04/04		127	%	N/A
			DiCB-(12)+(13)	2023/04/04		102	%	N/A
			3,5-DiCB-(14)	2023/04/04		106	%	N/A
			4,4'-DiCB-(15)	2023/04/04		111	%	60 - 145
			22'3'-TriCB-(16)	2023/04/04		77	%	N/A
			22'4'-TriCB-(17)	2023/04/04		71	%	N/A
			TriCB-(18)+(30)	2023/04/04		61	%	N/A
			22'6'-TriCB-(19)	2023/04/04		102	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		97	%	N/A
			TriCB-(21)+(33)	2023/04/04		102	%	N/A
			234'-TriCB-(22)	2023/04/04		101	%	N/A
			235-TriCB-(23)	2023/04/04		93	%	N/A
			236-TriCB-(24)	2023/04/04		75	%	N/A
			23'4'-TriCB-(25)	2023/04/04		106	%	N/A
			TriCB-(26)+(29)	2023/04/04		92	%	N/A
			23'6'-TriCB-(27)	2023/04/04		66	%	N/A
			24'5'-TriCB-(31)	2023/04/04		97	%	N/A
			24'6'-TriCB-(32)	2023/04/04		74	%	N/A
			23'5'-TriCB-(34)	2023/04/04		90	%	N/A
			33'4'-TriCB-(35)	2023/04/04		117	%	N/A
			33'5'-TriCB-(36)	2023/04/04		106	%	N/A
			344'-TriCB-(37)	2023/04/04		109	%	60 - 145
			345-TriCB-(38)	2023/04/04		112	%	N/A
			34'5'-TriCB-(39)	2023/04/04		120	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		86	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		97	%	N/A
			22'35'-TetraCB-(43)	2023/04/04		90	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		87	%	N/A
			TetraCB-(45)+(51)	2023/04/04		73	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		73	%	N/A
			22'45'-TetraCB-(48)	2023/04/04		82	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		80	%	N/A
			TetraCB-(50)+(53)	2023/04/04		72	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		87	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		116	%	60 - 145
			233'4'-TetraCB-(55)	2023/04/04		97	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		99	%	N/A
			233'5'-TetraCB-(57)	2023/04/04		90	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		91	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		83	%	N/A
			2344'-TetraCB -(60)	2023/04/04		98	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		99	%	N/A
			234'5'-TetraCB-(63)	2023/04/04		96	%	N/A
			234'6'-TetraCB-(64)	2023/04/04		96	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		98	%	N/A
			23'45'-TetraCB-(67)	2023/04/04		91	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		91	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		89	%	N/A
			23'5'6'-TetraCB-(73)	2023/04/04		71	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		98	%	60 - 145
			33'45'-TetraCB-(78)	2023/04/04		116	%	N/A
			33'45'-TetraCB(79)	2023/04/04		105	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		95	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			344'5-TetraCB-(81)	2023/04/04		100	%	60 - 145
			22'33'4-PentaCB-(82)	2023/04/04		108	%	N/A
			PentaCB-(83)+(99)	2023/04/04		96	%	N/A
			22'33'6-PentaCB-(84)	2023/04/04		87	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		93	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		92	%	N/A
			PentaCB-(88)+(91)	2023/04/04		89	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		103	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		93	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		101	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		82	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		80	%	N/A
			22'35'6-PentaCB-(95)	2023/04/04		103	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		88	%	N/A
			22'45'6-PentaCB-(103)	2023/04/04		88	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		102	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		105	%	60 - 145
			233'45-PentaCB-(106)	2023/04/04		112	%	N/A
			233'4'5-PentaCB-(107)	2023/04/04		96	%	N/A
			PentaCB-(108)+(124)	2023/04/04		101	%	N/A
			PentaCB-(110)+(115)	2023/04/04		104	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		96	%	N/A
			233'56-PentaCB-(112)	2023/04/04		97	%	N/A
			2344'5-PentaCB-(114)	2023/04/04		106	%	60 - 145
			23'44'5-PentaCB-(118)	2023/04/04		103	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		105	%	N/A
			23'45'6-PentaCB-(121)	2023/04/04		88	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		128	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		104	%	60 - 145
			33'44'5-PentaCB-(126)	2023/04/04		100	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		109	%	N/A
			HexaCB-(128)+(166)	2023/04/04		97	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		103	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		93	%	N/A
			22'33'46-HexaCB-(131)	2023/04/04		108	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		92	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		96	%	N/A
			HexaCB-(134)+(143)	2023/04/04		99	%	N/A
			HexaCB-(135)+(151)	2023/04/04		94	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		92	%	N/A
			22'344'5-HexaCB-(137)	2023/04/04		85	%	N/A
			HexaCB-(139)+(140)	2023/04/04		90	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		98	%	N/A
			22'3456-HexaCB-(142)	2023/04/04		96	%	N/A
			22'345'6-HexaCB-(144)	2023/04/04		97	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		86	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		93	%	N/A
			HexaCB-(147)+(149)	2023/04/04		91	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		93	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		84	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		87	%	N/A
			HexaCB-(153)+(168)	2023/04/04		91	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		89	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'44'66'-HexaCB-(155)	2023/04/04		103	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		105	%	N/A
			233'44'6-HexaCB-(158)	2023/04/04		96	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		95	%	N/A
			233'456-HexaCB-(160)	2023/04/04		99	%	N/A
			233'45'6-HexaCB-(161)	2023/04/04		92	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		97	%	N/A
			233'4'5'6-HexaCB-(164)	2023/04/04		104	%	N/A
			233'55'6-HexaCB-(165)	2023/04/04		91	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		107	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		106	%	60 - 145
			22'33'44'5-HeptaCB-(170)	2023/04/04		88	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		96	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		98	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		96	%	N/A
			22'33'45'6-HeptaCB-(175)	2023/04/04		93	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		90	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		93	%	N/A
			22'33'55'6-HeptaCB-(178)	2023/04/04		93	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		94	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		103	%	N/A
			22'344'56-HeptaCB-(181)	2023/04/04		96	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		97	%	N/A
			22'344'5'6-HeptaCB-(183)	2023/04/04		88	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		86	%	N/A
			22'3455'6-HeptaCB-(185)	2023/04/04		103	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		91	%	N/A
			22'34'55'6-HeptaCB-(187)	2023/04/04		96	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		103	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		104	%	60 - 145
			233'44'56-HeptaCB-(190)	2023/04/04		95	%	N/A
			233'44'5'6-HeptaCB-(191)	2023/04/04		95	%	N/A
			233'455'6-HeptaCB-(192)	2023/04/04		99	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		101	%	N/A
			22'33'44'56-OctaCB-(195)	2023/04/04		102	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		99	%	N/A
			22'33'44'66'OctaCB-(197)	2023/04/04		94	%	N/A
			OctaCB-(198)+(199)	2023/04/04		100	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		104	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		92	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		95	%	60 - 145
			22'344'55'6-OctaCB-(203)	2023/04/04		103	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		91	%	N/A
			233'44'55'6-OctaCB-(205)	2023/04/04		93	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2023/04/04		93	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		90	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		97	%	60 - 145
			DecaCB-(209)	2023/04/04		115	%	60 - 145
8533813	CXU	RPD	2-MonoCB-(1)	2023/04/04	1.0		%	30
			3-MonoCB-(2)	2023/04/04	1.9		%	30
			4-MonoCB-(3)	2023/04/04	0.85		%	30
			22'-DiCB-(4)	2023/04/04	4.4		%	30
			2,3-DiCB-(5)	2023/04/04	3.6		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			2,3'-DiCB-(6)	2023/04/04	0		%	30
			2,4-DiCB-(7)	2023/04/04	1.0		%	30
			2,4'-DiCB-(8)	2023/04/04	3.7		%	30
			2,5-DiCB-(9)	2023/04/04	2.3		%	30
			2,6-DiCB-(10)	2023/04/04	2.0		%	30
			3,3'-DiCB-(11)	2023/04/04	1.0		%	30
			DiCB-(12)+(13)	2023/04/04	0.29		%	30
			3,5-DiCB-(14)	2023/04/04	0.38		%	30
			4,4'-DiCB-(15)	2023/04/04	1.2		%	30
			2,2'3-TriCB-(16)	2023/04/04	9.8		%	30
			2,2'4-TriCB-(17)	2023/04/04	4.0		%	30
			TriCB-(18)+(30)	2023/04/04	2.5		%	30
			2,2'6-TriCB-(19)	2023/04/04	2.5		%	30
			TriCB-(20) + (28)	2023/04/04	4.3		%	30
			TriCB-(21)+(33)	2023/04/04	1.7		%	30
			2,3,4'-TriCB-(22)	2023/04/04	0.099		%	30
			2,3,5-TriCB-(23)	2023/04/04	3.2		%	30
			2,3,6-TriCB-(24)	2023/04/04	7.4		%	30
			2,3'4-TriCB-(25)	2023/04/04	3.3		%	30
			TriCB-(26)+(29)	2023/04/04	1.4		%	30
			2,3'6-TriCB-(27)	2023/04/04	9.2		%	30
			2,4'5-TriCB-(31)	2023/04/04	3.2		%	30
			2,4'6-TriCB-(32)	2023/04/04	2.3		%	30
			2,3'5'-TriCB-(34)	2023/04/04	1.7		%	30
			3,3'4-TriCB-(35)	2023/04/04	1.5		%	30
			3,3'5-TriCB-(36)	2023/04/04	0		%	30
			3,4,4'-TriCB-(37)	2023/04/04	2.1		%	30
			3,4,5-TriCB-(38)	2023/04/04	2.4		%	30
			3,4'5-TriCB-(39)	2023/04/04	1.1		%	30
			TetraCB-(40)+(41)+(71)	2023/04/04	4.3		%	30
			2,2'3,4'-TetraCB-(42)	2023/04/04	2.5		%	30
			2,2'3,5-TetraCB-(43)	2023/04/04	6.9		%	30
			TetraCB-(44)+(47)+(65)	2023/04/04	4.6		%	30
			TetraCB-(45)+(51)	2023/04/04	5.5		%	30
			2,2'3,6'-TetraCB-(46)	2023/04/04	3.7		%	30
			2,2'4,5-TetraCB-(48)	2023/04/04	5.1		%	30
			TetraCB-(49)+TetraCB-(69)	2023/04/04	4.3		%	30
			TetraCB-(50)+(53)	2023/04/04	6.2		%	30
			2,2'5,5'-TetraCB-(52)	2023/04/04	7.4		%	30
			2,2'6,6'-TetraCB-(54)	2023/04/04	1.3		%	30
			2,3,3'4-TetraCB-(55)	2023/04/04	3.1		%	30
			2,3,3'4'-Tetra CB(56)	2023/04/04	2.0		%	30
			2,3,3'5-TetraCB-(57)	2023/04/04	4.1		%	30
			2,3,3'5'-TetraCB-(58)	2023/04/04	3.5		%	30
			TetraCB-(59)+(62)+(75)	2023/04/04	6.1		%	30
			2,3,4,4'-TetraCB -(60)	2023/04/04	2.9		%	30
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04	4.1		%	30
			2,3,4'5-TetraCB-(63)	2023/04/04	4.2		%	30
			2,3,4'6-TetraCB-(64)	2023/04/04	4.5		%	30
			2,3'4,4'-TetraCB-(66)	2023/04/04	1.8		%	30
			2,3'4,5-TetraCB-(67)	2023/04/04	1.6		%	30
			2,3'4,5'-TetraCB-(68)	2023/04/04	2.8		%	30
			2,3'5,5'-TetraCB-(72)	2023/04/04	5.7		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			23'5'6-TetraCB-(73)	2023/04/04	3.7		%	30
			33'44'-TetraCB-(77)	2023/04/04	3.3		%	30
			33'45'-TetraCB-(78)	2023/04/04	1.7		%	30
			33'45'-TetraCB-(79)	2023/04/04	2.8		%	30
			33'55'-TetraCB-(80)	2023/04/04	3.5		%	30
			344'5-TetraCB-(81)	2023/04/04	1.8		%	30
			22'33'4-PentaCB-(82)	2023/04/04	3.5		%	30
			PentaCB-(83)+(99)	2023/04/04	5.9		%	30
			22'33'6-PentaCB-(84)	2023/04/04	4.5		%	30
			PentaCB-(85)+(116)+(117)	2023/04/04	5.1		%	30
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04	5.0		%	30
			PentaCB-(88)+(91)	2023/04/04	6.0		%	30
			22'346'-PentaCB-(89)	2023/04/04	5.1		%	30
			PentaCB-(90)+(101)+(113)	2023/04/04	5.0		%	30
			22'355'-PentaCB-(92)	2023/04/04	3.6		%	30
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04	5.5		%	30
			22'356'-PentaCB-(94)	2023/04/04	3.7		%	30
			22'35'6-PentaCB-(95)	2023/04/04	8.8		%	30
			22'366'-PentaCB-(96)	2023/04/04	6.0		%	30
			22'45'6-PentaCB-(103)	2023/04/04	4.9		%	30
			22'466'-PentaCB-(104)	2023/04/04	1.6		%	30
			233'44'-PentaCB-(105)	2023/04/04	0.66		%	30
			233'45-PentaCB-(106)	2023/04/04	1.5		%	30
			233'4'5-PentaCB-(107)	2023/04/04	4.9		%	30
			PentaCB-(108)+(124)	2023/04/04	3.1		%	30
			PentaCB-(110)+(115)	2023/04/04	5.0		%	30
			233'55'-PentaCB-(111)	2023/04/04	4.0		%	30
			233'56-PentaCB-(112)	2023/04/04	4.0		%	30
			2344'5-PentaCB-(114)	2023/04/04	2.1		%	30
			23'44'5-PentaCB-(118)	2023/04/04	6.1		%	30
			23'455'-PentaCB-(120)	2023/04/04	5.4		%	30
			23'45'6-PentaCB-(121)	2023/04/04	6.6		%	30
			233'4'5'-PentaCB-(122)	2023/04/04	2.0		%	30
			23'44'5'-PentaCB-(123)	2023/04/04	3.4		%	30
			33'44'5-PentaCB-(126)	2023/04/04	2.3		%	30
			33'455'-PentaCB-(127)	2023/04/04	1.5		%	30
			HexaCB-(128)+(166)	2023/04/04	6.0		%	30
			HexaCB-(129)+(138)+(163)	2023/04/04	5.1		%	30
			22'33'45'-HexaCB-(130)	2023/04/04	2.4		%	30
			22'33'46-HexaCB-(131)	2023/04/04	2.8		%	30
			22'33'46'-HexaCB-(132)	2023/04/04	3.3		%	30
			22'33'55'-HexaCB-(133)	2023/04/04	2.7		%	30
			HexaCB-(134)+(143)	2023/04/04	4.9		%	30
			HexaCB-(135)+(151)	2023/04/04	5.0		%	30
			22'33'66'-HexaCB-(136)	2023/04/04	8.6		%	30
			22'344'5-HexaCB-(137)	2023/04/04	0.47		%	30
			HexaCB-(139)+(140)	2023/04/04	4.0		%	30
			22'3455'-HexaCB-(141)	2023/04/04	4.7		%	30
			22'3456-HexaCB-(142)	2023/04/04	2.2		%	30
			22'345'6-HexaCB-(144)	2023/04/04	1.8		%	30
			22'3466'-HexaCB-(145)	2023/04/04	4.7		%	30
			22'34'55'-HexaCB-(146)	2023/04/04	3.7		%	30
			HexaCB-(147)+(149)	2023/04/04	5.2		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'34'56'-HexaCB-(148)	2023/04/04	7.8		%	30
			22'34'66'-HexaCB-(150)	2023/04/04	4.1		%	30
			22'3566'-HexaCB-(152)	2023/04/04	6.5		%	30
			HexaCB-(153)+(168)	2023/04/04	4.8		%	30
			22'44'56'-HexaCB-(154)	2023/04/04	5.4		%	30
			22'44'66'-HexaCB-(155)	2023/04/04	5.3		%	30
			HexaCB-(156)+(157)	2023/04/04	3.4		%	30
			233'44'6'-HexaCB-(158)	2023/04/04	3.6		%	30
			233'455'-HexaCB-(159)	2023/04/04	4.4		%	30
			233'456'-HexaCB-(160)	2023/04/04	2.2		%	30
			233'45'6'-HexaCB-(161)	2023/04/04	4.2		%	30
			233'4'55'-HexaCB-(162)	2023/04/04	4.3		%	30
			233'4'5'6'-HexaCB-(164)	2023/04/04	9.2		%	30
			233'55'6'-HexaCB-(165)	2023/04/04	2.3		%	30
			23'44'55'-HexaCB-(167)	2023/04/04	1.2		%	30
			33'44'55'-HexaCB-(169)	2023/04/04	2.3		%	30
			22'33'44'5'-HeptaCB-(170)	2023/04/04	1.4		%	30
			HeptaCB-(171)+(173)	2023/04/04	3.9		%	30
			22'33'455'-HeptaCB-(172)	2023/04/04	4.6		%	30
			22'33'456'-HeptaCB-(174)	2023/04/04	1.9		%	30
			22'33'45'6'-HeptaCB-(175)	2023/04/04	7.6		%	30
			22'33'466'-HeptaCB-(176)	2023/04/04	7.6		%	30
			22'33'45'6'-HeptaCB-(177)	2023/04/04	3.2		%	30
			22'33'55'6'-HeptaCB-(178)	2023/04/04	5.2		%	30
			22'33'566'-HeptaCB-(179)	2023/04/04	6.6		%	30
			HeptaCB-(180)+(193)	2023/04/04	3.9		%	30
			22'344'56'-HeptaCB-(181)	2023/04/04	3.9		%	30
			22'344'56'-HeptaCB-(182)	2023/04/04	8.6		%	30
			22'344'5'6'-HeptaCB-(183)	2023/04/04	4.2		%	30
			22'344'66'-HeptaCB-(184)	2023/04/04	5.0		%	30
			22'3455'6'-HeptaCB-(185)	2023/04/04	17		%	30
			22'34566'-HeptaCB-(186)	2023/04/04	4.4		%	30
			22'34'55'6'-HeptaCB-(187)	2023/04/04	6.8		%	30
			22'34'566'-HeptaCB-(188)	2023/04/04	3.3		%	30
			233'44'55'-HeptaCB-(189)	2023/04/04	3.4		%	30
			233'44'56'-HeptaCB-(190)	2023/04/04	4.3		%	30
			233'44'5'6'-HeptaCB-(191)	2023/04/04	3.0		%	30
			233'455'6'-HeptaCB-(192)	2023/04/04	5.1		%	30
			22'33'44'55'-OctaCB-(194)	2023/04/04	1.5		%	30
			22'33'44'56'-OctaCB-(195)	2023/04/04	0.098		%	30
			22'33'44'56'-OctaCB-(196)	2023/04/04	2.2		%	30
			22'33'44'66'-OctaCB-(197)	2023/04/04	2.5		%	30
			OctaCB-(198)+(199)	2023/04/04	1.7		%	30
			22'33'4566'-OctaCB-(200)	2023/04/04	3.6		%	30
			22'33'45'66'-OctaCB-(201)	2023/04/04	2.5		%	30
			22'33'55'66'-OctaCB-(202)	2023/04/04	3.6		%	30
			22'344'55'6'-OctaCB-(203)	2023/04/04	2.2		%	30
			22'344'566'-OctaCB-(204)	2023/04/04	3.8		%	30
			233'44'55'6'-OctaCB-(205)	2023/04/04	0.86		%	30
			22'33'44'55'6'-NonaCB-(206)	2023/04/04	2.2		%	30
			22'33'44'566'-NonaCB-(207)	2023/04/04	4.3		%	30
			22'33'455'66'-NonaCB-(208)	2023/04/04	4.9		%	30
			DecaCB-(209)	2023/04/04	6.0		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8533813	CXU	Method Blank	C13-2,44'-TriCB-(28)	2023/03/03		109	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/03/03		89	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/03/03		118	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/03/03		94	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/03/03		94	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/03/03		76	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/03/03		110	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/03/03		69	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/03/03		48	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/03/03		67	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/03/03		56	%	15 - 145
			C13-22'6-TriCB-(19)	2023/03/03		52	%	40 - 145
			C13-22'-DiCB-(4)	2023/03/03		37	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/03/03		109	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/03/03		113	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/03/03		146 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/03/03		98	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/03/03		96	%	40 - 145
			C13-2344'5'-PentaCB-(114)	2023/03/03		139	%	40 - 145
			C13-23'44'5'-PentaCB-(118)	2023/03/03		143	%	40 - 145
			C13-2'344'5'-PentaCB-(123)	2023/03/03		143	%	40 - 145
			C13-2-MonoCB-(1)	2023/03/03		39	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/03/03		101	%	40 - 145
			C13-33'44'5'-PentaCB-(126)	2023/03/03		151 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/03/03		86	%	40 - 145
			C13-344'5'-TetraCB-(81)	2023/03/03		82	%	40 - 145
			C13-344'-TriCB-(37)	2023/03/03		80	%	40 - 145
			C13-44'-DiCB-(15)	2023/03/03		82	%	15 - 145
			C13-4-MonoCB-(3)	2023/03/03		49	%	15 - 145
			C13-DecaCB-(209)	2023/03/03		69	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/03/03		96	%	40 - 145
			2-MonoCB-(1)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			3-MonoCB-(2)	2023/03/03	0.0087 U, EDL=0.0087		ng/L	
			4-MonoCB-(3)	2023/03/03	0.0083 U, EDL=0.0083		ng/L	
			22'-DiCB-(4)	2023/03/03	0.029 U, EDL=0.029		ng/L	
			2,3-DiCB-(5)	2023/03/03	0.0053 U, EDL=0.0053		ng/L	
			2,3'-DiCB-(6)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			2,4-DiCB-(7)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			2,4'-DiCB-(8)	2023/03/03	0.0062 J, EDL=0.0051		ng/L	
			2,5-DiCB-(9)	2023/03/03	0.0055 U, EDL=0.0055		ng/L	
			2,6-DiCB-(10)	2023/03/03	0.0097 U, EDL=0.0097		ng/L	
			3,3'-DiCB-(11)	2023/03/03	0.0834 J, EDL=0.0052		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			DiCB-(12)+(13)	2023/03/03	0.0051 U, EDL=0.0051		ng/L	
			3,5-DiCB-(14)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			4,4'-DiCB-(15)	2023/03/03	0.0110 J, EDL=0.0053		ng/L	
			22'3-TriCB-(16)	2023/03/03	0.0279 J, EDL=0.0081		ng/L	
			22'4-TriCB-(17)	2023/03/03	0.0179 J, EDL=0.0061		ng/L	
			TriCB-(18)+(30)	2023/03/03	0.0176 J, EDL=0.0053		ng/L	
			22'6-TriCB-(19)	2023/03/03	0.0081 U, EDL=0.0081		ng/L	
			TriCB-(20) + (28)	2023/03/03	0.0548, EDL=0.0027		ng/L	
			TriCB-(21)+(33)	2023/03/03	0.0405 J, EDL=0.0029		ng/L	
			234'-TriCB-(22)	2023/03/03	0.0213, EDL=0.0029		ng/L	
			235-TriCB-(23)	2023/03/03	0.0028 U, EDL=0.0028		ng/L	
			236-TriCB-(24)	2023/03/03	0.0048 U, EDL=0.0048		ng/L	
			23'4-TriCB-(25)	2023/03/03	0.0050 U, EDL=0.0050		ng/L	
			TriCB-(26)+(29)	2023/03/03	0.0111 J, EDL=0.0022		ng/L	
			23'6-TriCB-(27)	2023/03/03	0.0046 U, EDL=0.0046		ng/L	
			24'5-TriCB-(31)	2023/03/03	0.0613, EDL=0.0026		ng/L	
			24'6-TriCB-(32)	2023/03/03	0.0157 J, EDL=0.0043		ng/L	
			23'5'-TriCB-(34)	2023/03/03	0.0029 U, EDL=0.0029		ng/L	
			33'4-TriCB-(35)	2023/03/03	0.0030 U, EDL=0.0030		ng/L	
			33'5-TriCB-(36)	2023/03/03	0.0025 U, EDL=0.0025		ng/L	
			344'-TriCB-(37)	2023/03/03	0.0127 J, EDL=0.0031		ng/L	
			345-TriCB-(38)	2023/03/03	0.0029 U, EDL=0.0029		ng/L	
			34'5-TriCB-(39)	2023/03/03	0.0030 U, EDL=0.0030		ng/L	
			TetraCB-(40)+(41)+(71)	2023/03/03	0.029 J, EDL=0.015		ng/L	
			22'34'-TetraCB-(42)	2023/03/03	0.020 U, EDL=0.020		ng/L	
			22'35-TetraCB-(43)	2023/03/03	0.018 U, EDL=0.018		ng/L	
			TetraCB-(44)+(47)+(65)	2023/03/03	0.057 U, EDL=0.057 (2)		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			TetraCB-(45)+(51)	2023/03/03	0.015 U, EDL=0.015		ng/L	
			22'36'-TetraCB-(46)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			22'45'-TetraCB-(48)	2023/03/03	0.015 U, EDL=0.015		ng/L	
			TetraCB-(49)+TetraCB-(69)	2023/03/03	0.051 J, EDL=0.013		ng/L	
			TetraCB-(50)+(53)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'55'-TetraCB-(52)	2023/03/03	0.150, EDL=0.015		ng/L	
			22'66'-TetraCB-(54)	2023/03/03	0.025 U, EDL=0.025		ng/L	
			233'4'-TetraCB-(55)	2023/03/03	0.0095 U, EDL=0.0095		ng/L	
			233'4'-Tetra CB(56)	2023/03/03	0.0176 J, EDL=0.0097		ng/L	
			233'5'-TetraCB-(57)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			233'5'-TetraCB-(58)	2023/03/03	0.0094 U, EDL=0.0094		ng/L	
			TetraCB-(59)+(62)+(75)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			2344'-TetraCB -(60)	2023/03/03	0.0121 J, EDL=0.0092		ng/L	
			TetraCB-(61)+(70)+(74)+(76)	2023/03/03	0.115 J, EDL=0.0086		ng/L	
			234'5'-TetraCB-(63)	2023/03/03	0.0091 U, EDL=0.0091		ng/L	
			234'6'-TetraCB-(64)	2023/03/03	0.028 J, EDL=0.013		ng/L	
			23'44'-TetraCB-(66)	2023/03/03	0.0394 J, EDL=0.0086		ng/L	
			23'45'-TetraCB-(67)	2023/03/03	0.0080 U, EDL=0.0080		ng/L	
			23'45'-TetraCB-(68)	2023/03/03	0.0085 U, EDL=0.0085		ng/L	
			23'55'-TetraCB-(72)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			23'5'6'-TetraCB-(73)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			33'44'-TetraCB-(77)	2023/03/03	0.0098 U, EDL=0.0098		ng/L	
			33'45'-TetraCB-(78)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			33'45'-TetraCB(79)	2023/03/03	0.0084 U, EDL=0.0084		ng/L	
			33'55'-TetraCB-(80)	2023/03/03	0.0077 U, EDL=0.0077		ng/L	
			344'5'-TetraCB-(81)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'33'4'-PentaCB-(82)	2023/03/03	0.017 U, EDL=0.017		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C347713
Report Date: 2023/05/17

Apex Laboratories
Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			PentaCB-(83)+(99)	2023/03/03	0.059 J, EDL=0.014		ng/L	
			22'33'6-PentaCB-(84)	2023/03/03	0.024, EDL=0.014		ng/L	
			PentaCB-(85)+(116)+(117)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/03/03	0.068 J, EDL=0.011		ng/L	
			PentaCB-(88)+(91)	2023/03/03	0.012 U, EDL=0.012		ng/L	
			22'346'-PentaCB-(89)	2023/03/03	0.016 U, EDL=0.016		ng/L	
			PentaCB-(90)+(101)+(113)	2023/03/03	0.206, EDL=0.011		ng/L	
			22'355'-PentaCB-(92)	2023/03/03	0.035 J, EDL=0.015		ng/L	
			PentaCB-(93)+(98)+(100)+(102)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'356'-PentaCB-(94)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'35'6-PentaCB-(95)	2023/03/03	0.210, EDL=0.015		ng/L	
			22'366'-PentaCB-(96)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'45'6-PentaCB-(103)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'466'-PentaCB-(104)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			233'44'-PentaCB-(105)	2023/03/03	0.0276 J, EDL=0.0052		ng/L	
			233'45-PentaCB-(106)	2023/03/03	0.0057 U, EDL=0.0057		ng/L	
			233'4'5-PentaCB-(107)	2023/03/03	0.0081 J, EDL=0.0043		ng/L	
			PentaCB-(108)+(124)	2023/03/03	0.0053 U, EDL=0.0053		ng/L	
			PentaCB-(110)+(115)	2023/03/03	0.122, EDL=0.011		ng/L	
			233'55'-PentaCB-(111)	2023/03/03	0.0092 U, EDL=0.0092		ng/L	
			233'56-PentaCB-(112)	2023/03/03	0.0091 U, EDL=0.0091		ng/L	
			2344'5-PentaCB-(114)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			23'44'5-PentaCB-(118)	2023/03/03	0.0962 J, EDL=0.0048		ng/L	
			23'455'-PentaCB-(120)	2023/03/03	0.0097 U, EDL=0.0097		ng/L	
			23'45'6-PentaCB-(121)	2023/03/03	0.0092 U, EDL=0.0092		ng/L	
			233'4'5'-PentaCB-(122)	2023/03/03	0.0070 U, EDL=0.0070		ng/L	
			23'44'5'-PentaCB-(123)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			33'44'5-PentaCB-(126)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			33'45'5-PentaCB-(127)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			HexaCB-(128)+(166)	2023/03/03	0.0124 J, EDL=0.0057		ng/L	
			HexaCB-(129)+(138)+(163)	2023/03/03	0.201, EDL=0.0064		ng/L	
			22'33'45'-HexaCB-(130)	2023/03/03	0.0072 J, EDL=0.0069		ng/L	
			22'33'46'-HexaCB-(131)	2023/03/03	0.0083 U, EDL=0.0083		ng/L	
			22'33'46'-HexaCB-(132)	2023/03/03	0.0682, EDL=0.0069		ng/L	
			22'33'55'-HexaCB-(133)	2023/03/03	0.0071 U, EDL=0.0071		ng/L	
			HexaCB-(134)+(143)	2023/03/03	0.0135 J, EDL=0.0076		ng/L	
			HexaCB-(135)+(151)	2023/03/03	0.143, EDL=0.013		ng/L	
			22'33'66'-HexaCB-(136)	2023/03/03	0.0455 J, EDL=0.0099		ng/L	
			22'344'5-HexaCB-(137)	2023/03/03	0.0065 U, EDL=0.0065		ng/L	
			HexaCB-(139)+(140)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'3455'-HexaCB-(141)	2023/03/03	0.0545, EDL=0.0062		ng/L	
			22'3456-HexaCB-(142)	2023/03/03	0.0074 U, EDL=0.0074		ng/L	
			22'345'6-HexaCB-(144)	2023/03/03	0.022 J, EDL=0.013		ng/L	
			22'3466'-HexaCB-(145)	2023/03/03	0.0093 U, EDL=0.0093		ng/L	
			22'34'55'-HexaCB-(146)	2023/03/03	0.0310 J, EDL=0.0058		ng/L	
			HexaCB-(147)+(149)	2023/03/03	0.274, EDL=0.0055		ng/L	
			22'34'56'-HexaCB-(148)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'34'66'-HexaCB-(150)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			22'3566'-HexaCB-(152)	2023/03/03	0.0094 U, EDL=0.0094		ng/L	
			HexaCB-(153)+(168)	2023/03/03	0.237, EDL=0.0050		ng/L	
			22'44'56'-HexaCB-(154)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'44'66'-HexaCB-(155)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			HexaCB-(156)+(157)	2023/03/03	0.0088 J, EDL=0.0035		ng/L	
			233'44'6-HexaCB-(158)	2023/03/03	0.0167 J, EDL=0.0042		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'455'-HexaCB-(159)	2023/03/03	0.0033 U, EDL=0.0033		ng/L	
			233'456'-HexaCB-(160)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			233'45'6'-HexaCB-(161)	2023/03/03	0.0048 U, EDL=0.0048		ng/L	
			233'4'55'-HexaCB-(162)	2023/03/03	0.0032 U, EDL=0.0032		ng/L	
			233'4'5'6'-HexaCB-(164)	2023/03/03	0.0103 J, EDL=0.0046		ng/L	
			233'55'6'-HexaCB-(165)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			23'44'55'-HexaCB-(167)	2023/03/03	0.0041 J, EDL=0.0035		ng/L	
			33'44'55'-HexaCB-(169)	2023/03/03	0.0038 U, EDL=0.0038		ng/L	
			22'33'44'5'-HeptaCB-(170)	2023/03/03	0.0208 J, EDL=0.0054		ng/L	
			HeptaCB-(171)+(173)	2023/03/03	0.013 U, EDL=0.013 (2)		ng/L	
			22'33'455'-HeptaCB-(172)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'33'456'-HeptaCB-(174)	2023/03/03	0.0523, EDL=0.0054		ng/L	
			22'33'45'6'-HeptaCB-(175)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'33'466'-HeptaCB-(176)	2023/03/03	0.0140 J, EDL=0.0076		ng/L	
			22'33'45'6'-HeptaCB-(177)	2023/03/03	0.0308 J, EDL=0.0059		ng/L	
			22'33'55'6'-HeptaCB-(178)	2023/03/03	0.014 J, EDL=0.011		ng/L	
			22'33'566'-HeptaCB-(179)	2023/03/03	0.0419 J, EDL=0.0074		ng/L	
			HeptaCB-(180)+(193)	2023/03/03	0.0737 J, EDL=0.0047		ng/L	
			22'344'56'-HeptaCB-(181)	2023/03/03	0.0056 U, EDL=0.0056		ng/L	
			22'344'56'-HeptaCB-(182)	2023/03/03	0.0098 U, EDL=0.0098		ng/L	
			22'344'5'6'-HeptaCB-(183)	2023/03/03	0.0419 J, EDL=0.0048		ng/L	
			22'344'66'-HeptaCB-(184)	2023/03/03	0.0073 U, EDL=0.0073		ng/L	
			22'3455'6'-HeptaCB-(185)	2023/03/03	0.0058 U, EDL=0.0058		ng/L	
			22'34566'-HeptaCB-(186)	2023/03/03	0.0079 U, EDL=0.0079		ng/L	
			22'34'55'6'-HeptaCB-(187)	2023/03/03	0.085, EDL=0.010		ng/L	
			22'34'566'-HeptaCB-(188)	2023/03/03	0.0080 U, EDL=0.0080		ng/L	
			233'44'55'-HeptaCB-(189)	2023/03/03	0.0039 U, EDL=0.0039		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C347713

Report Date: 2023/05/17

Apex Laboratories

Client Project #: A3B0522

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'44'56-HeptaCB-(190)	2023/03/03	0.0049 J, EDL=0.0043		ng/L	
			233'44'5'6-HeptaCB-(191)	2023/03/03	0.0042 U, EDL=0.0042		ng/L	
			233'455'6-HeptaCB-(192)	2023/03/03	0.0047 U, EDL=0.0047		ng/L	
			22'33'44'55'-OctaCB-(194)	2023/03/03	0.0078 U, EDL=0.0078		ng/L	
			22'33'44'56-OctaCB-(195)	2023/03/03	0.0084 U, EDL=0.0084		ng/L	
			22'33'44'56'-OctaCB-(196)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'33'44'66'OctaCB-(197)	2023/03/03	0.0081 U, EDL=0.0081		ng/L	
			OctaCB-(198)+(199)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'33'4566'-OctaCB-(200)	2023/03/03	0.0082 U, EDL=0.0082		ng/L	
			22'33'45'66'-OctaCB-(201)	2023/03/03	0.0076 U, EDL=0.0076		ng/L	
			22'33'55'66'-OctaCB-(202)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			22'344'55'6-OctaCB-(203)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'344'566'-OctaCB-(204)	2023/03/03	0.0075 U, EDL=0.0075		ng/L	
			233'44'55'6-OctaCB-(205)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'33'44'55'6-NonaCB-(206)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'33'44'566'-NonaCB-(207)	2023/03/03	0.0076 U, EDL=0.0076		ng/L	
			22'33'455'66'-NonaCB-(208)	2023/03/03	0.0079 U, EDL=0.0079		ng/L	
			DecaCB-(209)	2023/03/03	0.012 U, EDL=0.012		ng/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The extracted internal standard analyte exhibited high recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. For results that were not detected (ND), this potential high bias has no impact.

(2) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Angel Guerrero, Supervisor, Ultra Trace Analysis, HRMS and SVOC

Colm McNamara, Senior Analyst, Liquid Chromatography

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

SUBCONTRACT ORDER

Apex Laboratories

AB 215 MW3 **A3B0522**

17-Feb-23 12:20

Lori Dufour



C347713

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY: A.I.G.

ENV-1656
BV Labs / Maxxam
C/O FEDEX DEPOT 299 Cayuga Rd
Cheektowaga, NY 14225
Phone : (800) 668-0639
Fax: (905) 332-9169

Sample Name: MW3-20230214-GW-35

Water **Sampled: 02/14/23 10:05** (A3B0522-01)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	02/14/24 10:05	
1668C PCB Congeners (SUB)	02/28/23 17:00	02/14/24 10:05	
1699 Insecticides/Pesticides (SUB)	02/28/23 17:00	02/21/23 10:05	waters
537M - PFOAs (SUB)	02/28/23 17:00	02/21/23 10:05	
<i>Containers Supplied:</i>			
(H)Other-Non Preserved			
(I)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(U)1 L Amber Glass - Non Preserved			

Sample Name: MW3-20230214-GW-35-DUP

Water **Sampled: 02/14/23 10:05** (A3B0522-02)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	02/14/24 10:05	
1668C PCB Congeners (SUB)	02/28/23 17:00	02/14/24 10:05	
1699 Insecticides/Pesticides (SUB)	02/28/23 17:00	02/21/23 10:05	waters
537M - PFOAs (SUB)	02/28/23 17:00	02/21/23 10:05	
<i>Containers Supplied:</i>			
(H)Other-Non Preserved			
(I)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(U)1 L Amber Glass - Non Preserved			

Standard TMT

	<i>PCS 215</i>	Fed Ex (Shipper)	
	<i>12-2-15-23</i>		
Released By	Date	Received By	Date
Fed Ex (Shipper)		<i>ARSHDEEP</i>	<i>2023/02/17 12:20</i>
Released By	Date	Received By	Date
	<i>N/A</i>	<i>On ice</i>	<i>ref to ACTR</i>

SUBCONTRACT ORDER

Apex Laboratories

AB 2/15/23 A3B0522

Sample Name: MW5-20230214-GW-40 Water Sampled: 02/14/23 12:51 (A3B0522-03)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	02/14/24 12:51	
1668C PCB Congeners (SUB)	02/28/23 17:00	02/14/24 12:51	
1699 Insecticides/Pesticides (SUB)	02/28/23 17:00	02/21/23 12:51	waters
537M - PFOAs (SUB)	02/28/23 17:00	02/21/23 12:51	
<i>Containers Supplied:</i>			
(H)Other-Non Preserved			
(I)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(U)1 L Amber Glass - Non Preserved			

Sample Name: MW4-20230214-GW-40 Water Sampled: 02/14/23 14:37 (A3B0522-04)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	02/14/24 14:37	
1668C PCB Congeners (SUB)	02/28/23 17:00	02/14/24 14:37	
1699 Insecticides/Pesticides (SUB)	02/28/23 17:00	02/21/23 14:37	waters
537M - PFOAs (SUB)	02/28/23 17:00	02/21/23 14:37	
<i>Containers Supplied:</i>			
(H)Other-Non Preserved			
(I)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(U)1 L Amber Glass - Non Preserved			

Standard TAT

[Signature] 2-15-23 Fed Ex (Shipper)
Released By _____ Date _____ Received By _____ Date _____
Fed Ex (Shipper)
Released By _____ Date _____ Received By _____ Date _____

SUBCONTRACT ORDER

Apex Laboratories

2/15/23 A3B0522

Sample Name: MW6-20230214-GW-40.25 Water Sampled: 02/14/23 16:17 (A3B0522-05)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	02/28/23 17:00	02/14/24 16:17	
1668C PCB Congeners (SUB)	02/28/23 17:00	02/14/24 16:17	
1699 Insecticides/Pesticides (SUB)	02/28/23 17:00	02/21/23 16:17	waters
537M - PFOAs (SUB)	02/28/23 17:00	02/21/23 16:17	
<i>Containers Supplied:</i>			
(H)Other-Non Preserved			
(I)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(U)1 L Amber Glass - Non Preserved			

Sample Name: Field Blank-02 Water Sampled: 02/14/23 16:10 (A3B0522-06)

Analysis	Due	Expires	Comments
537M - PFOAs (SUB)	02/28/23 17:00	02/21/23 16:10	
<i>Containers Supplied:</i>			
(A)Other-Non Preserved			
(B)Other-Non Preserved			

Standard TAT

[Signature] 2-15-23 Fed Ex (Shipper)
Released By _____ Date _____ Received By _____ Date _____
Fed Ex (Shipper)
Released By _____ Date _____ Received By _____ Date _____



Your Project #: A3B0674
Your C.O.C. #: n/a

Attention: Philip Nerenberg

Apex Laboratories
6700 SW Sandburg St.
Tigard, OR
USA 97223

Report Date: 2023/04/21
Report #: R7597655
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C351279

Received: 2023/02/22, 12:20

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dioxins/Furans in Water (1613B) (1)	2	2023/02/24	2023/02/28	BRL SOP-00410	EPA 1613B m
OC Pesticides in Water by GCTQ	2	2023/02/27	2023/03/03	BRL SOP-00014	EPA Method 1699m
PCB Congeners in Water (1668C)	2	2023/02/23	2023/04/06	BRL SOP-00408	EPA 1668C m
PFAS in water by SPE/LCMS (2)	2	2023/03/04	2023/03/05	CAM SOP-00894	EPA 537.1 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

(2) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Lori Dufour, Project Manager

Email: Lori.Dufour@bureauveritas.com

Phone# (905) 817-5700

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VCT482			VCT483			
Sampling Date		2023/02/20 10:26			2023/02/20 14:41			
COC Number		n/a			n/a			
	UNITS	MW1-20230220-GW-70	RDL	MDL	MW2-20230220-GW-60	RDL	MDL	QC Batch
Aldrin	ng/L	0.021 U	0.20	0.021	0.052 J	0.20	0.021	8523575
alpha-BHC	ng/L	0.024 U	0.20	0.024	0.024 U	0.20	0.024	8523575
delta-BHC	ng/L	0.029 U	0.20	0.029	0.029 U	0.20	0.029	8523575
beta-BHC	ng/L	0.024 J	0.20	0.014	0.020 U (1)	0.29	0.020	8523575
Lindane	ng/L	0.067 J	0.20	0.033	0.058 J	0.20	0.033	8523575
a-Chlordane	ng/L	0.029 U	0.20	0.029	0.029 U	0.20	0.029	8523575
g-Chlordane	ng/L	0.029 U	0.20	0.029	0.029 U	0.20	0.029	8523575
Oxychlordane	ng/L	0.028 U	0.20	0.028	0.028 U	0.20	0.028	8523575
o,p-DDD	ng/L	0.020 U	0.20	0.020	0.020 U	0.20	0.020	8523575
p,p-DDD	ng/L	0.014 U	0.20	0.014	0.015 J	0.20	0.014	8523575
o,p-DDE	ng/L	0.016 U	0.20	0.016	0.016 U	0.20	0.016	8523575
p,p-DDE	ng/L	0.012 U	0.20	0.012	0.026 J	0.20	0.012	8523575
o,p-DDT	ng/L	0.040 U	0.20	0.040	0.041 J	0.20	0.040	8523575
p,p-DDT	ng/L	0.050 U	0.20	0.050	0.050 U	0.20	0.050	8523575
Dieldrin	ng/L	0.050 U	0.20	0.050	0.050 U	0.20	0.050	8523575
Endosulfan I	ng/L	0.067 U	0.40	0.067	0.067 U	0.40	0.067	8523575
Endosulfan II	ng/L	0.074 U	0.40	0.074	0.089 J	0.40	0.074	8523575
Endosulfan sulfate	ng/L	0.070 U	0.20	0.070	0.070 U	0.20	0.070	8523575
Endrin	ng/L	0.093 J	0.20	0.045	0.045 U	0.20	0.045	8523575
Endrin aldehyde	ng/L	0.071 U	0.20	0.071	0.071 U	0.20	0.071	8523575
Endrin ketone	ng/L	0.034 U	0.20	0.034	0.034 U	0.20	0.034	8523575
Heptachlor	ng/L	0.029 U	0.20	0.029	0.029 U	0.20	0.029	8523575
Heptachlor epoxide	ng/L	0.015 U	0.20	0.015	0.092 J	0.20	0.015	8523575
Hexachlorobenzene	ng/L	0.10 U	0.20	0.10	0.10 U	0.20	0.10	8523575
Methoxychlor	ng/L	0.040 U	0.20	0.040	0.040 U	0.20	0.040	8523575
Mirex	ng/L	0.021 U	0.20	0.021	0.021 U	0.20	0.021	8523575
cis-Nonachlor	ng/L	0.037 U	0.20	0.037	0.037 U	0.20	0.037	8523575
trans-Nonachlor	ng/L	0.044 U	0.20	0.044	0.044 U	0.20	0.044	8523575
Surrogate Recovery (%)								
13C10-cis Nonachlor	%	79	N/A	N/A	84	N/A	N/A	8523575
13C10-Heptachlor	%	79	N/A	N/A	83	N/A	N/A	8523575
13C10-Heptachlor Epoxide	%	76	N/A	N/A	88	N/A	N/A	8523575
13C10-Oxychlordane	%	79	N/A	N/A	89	N/A	N/A	8523575
13C10-trans Nonachlor	%	76	N/A	N/A	88	N/A	N/A	8523575
13C12-Endrin	%	96	N/A	N/A	106	N/A	N/A	8523575
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.								



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VCT482			VCT483			
Sampling Date		2023/02/20 10:26			2023/02/20 14:41			
COC Number		n/a			n/a			
	UNITS	MW1-20230220-GW-70	RDL	MDL	MW2-20230220-GW-60	RDL	MDL	QC Batch
13C12-Endrin Ketone	%	78	N/A	N/A	78	N/A	N/A	8523575
13C6-beta BHC	%	74	N/A	N/A	57	N/A	N/A	8523575
13C6-d6-gamma BHC (Lindane)	%	74	N/A	N/A	63	N/A	N/A	8523575
13C-Methoxychlor	%	96	N/A	N/A	110	N/A	N/A	8523575
13C-pp-DDD	%	83	N/A	N/A	93	N/A	N/A	8523575
13C-pp-DDE	%	79	N/A	N/A	85	N/A	N/A	8523575
13C-pp-DDT	%	73	N/A	N/A	77	N/A	N/A	8523575
C13-Hexachlorobenzene	%	64	N/A	N/A	70	N/A	N/A	8523575
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable								



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VCT483			
Sampling Date		2023/02/20 14:41			
COC Number		n/a			
	UNITS	MW2-20230220-GW-60 Lab-Dup	RDL	MDL	QC Batch
Aldrin	ng/L	0.031 J	0.20	0.021	8523575
alpha-BHC	ng/L	0.024 U	0.20	0.024	8523575
delta-BHC	ng/L	0.029 U	0.20	0.029	8523575
beta-BHC	ng/L	0.016 U (1)	0.23	0.016	8523575
Lindane	ng/L	0.072 J	0.20	0.033	8523575
a-Chlordane	ng/L	0.029 U	0.20	0.029	8523575
g-Chlordane	ng/L	0.029 U	0.20	0.029	8523575
Oxychlordane	ng/L	0.028 U	0.20	0.028	8523575
o,p-DDD	ng/L	0.020 U	0.20	0.020	8523575
p,p-DDD	ng/L	0.014 U	0.20	0.014	8523575
o,p-DDE	ng/L	0.016 U	0.20	0.016	8523575
p,p-DDE	ng/L	0.026 J	0.20	0.012	8523575
o,p-DDT	ng/L	0.040 U	0.20	0.040	8523575
p,p-DDT	ng/L	0.050 U	0.20	0.050	8523575
Dieldrin	ng/L	0.050 U	0.20	0.050	8523575
Endosulfan I	ng/L	0.092 J	0.40	0.067	8523575
Endosulfan II	ng/L	0.074 U	0.40	0.074	8523575
Endosulfan sulfate	ng/L	0.070 U	0.20	0.070	8523575
Endrin	ng/L	0.075 J	0.20	0.045	8523575
Endrin aldehyde	ng/L	0.071 U	0.20	0.071	8523575
Endrin ketone	ng/L	0.034 U	0.20	0.034	8523575
Heptachlor	ng/L	0.029 U	0.20	0.029	8523575
Heptachlor epoxide	ng/L	0.112 J	0.20	0.015	8523575
Hexachlorobenzene	ng/L	0.10 U	0.20	0.10	8523575
Methoxychlor	ng/L	0.040 U	0.20	0.040	8523575
Mirex	ng/L	0.021 U	0.20	0.021	8523575
cis-Nonachlor	ng/L	0.037 U	0.20	0.037	8523575
trans-Nonachlor	ng/L	0.044 U	0.20	0.044	8523575
Surrogate Recovery (%)					
13C10-cis Nonachlor	%	91	N/A	N/A	8523575
13C10-Heptachlor	%	85	N/A	N/A	8523575
13C10-Heptachlor Epoxide	%	95	N/A	N/A	8523575
13C10-Oxychlordane	%	87	N/A	N/A	8523575
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.					



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VCT483			
Sampling Date		2023/02/20 14:41			
COC Number		n/a			
	UNITS	MW2-20230220-GW-60 Lab-Dup	RDL	MDL	QC Batch
13C10-trans Nonachlor	%	86	N/A	N/A	8523575
13C12-Endrin	%	103	N/A	N/A	8523575
13C12-Endrin Ketone	%	78	N/A	N/A	8523575
13C6-beta BHC	%	82	N/A	N/A	8523575
13C6-d6-gamma BHC (Lindane)	%	77	N/A	N/A	8523575
13C-Methoxychlor	%	114	N/A	N/A	8523575
13C-pp-DDD	%	94	N/A	N/A	8523575
13C-pp-DDE	%	96	N/A	N/A	8523575
13C-pp-DDT	%	79	N/A	N/A	8523575
C13-Hexachlorobenzene	%	63	N/A	N/A	8523575
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					



PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VCT482	VCT483			
Sampling Date		2023/02/20 10:26	2023/02/20 14:41			
COC Number		n/a	n/a			
	UNITS	MW1-20230220-GW-70	MW2-20230220-GW-60	RDL	MDL	QC Batch
Perfluorobutanoic acid (PFBA)	ug/L	0.0015 U	0.0015 U	0.020	0.0015	8534937
Perfluoropentanoic acid (PFPeA)	ug/L	0.0025 U	0.0025 U	0.020	0.0025	8534937
Perfluorohexanoic acid (PFHxA)	ug/L	0.0038 U	0.0038 U	0.020	0.0038	8534937
Perfluoroheptanoic acid (PFHpA)	ug/L	0.0018 U	0.0018 U	0.020	0.0018	8534937
Perfluorooctanoic acid (PFOA)	ug/L	0.011 J	0.0030 U	0.020	0.0030	8534937
Perfluorononanoic acid (PFNA)	ug/L	0.0070 J	0.0021 U	0.020	0.0021	8534937
Perfluorodecanoic acid (PFDA)	ug/L	0.0016 U	0.0016 U	0.020	0.0016	8534937
Perfluoroundecanoic acid (PFUnA)	ug/L	0.0024 U	0.0024 U	0.020	0.0024	8534937
Perfluorododecanoic acid (PFDoA)	ug/L	0.0029 U	0.0029 U	0.020	0.0029	8534937
Perfluorotridecanoic acid (PFTRDA)	ug/L	0.0026 U	0.0026 U	0.020	0.0026	8534937
Perfluorotetradecanoic acid(PFTEDA)	ug/L	0.0016 U	0.0016 U	0.020	0.0016	8534937
Perfluorobutanesulfonic acid (PFBS)	ug/L	0.0021 U	0.0021 U	0.020	0.0021	8534937
Perfluoropentanesulfonic acid PFPes	ug/L	0.0023 U	0.0023 U	0.020	0.0023	8534937
Perfluorohexanesulfonic acid(PFHxS)	ug/L	0.0022 U	0.0022 U	0.020	0.0022	8534937
Perfluoroheptanesulfonic acid PFHpS	ug/L	0.0039 U	0.0039 U	0.020	0.0039	8534937
Perfluorooctanesulfonic acid (PFOS)	ug/L	0.0035 U	0.0035 U	0.020	0.0035	8534937
Perfluoronananesulfonic acid (PFNS)	ug/L	0.0037 U	0.0037 U	0.020	0.0037	8534937
Perfluorodecanesulfonic acid (PFDS)	ug/L	0.0048 U	0.0048 U	0.020	0.0048	8534937
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0034 U	0.0034 U	0.020	0.0034	8534937
EtFOSA	ug/L	0.0095 U	0.0095 U	0.020	0.0095	8534937
MeFOSA	ug/L	0.0084 U	0.0084 U	0.020	0.0084	8534937
EtFOSE	ug/L	0.0070 U	0.0070 U	0.020	0.0070	8534937
MeFOSE	ug/L	0.0073 U	0.0073 U	0.020	0.0073	8534937
EtFOSAA	ug/L	0.0046 U	0.0046 U	0.020	0.0046	8534937
MeFOSAA	ug/L	0.0045 U	0.0045 U	0.020	0.0045	8534937
4:2 Fluorotelomer sulfonic acid	ug/L	0.0033 U	0.0033 U	0.020	0.0033	8534937
6:2 Fluorotelomer sulfonic acid	ug/L	0.0015 U	0.0015 U	0.020	0.0015	8534937
8:2 Fluorotelomer sulfonic acid	ug/L	0.0031 U	0.0031 U	0.020	0.0031	8534937
Hexafluoropropyleneoxide dimer acid	ug/L	0.0052 U	0.0052 U	0.020	0.0052	8534937
4,8-Dioxa-3H-perfluorononanoic acid	ug/L	0.0027 U	0.0027 U	0.020	0.0027	8534937
9Cl-PF3ONS (F-53B Major)	ug/L	0.0043 U	0.0043 U	0.020	0.0043	8534937
11Cl-PF3OUdS (F-53B Minor)	ug/L	0.0035 U	0.0035 U	0.020	0.0035	8534937
Surrogate Recovery (%)						
13C2-4:2-Fluorotelomersulfonic Acid	%	102	90	N/A	N/A	8534937
13C2-6:2-Fluorotelomersulfonic Acid	%	101	92	N/A	N/A	8534937
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable						



PERFLUOROALKYL SUBSTANCES (WATER)

Bureau Veritas ID		VCT482	VCT483			
Sampling Date		2023/02/20 10:26	2023/02/20 14:41			
COC Number		n/a	n/a			
	UNITS	MW1-20230220-GW-70	MW2-20230220-GW-60	RDL	MDL	QC Batch
13C2-8:2-Fluorotelomersulfonic Acid	%	100	93	N/A	N/A	8534937
13C2-Perfluorodecanoic acid	%	102	90	N/A	N/A	8534937
13C2-Perfluorododecanoic acid	%	92	82	N/A	N/A	8534937
13C2-Perfluorohexanoic acid	%	104	93	N/A	N/A	8534937
13C2-perfluorotetradecanoic acid	%	82	56	N/A	N/A	8534937
13C2-Perfluoroundecanoic acid	%	96	87	N/A	N/A	8534937
13C3-HFPO-DA	%	99	91	N/A	N/A	8534937
13C3-Perfluorobutanesulfonic acid	%	108	96	N/A	N/A	8534937
13C4-Perfluorobutanoic acid	%	105	93	N/A	N/A	8534937
13C4-Perfluoroheptanoic acid	%	104	93	N/A	N/A	8534937
13C4-Perfluorooctanesulfonic acid	%	101	94	N/A	N/A	8534937
13C4-Perfluorooctanoic acid	%	102	92	N/A	N/A	8534937
13C5-Perfluorononanoic acid	%	103	91	N/A	N/A	8534937
13C5-Perfluoropentanoic acid	%	106	94	N/A	N/A	8534937
13C8-Perfluorooctane Sulfonamide	%	100	93	N/A	N/A	8534937
18O2-Perfluorohexanesulfonic acid	%	105	94	N/A	N/A	8534937
D3-MeFOSA	%	82	74	N/A	N/A	8534937
D3-MeFOSAA	%	95	89	N/A	N/A	8534937
D5-EtFOSA	%	82	75	N/A	N/A	8534937
D5-EtFOSAA	%	91	83	N/A	N/A	8534937
D7-MeFOSE	%	90	78	N/A	N/A	8534937
D9-EtFOSE	%	90	78	N/A	N/A	8534937
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	1.45 U	1.45	10.5	1.45	1.00	1.45	0	8524619
1,2,3,7,8-Penta CDD *	pg/L	1.07 U	1.07	52.6	1.86	1.00	1.07	0	8524619
1,2,3,4,7,8-Hexa CDD *	pg/L	1.10 U	1.10	52.6	2.25	0.100	0.110	0	8524619
1,2,3,6,7,8-Hexa CDD *	pg/L	1.08 U	1.08	52.6	1.40	0.100	0.108	0	8524619
1,2,3,7,8,9-Hexa CDD *	pg/L	1.02 U	1.02	52.6	1.13	0.100	0.102	0	8524619
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.06 U	1.06	52.6	1.90	0.0100	0.0106	0	8524619
Octa CDD *	pg/L	1.07 U	1.07	105	3.13	0.000300	0.000321	0	8524619
Total Tetra CDD *	pg/L	1.45 U	1.45	10.5	4.00	N/A	N/A	0	8524619
Total Penta CDD *	pg/L	1.07 U	1.07	52.6	4.00	N/A	N/A	0	8524619
Total Hexa CDD *	pg/L	1.15 U	1.15	52.6	4.00	N/A	N/A	0	8524619
Total Hepta CDD *	pg/L	1.06 U	1.06	52.6	4.00	N/A	N/A	0	8524619
2,3,7,8-Tetra CDF **	pg/L	1.07 U	1.07	10.5	1.68	0.100	0.107	0	8524619
1,2,3,7,8-Penta CDF **	pg/L	1.31 U	1.31	52.6	1.33	0.0300	0.0393	0	8524619
2,3,4,7,8-Penta CDF **	pg/L	1.11 U	1.11	52.6	1.23	0.300	0.333	0	8524619
1,2,3,4,7,8-Hexa CDF **	pg/L	0.904 U	0.904	52.6	1.85	0.100	0.0904	0	8524619
1,2,3,6,7,8-Hexa CDF **	pg/L	0.911 U	0.911	52.6	1.52	0.100	0.0911	0	8524619
2,3,4,6,7,8-Hexa CDF **	pg/L	0.811 U	0.811	52.6	1.97	0.100	0.0811	0	8524619
1,2,3,7,8,9-Hexa CDF **	pg/L	0.979 U	0.979	52.6	1.66	0.100	0.0979	0	8524619
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.870 U	0.870	52.6	2.00	0.0100	0.00870	0	8524619
1,2,3,4,7,8,9-Hepta CDF **	pg/L	0.962 U	0.962	52.6	1.87	0.0100	0.00962	0	8524619
Octa CDF **	pg/L	0.954 U	0.954	105	3.99	0.000300	0.000286	0	8524619
Total Tetra CDF **	pg/L	1.07 U	1.07	10.5	4.00	N/A	N/A	0	8524619
Total Penta CDF **	pg/L	1.20 U	1.20	52.6	4.00	N/A	N/A	0	8524619
Total Hexa CDF **	pg/L	0.898 U	0.898	52.6	4.00	N/A	N/A	0	8524619
Total Hepta CDF **	pg/L	0.913 U	0.913	52.6	4.00	N/A	N/A	0	8524619
TOTAL TOXIC EQUIVALENCY	pg/L	N/A	N/A	N/A	N/A	N/A	3.71	N/A	N/A
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	79	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234678 HeptaCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch * CDD = Chloro Dibenzo-p-Dioxin N/A = Not Applicable ** CDF = Chloro Dibenzo-p-Furan									



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDD *	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 ** CDF = Chloro Dibenzo-p-Furan
 N/A = Not Applicable
 * CDD = Chloro Dibenzo-p-Dioxin



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	1.53 U	1.53	10.2	1.45	1.00	1.53	0	8524619
1,2,3,7,8-Penta CDD *	pg/L	1.06 U	1.06	51.0	1.86	1.00	1.06	0	8524619
1,2,3,4,7,8-Hexa CDD *	pg/L	1.02 U	1.02	51.0	2.25	0.100	0.102	0	8524619
1,2,3,6,7,8-Hexa CDD *	pg/L	1.07 U	1.07	51.0	1.40	0.100	0.107	0	8524619
1,2,3,7,8,9-Hexa CDD *	pg/L	0.971 U	0.971	51.0	1.13	0.100	0.0971	0	8524619
1,2,3,4,6,7,8-Hepta CDD *	pg/L	1.01 U	1.01	51.0	1.90	0.0100	0.0101	0	8524619
Octa CDD *	pg/L	3.63 J	1.08	102	3.13	0.000300	0.00109	1	8524619
Total Tetra CDD *	pg/L	1.53 U	1.53	10.2	4.00	N/A	N/A	0	8524619
Total Penta CDD *	pg/L	1.06 U	1.06	51.0	4.00	N/A	N/A	0	8524619
Total Hexa CDD *	pg/L	1.39 U	1.39	51.0	4.00	N/A	N/A	0	8524619
Total Hepta CDD *	pg/L	1.01 U	1.01	51.0	4.00	N/A	N/A	0	8524619
2,3,7,8-Tetra CDF **	pg/L	1.12 U	1.12	10.2	1.68	0.100	0.112	0	8524619
1,2,3,7,8-Penta CDF **	pg/L	1.33 U	1.33	51.0	1.33	0.0300	0.0399	0	8524619
2,3,4,7,8-Penta CDF **	pg/L	1.14 U	1.14	51.0	1.23	0.300	0.342	0	8524619
1,2,3,4,7,8-Hexa CDF **	pg/L	0.891 U	0.891	51.0	1.85	0.100	0.0891	0	8524619
1,2,3,6,7,8-Hexa CDF **	pg/L	0.884 U	0.884	51.0	1.52	0.100	0.0884	0	8524619
2,3,4,6,7,8-Hexa CDF **	pg/L	0.800 U	0.800	51.0	1.97	0.100	0.0800	0	8524619
1,2,3,7,8,9-Hexa CDF **	pg/L	0.955 U	0.955	51.0	1.66	0.100	0.0955	0	8524619
1,2,3,4,6,7,8-Hepta CDF **	pg/L	0.844 U	0.844	51.0	2.00	0.0100	0.00844	0	8524619
1,2,3,4,7,8,9-Hepta CDF **	pg/L	0.897 U	0.897	51.0	1.87	0.0100	0.00897	0	8524619
Octa CDF **	pg/L	0.958 U	0.958	102	3.99	0.000300	0.000287	0	8524619
Total Tetra CDF **	pg/L	1.12 U	1.12	10.2	4.00	N/A	N/A	0	8524619
Total Penta CDF **	pg/L	1.23 U	1.23	51.0	4.00	N/A	N/A	0	8524619
Total Hexa CDF **	pg/L	0.880 U	0.880	51.0	4.00	N/A	N/A	0	8524619
Total Hepta CDF **	pg/L	0.869 U	0.869	51.0	4.00	N/A	N/A	0	8524619
TOTAL TOXIC EQUIVALENCY	pg/L	N/A	N/A	N/A	N/A	N/A	3.77	N/A	N/A
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	84	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234678 HeptaCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	8524619
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch * CDD = Chloro Dibenzo-p-Dioxin N/A = Not Applicable ** CDF = Chloro Dibenzo-p-Furan									



DIOXINS AND FURANS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123478 HexaCDF **	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-1234789 HeptaCDF **	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123678 HexaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDD *	%	88	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-12378 PentaCDF **	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-123789 HexaCDF **	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-234678 HexaCDF **	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-23478 PentaCDF **	%	86	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDD *	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-2378 TetraCDF **	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8524619
C13-OCDD *	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8524619

EDL = Estimated Detection Limit
 RDL = Reportable Detection Limit
 TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
 The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
 WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
 QC Batch = Quality Control Batch
 ** CDF = Chloro Dibenzo-p-Furan
 N/A = Not Applicable
 * CDD = Chloro Dibenzo-p-Dioxin



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.028	0.024	0.021	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.055	0.021	0.021	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.100	0.017	0.052	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.020 U	0.020	0.052	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0053 U	0.0053	0.052	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0055 U	0.0055	0.021	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0053 U	0.0053	0.021	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0091 J	0.0052	0.052	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0052 U	0.0052	0.021	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.0073 U	0.0073	0.052	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.365	0.0054	0.21	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0057 J	0.0050	0.052	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0054 U	0.0054	0.021	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0138 J	0.0046	0.052	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.013 U	0.013	0.052	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.011 U	0.011	0.021	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.0123 J	0.0091	0.052	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.012 U	0.012	0.021	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0059 J	0.0028	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0038 J	0.0031	0.052	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0064 U	0.0064	0.021	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0063 U	0.0063	0.021	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0080 U	0.0080	0.021	0.0043	N/A	N/A	1	8533813
2,3',4-TriCB-(25)	ng/L	0.0064 U	0.0064	0.021	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0058 U	0.0058	0.052	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0076 U	0.0076	0.021	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0114 J	0.0054	0.052	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0074 U	0.0074	0.021	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0062 U	0.0062	0.021	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0064 U	0.0064	0.021	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0057 U	0.0057	0.021	0.0052	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
344'-TriCB-(37)	ng/L	0.0066 U	0.0066	0.021	0.0041	N/A	N/A	1	8533813
345-TriCB-(38)	ng/L	0.0059 U	0.0059	0.021	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0063 U	0.0063	0.021	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.019 U	0.019	0.10	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.026 U	0.026	0.052	0.011	N/A	N/A	1	8533813
22'35-TetraCB-(43)	ng/L	0.025 U	0.025	0.052	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.018 U	0.018	0.10	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.020 U (1)	0.020	0.052	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.022 U	0.022	0.021	0.014	N/A	N/A	1	8533813
22'45-TetraCB-(48)	ng/L	0.019 U	0.019	0.052	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.017 U	0.017	0.10	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.019 U	0.019	0.10	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.031 J	0.019	0.052	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.021 U	0.021	0.052	0.020	N/A	N/A	1	8533813
233'4-TetraCB-(55)	ng/L	0.015 U	0.015	0.052	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.014 U	0.014	0.052	0.018	N/A	N/A	1	8533813
233'5-TetraCB-(57)	ng/L	0.014 U	0.014	0.052	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.013 U	0.013	0.052	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.014 U	0.014	0.10	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.014 U	0.014	0.052	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.032 J	0.014	0.21	0.035	N/A	N/A	1	8533813
234'5-TetraCB-(63)	ng/L	0.013 U	0.013	0.052	0.0080	N/A	N/A	1	8533813
234'6-TetraCB-(64)	ng/L	0.016 U	0.016	0.052	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.013 U	0.013	0.052	0.0084	N/A	N/A	1	8533813
23'45-TetraCB-(67)	ng/L	0.011 U	0.011	0.052	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.012 U	0.012	0.052	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.013 U	0.013	0.052	0.0082	N/A	N/A	1	8533813
23'5'6-TetraCB-(73)	ng/L	0.013 U	0.013	0.052	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.011 U	0.011	0.052	0.011	0.000100	0.00000110	1	8533813
33'45-TetraCB-(78)	ng/L	0.015 U	0.015	0.052	0.013	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
33'45'-TetraCB(79)	ng/L	0.011 U	0.011	0.052	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.011 U	0.011	0.052	0.0087	N/A	N/A	1	8533813
344'5'-TetraCB-(81)	ng/L	0.012 U	0.012	0.052	0.0079	0.000300	0.00000360	1	8533813
22'33'4'-PentaCB-(82)	ng/L	0.025 U	0.025	0.052	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.020 U	0.020	0.10	0.033	N/A	N/A	1	8533813
22'33'6'-PentaCB-(84)	ng/L	0.021 U	0.021	0.021	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.026 U	0.026	0.10	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.026 J	0.016	0.21	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.020 U	0.020	0.052	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.024 U	0.024	0.052	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.016 U (1)	0.016	0.21	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.022 U	0.022	0.052	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.019 U	0.019	0.21	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.020 U	0.020	0.052	0.017	N/A	N/A	1	8533813
22'35'6'-PentaCB-(95)	ng/L	0.052	0.022	0.052	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.016 U	0.016	0.052	0.014	N/A	N/A	1	8533813
22'45'6'-PentaCB-(103)	ng/L	0.020 U	0.020	0.052	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.016 U (1)	0.016	0.052	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.0100 J	0.0096	0.052	0.0052	0.0000300	0.000000300	1	8533813
233'45'-PentaCB-(106)	ng/L	0.012 U	0.012	0.052	0.018	N/A	N/A	1	8533813
233'4'5'-PentaCB-(107)	ng/L	0.0091 U	0.0091	0.052	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.011 U	0.011	0.10	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.046 J	0.015	0.10	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.013 U	0.013	0.052	0.012	N/A	N/A	1	8533813
233'56'-PentaCB-(112)	ng/L	0.013 U	0.013	0.052	0.018	N/A	N/A	1	8533813
2344'5'-PentaCB-(114)	ng/L	0.011 U	0.011	0.052	0.0084	0.0000300	0.000000330	1	8533813
23'44'5'-PentaCB-(118)	ng/L	0.031 J	0.010	0.10	0.0071	0.0000300	0.000000930	1	8533813
23'455'-PentaCB-(120)	ng/L	0.014 U	0.014	0.052	0.014	N/A	N/A	1	8533813
23'45'6'-PentaCB-(121)	ng/L	0.014 U	0.014	0.052	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.015 U	0.015	0.052	0.011	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'44'5'-PentaCB-(123)	ng/L	0.011 U	0.011	0.052	0.014	0.0000300	0.000000330	1	8533813
33'44'5'-PentaCB-(126)	ng/L	0.010 U	0.010	0.052	0.0061	0.100	0.00100	1	8533813
33'455'-PentaCB-(127)	ng/L	0.011 U	0.011	0.052	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.016 U	0.016	0.10	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.061 J	0.018	0.21	0.014	N/A	N/A	1	8533813
22'33'45'-HexaCB-(130)	ng/L	0.018 U	0.018	0.052	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.023 U	0.023	0.052	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.020 U	0.020	0.052	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.020 U	0.020	0.052	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.022 U	0.022	0.10	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.037 J	0.023	0.10	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.016 U	0.016	0.052	0.014	N/A	N/A	1	8533813
22'344'5'-HexaCB-(137)	ng/L	0.019 U	0.019	0.10	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.017 U	0.017	0.10	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.016 U	0.016	0.052	0.018	N/A	N/A	1	8533813
22'3456'-HexaCB-(142)	ng/L	0.021 U	0.021	0.052	0.018	N/A	N/A	1	8533813
22'345'6'-HexaCB-(144)	ng/L	0.022 U	0.022	0.052	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.015 U	0.015	0.052	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.016 U	0.016	0.052	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.072 J	0.016	0.10	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.023 U	0.023	0.052	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.016 U	0.016	0.052	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.017 U	0.017	0.052	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.062 J	0.014	0.10	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.018 U	0.018	0.052	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.018 U	0.018	0.052	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.010 U	0.010	0.10	0.015	0.0000300	0.000000300	1	8533813
233'44'6'-HexaCB-(158)	ng/L	0.011 U	0.011	0.052	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.0096 U	0.0096	0.052	0.015	N/A	N/A	1	8533813
233'456'-HexaCB-(160)	ng/L	0.014 U	0.014	0.052	0.013	N/A	N/A	1	8533813
233'45'6'-HexaCB-(161)	ng/L	0.014 U	0.014	0.052	0.022	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
233'4'55'-HexaCB-(162)	ng/L	0.0095 U	0.0095	0.052	0.016	N/A	N/A	1	8533813
233'4'5'6'-HexaCB-(164)	ng/L	0.012 U	0.012	0.052	0.020	N/A	N/A	1	8533813
233'5'5'6'-HexaCB-(165)	ng/L	0.015 U	0.015	0.052	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.010 U	0.010	0.052	0.0096	0.0000300	0.000000300	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.011 U	0.011	0.052	0.0092	0.0300	0.000330	1	8533813
22'33'44'5'-HeptaCB-(170)	ng/L	0.012 U	0.012	0.052	0.011	N/A	N/A	1	8533813
HeptaCB-(171)+(173)	ng/L	0.015 U	0.015	0.10	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.015 U	0.015	0.052	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.014 U	0.014	0.052	0.017	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(175)	ng/L	0.018 U	0.018	0.052	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.013 U	0.013	0.052	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.015 U	0.015	0.052	0.013	N/A	N/A	1	8533813
22'33'55'6'-HeptaCB-(178)	ng/L	0.018 U	0.018	0.052	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.013 U (1)	0.013	0.052	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.023 J	0.011	0.10	0.018	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(181)	ng/L	0.014 U	0.014	0.052	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.016 U	0.016	0.052	0.0066	N/A	N/A	1	8533813
22'344'5'6'-HeptaCB-(183)	ng/L	0.013 U	0.013	0.052	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.012 U	0.012	0.052	0.0065	N/A	N/A	1	8533813
22'3455'6'-HeptaCB-(185)	ng/L	0.013 U	0.013	0.052	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.013 U	0.013	0.052	0.0095	N/A	N/A	1	8533813
22'34'55'6'-HeptaCB-(187)	ng/L	0.022 J	0.016	0.052	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.013 U	0.013	0.052	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.0093 U	0.0093	0.052	0.014	0.0000300	0.000000279	1	8533813
233'44'56'-HeptaCB-(190)	ng/L	0.010 U	0.010	0.052	0.016	N/A	N/A	1	8533813
233'44'5'6'-HeptaCB-(191)	ng/L	0.010 U	0.010	0.052	0.014	N/A	N/A	1	8533813
233'455'6'-HeptaCB-(192)	ng/L	0.012 U	0.012	0.052	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.0095 U	0.0095	0.052	0.024	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(195)	ng/L	0.011 U	0.011	0.052	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.011 U	0.011	0.052	0.017	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'33'44'66'-OctaCB-(197)	ng/L	0.0080 U	0.0080	0.052	0.033	N/A	N/A	1	8533813
OctaCB-(198)+(199)	ng/L	0.012 U	0.012	0.10	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.0091 U	0.0091	0.052	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.0081 U	0.0081	0.052	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.0090 U	0.0090	0.052	0.013	N/A	N/A	1	8533813
22'344'55'6'-OctaCB-(203)	ng/L	0.011 U	0.011	0.052	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.0056 U	0.0056	0.052	0.018	N/A	N/A	1	8533813
233'44'55'6'-OctaCB-(205)	ng/L	0.0069 U	0.0069	0.052	0.014	N/A	N/A	1	8533813
22'33'44'55'6'-NonaCB-(206)	ng/L	0.014 U	0.014	0.052	0.020	N/A	N/A	1	8533813
22'33'44'566'-NonaCB-(207)	ng/L	0.012 U	0.012	0.052	0.018	N/A	N/A	1	8533813
22'33'455'66'-NonaCB-(208)	ng/L	0.011 U	0.011	0.052	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.011 U	0.011	0.052	0.015	N/A	N/A	1	8533813
Total PCB	ng/L	1.11	0.026	N/A	N/A	N/A	N/A	N/A	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.00134	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2,4'5'-TriCB-(31) (FS)	%	116	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	111	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'455'66'-NonaCB-(208)	%	99	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'-OctaCB-(202)	%	95	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'-HeptaCB-(180)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'-HeptaCB-(188)	%	77	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'-HexaCB-(155)	%	75	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'-PentaCB-(104)	%	64	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'-TetraCB-(54)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6'-TriCB-(19)	%	48	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	33	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'-HeptaCB-(189)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	8533813
EDL = Estimated Detection Limit RDL = Reportable Detection Limit TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient, The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds QC Batch = Quality Control Batch N/A = Not Applicable									



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT482							
Sampling Date		2023/02/20 10:26							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW1-20230220-GW-70	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-233'44'-PentaCB-(105)	%	70	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'-PentaCB-(111)	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'-HexaCB-(167)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	61	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	15	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'-HexaCB-(169)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	69	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'-TetraCB-(77)	%	83	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'5'-TetraCB-(81)	%	75	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'-TriCB-(37)	%	54	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	58	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	21	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	127	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	73	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng/L	0.023 U	0.023	0.020	0.0098	N/A	N/A	1	8533813
3-MonoCB-(2)	ng/L	0.021 U	0.021	0.020	0.0079	N/A	N/A	1	8533813
4-MonoCB-(3)	ng/L	0.018 U	0.018	0.050	0.0071	N/A	N/A	1	8533813
2,2'-DiCB-(4)	ng/L	0.025 U	0.025	0.050	0.017	N/A	N/A	1	8533813
2,3-DiCB-(5)	ng/L	0.0083 U	0.0083	0.050	0.012	N/A	N/A	1	8533813
2,3'-DiCB-(6)	ng/L	0.0086 U	0.0086	0.020	0.0053	N/A	N/A	1	8533813
2,4-DiCB-(7)	ng/L	0.0084 U	0.0084	0.020	0.0056	N/A	N/A	1	8533813
2,4'-DiCB-(8)	ng/L	0.0082 U	0.0082	0.050	0.017	N/A	N/A	1	8533813
2,5-DiCB-(9)	ng/L	0.0082 U	0.0082	0.020	0.0044	N/A	N/A	1	8533813
2,6-DiCB-(10)	ng/L	0.011 U	0.011	0.050	0.0052	N/A	N/A	1	8533813
3,3'-DiCB-(11)	ng/L	0.102 J	0.0085	0.20	0.0090	N/A	N/A	1	8533813
DiCB-(12)+(13)	ng/L	0.0079 U	0.0079	0.050	0.015	N/A	N/A	1	8533813
3,5-DiCB-(14)	ng/L	0.0085 U	0.0085	0.020	0.0082	N/A	N/A	1	8533813
4,4'-DiCB-(15)	ng/L	0.0075 U	0.0075	0.050	0.011	N/A	N/A	1	8533813
2,2',3-TriCB-(16)	ng/L	0.013 U	0.013	0.050	0.0060	N/A	N/A	1	8533813
2,2',4-TriCB-(17)	ng/L	0.010 U	0.010	0.020	0.0091	N/A	N/A	1	8533813
TriCB-(18)+(30)	ng/L	0.0085 U	0.0085	0.050	0.017	N/A	N/A	1	8533813
2,2',6-TriCB-(19)	ng/L	0.018 U	0.018	0.020	0.0061	N/A	N/A	1	8533813
TriCB-(20) + (28)	ng/L	0.0077 J	0.0026	0.050	0.010	N/A	N/A	1	8533813
TriCB-(21)+(33)	ng/L	0.0047 J	0.0029	0.050	0.011	N/A	N/A	1	8533813
2,3,4'-TriCB-(22)	ng/L	0.0070 J	0.0060	0.020	0.0065	N/A	N/A	1	8533813
2,3,5-TriCB-(23)	ng/L	0.0059 U	0.0059	0.020	0.0072	N/A	N/A	1	8533813
2,3,6-TriCB-(24)	ng/L	0.0075 U	0.0075	0.020	0.0043	N/A	N/A	1	8533813
2,3',4-TriCB-(25)	ng/L	0.0060 U	0.0060	0.020	0.0054	N/A	N/A	1	8533813
TriCB-(26)+(29)	ng/L	0.0054 U	0.0054	0.050	0.013	N/A	N/A	1	8533813
2,3',6-TriCB-(27)	ng/L	0.0071 U	0.0071	0.020	0.0082	N/A	N/A	1	8533813
2,4',5-TriCB-(31)	ng/L	0.0148 J	0.0051	0.050	0.0078	N/A	N/A	1	8533813
2,4',6-TriCB-(32)	ng/L	0.0070 U	0.0070	0.020	0.0087	N/A	N/A	1	8533813
2,3',5'-TriCB-(34)	ng/L	0.0058 U	0.0058	0.020	0.0061	N/A	N/A	1	8533813
3,3',4-TriCB-(35)	ng/L	0.0060 U	0.0060	0.020	0.0042	N/A	N/A	1	8533813
3,3',5-TriCB-(36)	ng/L	0.0053 U	0.0053	0.020	0.0052	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
344'-TriCB-(37)	ng/L	0.0077 J	0.0052	0.020	0.0041	N/A	N/A	1	8533813
345-TriCB-(38)	ng/L	0.0055 U	0.0055	0.020	0.0047	N/A	N/A	1	8533813
34'5-TriCB-(39)	ng/L	0.0059 U	0.0059	0.020	0.0059	N/A	N/A	1	8533813
TetraCB-(40)+(41)+(71)	ng/L	0.016 U	0.016	0.10	0.035	N/A	N/A	1	8533813
22'34'-TetraCB-(42)	ng/L	0.022 U	0.022	0.050	0.011	N/A	N/A	1	8533813
22'35-TetraCB-(43)	ng/L	0.021 U	0.021	0.050	0.015	N/A	N/A	1	8533813
TetraCB-(44)+(47)+(65)	ng/L	0.028 J	0.015	0.10	0.029	N/A	N/A	1	8533813
TetraCB-(45)+(51)	ng/L	0.017 U	0.017	0.050	0.011	N/A	N/A	1	8533813
22'36'-TetraCB-(46)	ng/L	0.019 U	0.019	0.020	0.014	N/A	N/A	1	8533813
22'45-TetraCB-(48)	ng/L	0.016 U	0.016	0.050	0.017	N/A	N/A	1	8533813
TetraCB-(49)+TetraCB-(69)	ng/L	0.015 U	0.015	0.10	0.023	N/A	N/A	1	8533813
TetraCB-(50)+(53)	ng/L	0.017 U	0.017	0.10	0.027	N/A	N/A	1	8533813
22'55'-TetraCB-(52)	ng/L	0.049 J	0.017	0.050	0.019	N/A	N/A	1	8533813
22'66'-TetraCB-(54)	ng/L	0.028 U	0.028	0.050	0.020	N/A	N/A	1	8533813
233'4-TetraCB-(55)	ng/L	0.012 U	0.012	0.050	0.015	N/A	N/A	1	8533813
233'4'-Tetra CB(56)	ng/L	0.012 U	0.012	0.050	0.018	N/A	N/A	1	8533813
233'5-TetraCB-(57)	ng/L	0.012 U	0.012	0.050	0.0097	N/A	N/A	1	8533813
233'5'-TetraCB-(58)	ng/L	0.011 U	0.011	0.050	0.020	N/A	N/A	1	8533813
TetraCB-(59)+(62)+(75)	ng/L	0.012 U	0.012	0.10	0.038	N/A	N/A	1	8533813
2344'-TetraCB -(60)	ng/L	0.012 U	0.012	0.050	0.011	N/A	N/A	1	8533813
TetraCB-(61)+(70)+(74)+(76)	ng/L	0.058 J	0.012	0.20	0.035	N/A	N/A	1	8533813
234'5-TetraCB-(63)	ng/L	0.011 U	0.011	0.050	0.0080	N/A	N/A	1	8533813
234'6-TetraCB-(64)	ng/L	0.014 U	0.014	0.050	0.0089	N/A	N/A	1	8533813
23'44'-TetraCB-(66)	ng/L	0.011 U (1)	0.011	0.050	0.0084	N/A	N/A	1	8533813
23'45-TetraCB-(67)	ng/L	0.0095 U	0.0095	0.050	0.0040	N/A	N/A	1	8533813
23'45'-TetraCB-(68)	ng/L	0.011 U	0.011	0.050	0.014	N/A	N/A	1	8533813
23'55'-TetraCB-(72)	ng/L	0.011 U	0.011	0.050	0.0082	N/A	N/A	1	8533813
23'5'6-TetraCB-(73)	ng/L	0.011 U	0.011	0.050	0.023	N/A	N/A	1	8533813
33'44'-TetraCB-(77)	ng/L	0.0086 U	0.0086	0.050	0.011	0.000100	0.000000860	1	8533813
33'45-TetraCB-(78)	ng/L	0.012 U	0.012	0.050	0.013	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
33'45'-TetraCB(79)	ng/L	0.0095 U	0.0095	0.050	0.0088	N/A	N/A	1	8533813
33'55'-TetraCB-(80)	ng/L	0.0097 U	0.0097	0.050	0.0087	N/A	N/A	1	8533813
344'5'-TetraCB-(81)	ng/L	0.0093 U	0.0093	0.050	0.0079	0.000300	0.00000279	1	8533813
22'33'4'-PentaCB-(82)	ng/L	0.018 U	0.018	0.050	0.014	N/A	N/A	1	8533813
PentaCB-(83)+(99)	ng/L	0.015 U	0.015	0.10	0.033	N/A	N/A	1	8533813
22'33'6'-PentaCB-(84)	ng/L	0.019 J	0.015	0.020	0.0088	N/A	N/A	1	8533813
PentaCB-(85)+(116)+(117)	ng/L	0.026 J	0.019	0.10	0.040	N/A	N/A	1	8533813
PentaCB-(86)(87)(97)(109)(119)(125)	ng/L	0.050 J	0.012	0.20	0.080	N/A	N/A	1	8533813
PentaCB-(88)+(91)	ng/L	0.015 U	0.015	0.050	0.025	N/A	N/A	1	8533813
22'346'-PentaCB-(89)	ng/L	0.018 U	0.018	0.050	0.0040	N/A	N/A	1	8533813
PentaCB-(90)+(101)+(113)	ng/L	0.120 J	0.012	0.20	0.0080	N/A	N/A	1	8533813
22'355'-PentaCB-(92)	ng/L	0.016 U	0.016	0.050	0.010	N/A	N/A	1	8533813
PentaCB-(93)+(98)+(100)+(102)	ng/L	0.014 U	0.014	0.20	0.051	N/A	N/A	1	8533813
22'356'-PentaCB-(94)	ng/L	0.015 U	0.015	0.050	0.017	N/A	N/A	1	8533813
22'35'6'-PentaCB-(95)	ng/L	0.104	0.016	0.050	0.011	N/A	N/A	1	8533813
22'366'-PentaCB-(96)	ng/L	0.012 U	0.012	0.050	0.014	N/A	N/A	1	8533813
22'45'6'-PentaCB-(103)	ng/L	0.014 U	0.014	0.050	0.012	N/A	N/A	1	8533813
22'466'-PentaCB-(104)	ng/L	0.013 U	0.013	0.050	0.022	N/A	N/A	1	8533813
233'44'-PentaCB-(105)	ng/L	0.0196 J	0.0070	0.050	0.0052	0.0000300	0.000000588	1	8533813
233'45'-PentaCB-(106)	ng/L	0.0084 U	0.0084	0.050	0.018	N/A	N/A	1	8533813
233'4'5'-PentaCB-(107)	ng/L	0.0066 U	0.0066	0.050	0.014	N/A	N/A	1	8533813
PentaCB-(108)+(124)	ng/L	0.0083 U	0.0083	0.10	0.023	N/A	N/A	1	8533813
PentaCB-(110)+(115)	ng/L	0.102	0.011	0.10	0.022	N/A	N/A	1	8533813
233'55'-PentaCB-(111)	ng/L	0.0095 U	0.0095	0.050	0.012	N/A	N/A	1	8533813
233'56'-PentaCB-(112)	ng/L	0.0243 J	0.0092	0.050	0.018	N/A	N/A	1	8533813
2344'5'-PentaCB-(114)	ng/L	0.0075 U	0.0075	0.050	0.0084	0.0000300	0.000000225	1	8533813
23'44'5'-PentaCB-(118)	ng/L	0.0617 J	0.0071	0.10	0.0071	0.0000300	0.00000185	1	8533813
23'455'-PentaCB-(120)	ng/L	0.010 U	0.010	0.050	0.014	N/A	N/A	1	8533813
23'45'6'-PentaCB-(121)	ng/L	0.010 U	0.010	0.050	0.0040	N/A	N/A	1	8533813
233'4'5'-PentaCB-(122)	ng/L	0.011 U	0.011	0.050	0.011	N/A	N/A	1	8533813
23'44'5'-PentaCB-(123)	ng/L	0.0082 U	0.0082	0.050	0.014	0.0000300	0.000000246	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
33'44'5-PentaCB-(126)	ng/L	0.0075 U	0.0075	0.050	0.0061	0.100	0.000750	1	8533813
33'45'5-PentaCB-(127)	ng/L	0.0081 U	0.0081	0.050	0.017	N/A	N/A	1	8533813
HexaCB-(128)+(166)	ng/L	0.011 U (1)	0.011	0.10	0.026	N/A	N/A	1	8533813
HexaCB-(129)+(138)+(163)	ng/L	0.139 J	0.013	0.20	0.014	N/A	N/A	1	8533813
22'33'45'-HexaCB-(130)	ng/L	0.013 U	0.013	0.050	0.020	N/A	N/A	1	8533813
22'33'46'-HexaCB-(131)	ng/L	0.017 U	0.017	0.050	0.019	N/A	N/A	1	8533813
22'33'46'-HexaCB-(132)	ng/L	0.044 J	0.014	0.050	0.019	N/A	N/A	1	8533813
22'33'55'-HexaCB-(133)	ng/L	0.014 U	0.014	0.050	0.017	N/A	N/A	1	8533813
HexaCB-(134)+(143)	ng/L	0.016 U	0.016	0.10	0.028	N/A	N/A	1	8533813
HexaCB-(135)+(151)	ng/L	0.076 J	0.016	0.10	0.038	N/A	N/A	1	8533813
22'33'66'-HexaCB-(136)	ng/L	0.023 J	0.011	0.050	0.014	N/A	N/A	1	8533813
22'344'5-HexaCB-(137)	ng/L	0.013 U	0.013	0.10	0.014	N/A	N/A	1	8533813
HexaCB-(139)+(140)	ng/L	0.012 U	0.012	0.10	0.032	N/A	N/A	1	8533813
22'3455'-HexaCB-(141)	ng/L	0.029 J	0.012	0.050	0.018	N/A	N/A	1	8533813
22'3456-HexaCB-(142)	ng/L	0.015 U	0.015	0.050	0.018	N/A	N/A	1	8533813
22'345'6-HexaCB-(144)	ng/L	0.016 U	0.016	0.050	0.011	N/A	N/A	1	8533813
22'3466'-HexaCB-(145)	ng/L	0.011 U	0.011	0.050	0.022	N/A	N/A	1	8533813
22'34'55'-HexaCB-(146)	ng/L	0.018 J	0.011	0.050	0.014	N/A	N/A	1	8533813
HexaCB-(147)+(149)	ng/L	0.134	0.012	0.10	0.027	N/A	N/A	1	8533813
22'34'56'-HexaCB-(148)	ng/L	0.016 U	0.016	0.050	0.013	N/A	N/A	1	8533813
22'34'66'-HexaCB-(150)	ng/L	0.011 U	0.011	0.050	0.022	N/A	N/A	1	8533813
22'3566'-HexaCB-(152)	ng/L	0.012 U	0.012	0.050	0.020	N/A	N/A	1	8533813
HexaCB-(153)+(168)	ng/L	0.125	0.0097	0.10	0.028	N/A	N/A	1	8533813
22'44'56'-HexaCB-(154)	ng/L	0.013 U	0.013	0.050	0.014	N/A	N/A	1	8533813
22'44'66'-HexaCB-(155)	ng/L	0.011 U	0.011	0.050	0.013	N/A	N/A	1	8533813
HexaCB-(156)+(157)	ng/L	0.0098 J	0.0073	0.10	0.015	0.0000300	0.000000294	1	8533813
233'44'6-HexaCB-(158)	ng/L	0.0113 J	0.0079	0.050	0.017	N/A	N/A	1	8533813
233'455'-HexaCB-(159)	ng/L	0.0068 U	0.0068	0.050	0.015	N/A	N/A	1	8533813
233'456-HexaCB-(160)	ng/L	0.010 U	0.010	0.050	0.013	N/A	N/A	1	8533813
233'45'6-HexaCB-(161)	ng/L	0.0096 U	0.0096	0.050	0.022	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.



BUREAU VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
233'4'55'-HexaCB-(162)	ng/L	0.0068 U	0.0068	0.050	0.016	N/A	N/A	1	8533813
233'4'5'6'-HexaCB-(164)	ng/L	0.0084 U	0.0084	0.050	0.020	N/A	N/A	1	8533813
233'5'5'6'-HexaCB-(165)	ng/L	0.010 U	0.010	0.050	0.022	N/A	N/A	1	8533813
23'44'55'-HexaCB-(167)	ng/L	0.0074 U	0.0074	0.050	0.0096	0.0000300	0.00000222	1	8533813
33'44'55'-HexaCB-(169)	ng/L	0.0081 U	0.0081	0.050	0.0092	0.0300	0.000243	1	8533813
22'33'44'5'-HeptaCB-(170)	ng/L	0.0163 J	0.0087	0.050	0.011	N/A	N/A	1	8533813
HeptaCB-(171)+(173)	ng/L	0.010 U	0.010	0.10	0.027	N/A	N/A	1	8533813
22'33'455'-HeptaCB-(172)	ng/L	0.011 U	0.011	0.050	0.012	N/A	N/A	1	8533813
22'33'456'-HeptaCB-(174)	ng/L	0.0298 J	0.0098	0.050	0.017	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(175)	ng/L	0.012 U	0.012	0.050	0.0064	N/A	N/A	1	8533813
22'33'466'-HeptaCB-(176)	ng/L	0.0087 U	0.0087	0.050	0.0079	N/A	N/A	1	8533813
22'33'45'6'-HeptaCB-(177)	ng/L	0.019 J	0.011	0.050	0.013	N/A	N/A	1	8533813
22'33'55'6'-HeptaCB-(178)	ng/L	0.012 U	0.012	0.050	0.0071	N/A	N/A	1	8533813
22'33'566'-HeptaCB-(179)	ng/L	0.0204 J	0.0087	0.050	0.010	N/A	N/A	1	8533813
HeptaCB-(180)+(193)	ng/L	0.0498 J	0.0074	0.10	0.018	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(181)	ng/L	0.0099 U	0.0099	0.050	0.015	N/A	N/A	1	8533813
22'344'56'-HeptaCB-(182)	ng/L	0.011 U	0.011	0.050	0.0066	N/A	N/A	1	8533813
22'344'5'6'-HeptaCB-(183)	ng/L	0.0193 J	0.0089	0.050	0.017	N/A	N/A	1	8533813
22'344'66'-HeptaCB-(184)	ng/L	0.0084 U	0.0084	0.050	0.0065	N/A	N/A	1	8533813
22'3455'6'-HeptaCB-(185)	ng/L	0.0093 U	0.0093	0.050	0.017	N/A	N/A	1	8533813
22'34566'-HeptaCB-(186)	ng/L	0.0089 U	0.0089	0.050	0.0095	N/A	N/A	1	8533813
22'34'55'6'-HeptaCB-(187)	ng/L	0.038 J	0.011	0.050	0.0047	N/A	N/A	1	8533813
22'34'566'-HeptaCB-(188)	ng/L	0.0083 U	0.0083	0.050	0.015	N/A	N/A	1	8533813
233'44'55'-HeptaCB-(189)	ng/L	0.0066 U	0.0066	0.050	0.014	0.0000300	0.00000198	1	8533813
233'44'56'-HeptaCB-(190)	ng/L	0.0071 U	0.0071	0.050	0.016	N/A	N/A	1	8533813
233'44'5'6'-HeptaCB-(191)	ng/L	0.0070 U	0.0070	0.050	0.014	N/A	N/A	1	8533813
233'455'6'-HeptaCB-(192)	ng/L	0.0082 U	0.0082	0.050	0.0088	N/A	N/A	1	8533813
22'33'44'55'-OctaCB-(194)	ng/L	0.0092 U	0.0092	0.050	0.024	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(195)	ng/L	0.011 U	0.011	0.050	0.019	N/A	N/A	1	8533813
22'33'44'56'-OctaCB-(196)	ng/L	0.011 U	0.011	0.050	0.017	N/A	N/A	1	8533813
22'33'44'66'-OctaCB-(197)	ng/L	0.0079 U	0.0079	0.050	0.033	N/A	N/A	1	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
OctaCB-(198)+(199)	ng/L	0.012 U	0.012	0.10	0.028	N/A	N/A	1	8533813
22'33'4566'-OctaCB-(200)	ng/L	0.0089 U	0.0089	0.050	0.031	N/A	N/A	1	8533813
22'33'45'66'-OctaCB-(201)	ng/L	0.0079 U	0.0079	0.050	0.014	N/A	N/A	1	8533813
22'33'55'66'-OctaCB-(202)	ng/L	0.0084 U	0.0084	0.050	0.013	N/A	N/A	1	8533813
22'344'55'6'-OctaCB-(203)	ng/L	0.011 U	0.011	0.050	0.021	N/A	N/A	1	8533813
22'344'566'-OctaCB-(204)	ng/L	0.0055 U	0.0055	0.050	0.018	N/A	N/A	1	8533813
233'44'55'6'-OctaCB-(205)	ng/L	0.0070 U	0.0070	0.050	0.014	N/A	N/A	1	8533813
22'33'44'55'6'-NonaCB-(206)	ng/L	0.014 U	0.014	0.050	0.020	N/A	N/A	1	8533813
22'33'44'566'-NonaCB-(207)	ng/L	0.012 U	0.012	0.050	0.018	N/A	N/A	1	8533813
22'33'455'66'-NonaCB-(208)	ng/L	0.011 U	0.011	0.050	0.021	N/A	N/A	1	8533813
DecaCB-(209)	ng/L	0.010 U	0.010	0.050	0.015	N/A	N/A	1	8533813
Total PCB	ng/L	1.60	0.028	N/A	N/A	N/A	N/A	N/A	8533813
TOTAL TOXIC EQUIVALENCY	ng/L	N/A	N/A	N/A	N/A	N/A	0.00100	N/A	N/A
Surrogate Recovery (%)									
C13-2,44'-TriCB-(28)	%	45	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2,4'5'-TriCB-(31) (FS)	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'55'6'-NonaCB-(206)	%	114	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'44'5'-HeptaCB-(170)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'455'66'-NonaCB-(208)	%	105	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'66'-OctaCB-(202)	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'33'55'6'-HeptaCB-(178)	%	107	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'344'55'-HeptaCB-(180)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'34'566'-HeptaCB-(188)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'44'66'-HexaCB-(155)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'466'-PentaCB-(104)	%	58	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'66'-TetraCB-(54)	%	44	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'6'-TriCB-(19)	%	39 (1)	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-22'-DiCB-(4)	%	33	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'55'6'-OctaCB-(205)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Bureau Veritas ID		VCT483							
Sampling Date		2023/02/20 14:41							
COC Number		n/a				TOXIC EQUIVALENCY		# of	
	UNITS	MW2-20230220-GW-60	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-233'44'55'-HeptaCB-(189)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'44'-PentaCB-(105)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-233'55'-PentaCB-(111)	%	90	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'55'-HexaCB-(167)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2344'5'-PentaCB-(114)	%	64	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-23'44'5'-PentaCB-(118)	%	64	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2'344'5'-PentaCB-(123)	%	62	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-2-MonoCB-(1)	%	18	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'55'-HexaCB-(169)	%	77	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'5'-PentaCB-(126)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-33'44'-TetraCB-(77)	%	87	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'5'-TetraCB-(81)	%	81	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-344'-TriCB-(37)	%	52	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-44'-DiCB-(15)	%	44	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-4-MonoCB-(3)	%	23	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-DecaCB-(209)	%	131	N/A	N/A	N/A	N/A	N/A	N/A	8533813
C13-HexaCB-(156)+(157)	%	75	N/A	N/A	N/A	N/A	N/A	N/A	8533813

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable



TEST SUMMARY

Bureau Veritas ID: VCT482
Sample ID: MW1-20230220-GW-70
Matrix: Water

Collected: 2023/02/20
Shipped:
Received: 2023/02/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8523575	2023/02/27	2023/03/03	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/04/06	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8534937	2023/03/04	2023/03/05	Hitaishi Bhardwaj

Bureau Veritas ID: VCT483
Sample ID: MW2-20230220-GW-60
Matrix: Water

Collected: 2023/02/20
Shipped:
Received: 2023/02/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	8524619	2023/02/24	2023/02/28	Yan Qin
OC Pesticides in Water by GCTQ	GCTQ/MS	8523575	2023/02/27	2023/03/03	Chau Ting (Ruth) Chan
PCB Congeners in Water (1668C)	HRMS/MS	8533813	2023/02/23	2023/04/06	Cathy Xu
PFAS in water by SPE/LCMS	LCMS	8534937	2023/03/04	2023/03/05	Hitaishi Bhardwaj

Bureau Veritas ID: VCT483 Dup
Sample ID: MW2-20230220-GW-60
Matrix: Water

Collected: 2023/02/20
Shipped:
Received: 2023/02/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
OC Pesticides in Water by GCTQ	GCTQ/MS	8523575	2023/02/27	2023/03/03	Chau Ting (Ruth) Chan



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.0°C
Package 2	3.7°C

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

PCB Congeners in Water (1668C): Worksheet Blank contains some traces of PCB congeners natives that are above the RDL. However, all samples in worksheet (8533813) shows trace concentration levels below RDL. Results should be reviewed with caution.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8523575	CTC	Matrix Spike(VCT482)	13C10-cis Nonachlor	2023/03/03		108	%	36 - 139
			13C10-Heptachlor	2023/03/03		97	%	5 - 120
			13C10-Heptachlor Epoxide	2023/03/03		94	%	27 - 137
			13C10-Oxychlordane	2023/03/03		97	%	23 - 135
			13C10-trans Nonachlor	2023/03/03		89	%	14 - 136
			13C12-Endrin	2023/03/03		131	%	35 - 155
			13C12-Endrin Ketone	2023/03/03		89	%	35 - 155
			13C6-beta BHC	2023/03/03		81	%	32 - 130
			13C6-d6-gamma BHC (Lindane)	2023/03/03		94	%	11 - 120
			13C-Methoxychlor	2023/03/03		125 (1)	%	5 - 120
			13C-pp-DDD	2023/03/03		110	%	5 - 120
			13C-pp-DDE	2023/03/03		96	%	47 - 160
			13C-pp-DDT	2023/03/03		90	%	5 - 120
			C13-Hexachlorobenzene	2023/03/03		79	%	5 - 120
			Aldrin	2023/03/03		155	%	50 - 200
			alpha-BHC	2023/03/03		122	%	50 - 200
			delta-BHC	2023/03/03		128	%	50 - 200
			beta-BHC	2023/03/03		130	%	50 - 200
			Lindane	2023/03/03		120	%	50 - 200
			a-Chlordane	2023/03/03		137	%	50 - 200
			g-Chlordane	2023/03/03		120	%	50 - 200
			Oxychlordane	2023/03/03		86	%	50 - 200
			o,p-DDD	2023/03/03		110	%	50 - 200
			p,p-DDD	2023/03/03		119	%	50 - 200
			o,p-DDE	2023/03/03		118	%	50 - 200
			p,p-DDE	2023/03/03		126	%	50 - 200
			o,p-DDT	2023/03/03		111	%	50 - 200
			p,p-DDT	2023/03/03		143	%	50 - 200
			Dieldrin	2023/03/03		126	%	50 - 200
			Endosulfan I	2023/03/03		125	%	50 - 200
			Endosulfan II	2023/03/03		127	%	50 - 200
			Endosulfan sulfate	2023/03/03		139	%	50 - 200
			Endrin	2023/03/03		96	%	50 - 200
			Endrin aldehyde	2023/03/03		123	%	50 - 200
			Endrin ketone	2023/03/03		139	%	50 - 200
			Heptachlor	2023/03/03		114	%	50 - 200
			Heptachlor epoxide	2023/03/03		136	%	50 - 200
			Hexachlorobenzene	2023/03/03		115	%	50 - 200
			Methoxychlor	2023/03/03		131	%	50 - 200
			Mirex	2023/03/03		118	%	50 - 200
cis-Nonachlor	2023/03/03		123	%	50 - 200			
trans-Nonachlor	2023/03/03		126	%	50 - 200			
8523575	CTC	Spiked Blank	13C10-cis Nonachlor	2023/03/03		88	%	36 - 139
			13C10-Heptachlor	2023/03/03		81	%	5 - 120
			13C10-Heptachlor Epoxide	2023/03/03		87	%	27 - 137
			13C10-Oxychlordane	2023/03/03		88	%	23 - 135
			13C10-trans Nonachlor	2023/03/03		82	%	14 - 136
			13C12-Endrin	2023/03/03		90	%	35 - 155
			13C12-Endrin Ketone	2023/03/03		76	%	35 - 155
			13C6-beta BHC	2023/03/03		80	%	32 - 130
			13C6-d6-gamma BHC (Lindane)	2023/03/03		86	%	11 - 120
			13C-Methoxychlor	2023/03/03		83	%	5 - 120
13C-pp-DDD	2023/03/03		88	%	5 - 120			



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C-pp-DDE	2023/03/03		81	%	47 - 160
			13C-pp-DDT	2023/03/03		79	%	5 - 120
			C13-Hexachlorobenzene	2023/03/03		67	%	5 - 120
			Aldrin	2023/03/03		124	%	50 - 200
			alpha-BHC	2023/03/03		110	%	50 - 200
			delta-BHC	2023/03/03		110	%	50 - 200
			beta-BHC	2023/03/03		105	%	50 - 200
			Lindane	2023/03/03		117	%	50 - 200
			a-Chlordane	2023/03/03		141	%	50 - 200
			g-Chlordane	2023/03/03		126	%	50 - 200
			Oxychlordane	2023/03/03		101	%	50 - 200
			o,p-DDD	2023/03/03		110	%	50 - 200
			p,p-DDD	2023/03/03		119	%	50 - 200
			o,p-DDE	2023/03/03		115	%	50 - 200
			p,p-DDE	2023/03/03		118	%	50 - 200
			o,p-DDT	2023/03/03		106	%	50 - 200
			p,p-DDT	2023/03/03		122	%	50 - 200
			Dieldrin	2023/03/03		114	%	50 - 200
			Endosulfan I	2023/03/03		132	%	50 - 200
			Endosulfan II	2023/03/03		135	%	50 - 200
			Endosulfan sulfate	2023/03/03		114	%	50 - 200
			Endrin	2023/03/03		107	%	50 - 200
			Endrin aldehyde	2023/03/03		126	%	50 - 200
			Endrin ketone	2023/03/03		119	%	50 - 200
			Heptachlor	2023/03/03		109	%	50 - 200
			Heptachlor epoxide	2023/03/03		124	%	50 - 200
			Hexachlorobenzene	2023/03/03		113	%	50 - 200
			Methoxychlor	2023/03/03		121	%	50 - 200
			Mirex	2023/03/03		99	%	50 - 200
			cis-Nonachlor	2023/03/03		121	%	50 - 200
			trans-Nonachlor	2023/03/03		119	%	50 - 200
8523575	CTC	Method Blank	13C10-cis Nonachlor	2023/03/03		80	%	36 - 139
			13C10-Heptachlor	2023/03/03		66	%	5 - 120
			13C10-Heptachlor Epoxide	2023/03/03		83	%	27 - 137
			13C10-Oxychlordane	2023/03/03		86	%	23 - 135
			13C10-trans Nonachlor	2023/03/03		83	%	14 - 136
			13C12-Endrin	2023/03/03		91	%	35 - 155
			13C12-Endrin Ketone	2023/03/03		77	%	35 - 155
			13C6-beta BHC	2023/03/03		70	%	32 - 130
			13C6-d6-gamma BHC (Lindane)	2023/03/03		98	%	11 - 120
			13C-Methoxychlor	2023/03/03		69	%	5 - 120
			13C-pp-DDD	2023/03/03		71	%	5 - 120
			13C-pp-DDE	2023/03/03		97	%	47 - 160
			13C-pp-DDT	2023/03/03		79	%	5 - 120
			C13-Hexachlorobenzene	2023/03/03		75	%	5 - 120
			Aldrin	2023/03/03	0.021 U, MDL=0.021		ng/L	
			alpha-BHC	2023/03/03	0.024 U, MDL=0.024		ng/L	
			delta-BHC	2023/03/03	0.029 U, MDL=0.029		ng/L	
			beta-BHC	2023/03/03	0.014 U, MDL=0.014		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Lindane	2023/03/03	0.033 U, MDL=0.033		ng/L	
			a-Chlordane	2023/03/03	0.029 U, MDL=0.029		ng/L	
			g-Chlordane	2023/03/03	0.029 U, MDL=0.029		ng/L	
			Oxychlordane	2023/03/03	0.028 U, MDL=0.028		ng/L	
			o,p-DDD	2023/03/03	0.020 U, MDL=0.020		ng/L	
			p,p-DDD	2023/03/03	0.014 U, MDL=0.014		ng/L	
			o,p-DDE	2023/03/03	0.016 U, MDL=0.016		ng/L	
			p,p-DDE	2023/03/03	0.012 U, MDL=0.012		ng/L	
			o,p-DDT	2023/03/03	0.040 U, MDL=0.040		ng/L	
			p,p-DDT	2023/03/03	0.050 U, MDL=0.050		ng/L	
			Dieldrin	2023/03/03	0.050 U, MDL=0.050		ng/L	
			Endosulfan I	2023/03/03	0.067 U, MDL=0.067		ng/L	
			Endosulfan II	2023/03/03	0.074 U, MDL=0.074		ng/L	
			Endosulfan sulfate	2023/03/03	0.070 U, MDL=0.070		ng/L	
			Endrin	2023/03/03	0.063 J, MDL=0.045		ng/L	
			Endrin aldehyde	2023/03/03	0.071 U, MDL=0.071		ng/L	
			Endrin ketone	2023/03/03	0.034 U, MDL=0.034		ng/L	
			Heptachlor	2023/03/03	0.029 U, MDL=0.029		ng/L	
			Heptachlor epoxide	2023/03/03	0.015 U, MDL=0.015		ng/L	
			Hexachlorobenzene	2023/03/03	0.10 U, MDL=0.10		ng/L	
			Methoxychlor	2023/03/03	0.040 U, MDL=0.040		ng/L	
			Mirex	2023/03/03	0.021 U, MDL=0.021		ng/L	
			cis-Nonachlor	2023/03/03	0.037 U, MDL=0.037		ng/L	
			trans-Nonachlor	2023/03/03	0.044 U, MDL=0.044		ng/L	
8523575	CTC	RPD - Sample/Sample Dup	Aldrin	2023/03/03	NC		%	25
			alpha-BHC	2023/03/03	NC		%	25
			delta-BHC	2023/03/03	NC		%	25
			beta-BHC	2023/03/03	NC (2)		%	25
			Lindane	2023/03/03	NC		%	25
			a-Chlordane	2023/03/03	NC		%	25



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			g-Chlordane	2023/03/03	NC		%	25
			Oxychlordane	2023/03/03	NC		%	25
			o,p-DDD	2023/03/03	NC		%	25
			p,p-DDD	2023/03/03	NC		%	25
			o,p-DDE	2023/03/03	NC		%	25
			p,p-DDE	2023/03/03	NC		%	25
			o,p-DDT	2023/03/03	NC		%	25
			p,p-DDT	2023/03/03	NC		%	25
			Dieldrin	2023/03/03	NC		%	25
			Endosulfan I	2023/03/03	NC		%	25
			Endosulfan II	2023/03/03	NC		%	25
			Endosulfan sulfate	2023/03/03	NC		%	25
			Endrin	2023/03/03	NC		%	25
			Endrin aldehyde	2023/03/03	NC		%	25
			Endrin ketone	2023/03/03	NC		%	25
			Heptachlor	2023/03/03	NC		%	25
			Heptachlor epoxide	2023/03/03	NC		%	25
			Hexachlorobenzene	2023/03/03	NC		%	25
			Methoxychlor	2023/03/03	NC		%	25
			Mirex	2023/03/03	NC		%	25
			cis-Nonachlor	2023/03/03	NC		%	25
			trans-Nonachlor	2023/03/03	NC		%	25
8524619	YQI	Spiked Blank	37CL4 2378 Tetra CDD	2023/02/28		76	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/28		96	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/28		91	%	28 - 143
			C13-123478 HexaCDD	2023/02/28		92	%	32 - 141
			C13-123478 HexaCDF	2023/02/28		88	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/28		93	%	28 - 138
			C13-123678 HexaCDD	2023/02/28		96	%	28 - 130
			C13-123678 HexaCDF	2023/02/28		90	%	26 - 123
			C13-12378 PentaCDD	2023/02/28		91	%	25 - 181
			C13-12378 PentaCDF	2023/02/28		82	%	24 - 185
			C13-123789 HexaCDF	2023/02/28		92	%	29 - 147
			C13-234678 HexaCDF	2023/02/28		99	%	28 - 136
			C13-23478 PentaCDF	2023/02/28		89	%	21 - 178
			C13-2378 TetraCDD	2023/02/28		72	%	25 - 164
			C13-2378 TetraCDF	2023/02/28		83	%	24 - 169
			C13-OCDD	2023/02/28		96	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/28		105	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/28		96	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/28		97	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/28		97	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2023/02/28		97	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28		100	%	70 - 140
			Octa CDD	2023/02/28		103	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/28		99	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/28		102	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/28		98	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/28		99	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/28		98	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/28		93	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/28		98	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28		102	%	82 - 122



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8524619	YQI	Spiked Blank DUP	1,2,3,4,7,8,9-Hepta CDF	2023/02/28		96	%	78 - 138
			Octa CDF	2023/02/28		97	%	63 - 170
			37CL4 2378 Tetra CDD	2023/02/28		74	%	35 - 197
			C13-1234678 HeptaCDD	2023/02/28		93	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/28		90	%	28 - 143
			C13-123478 HexaCDD	2023/02/28		95	%	32 - 141
			C13-123478 HexaCDF	2023/02/28		89	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/28		92	%	28 - 138
			C13-123678 HexaCDD	2023/02/28		98	%	28 - 130
			C13-123678 HexaCDF	2023/02/28		91	%	26 - 123
			C13-12378 PentaCDD	2023/02/28		87	%	25 - 181
			C13-12378 PentaCDF	2023/02/28		81	%	24 - 185
			C13-123789 HexaCDF	2023/02/28		91	%	29 - 147
			C13-234678 HexaCDF	2023/02/28		103	%	28 - 136
			C13-23478 PentaCDF	2023/02/28		84	%	21 - 178
			C13-2378 TetraCDD	2023/02/28		72	%	25 - 164
			C13-2378 TetraCDF	2023/02/28		80	%	24 - 169
			C13-OCDD	2023/02/28		91	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/28		100	%	67 - 158
			1,2,3,7,8-Penta CDD	2023/02/28		98	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2023/02/28		95	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2023/02/28		99	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2023/02/28		98	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28		101	%	70 - 140
			Octa CDD	2023/02/28		103	%	78 - 144
			2,3,7,8-Tetra CDF	2023/02/28		94	%	75 - 158
			1,2,3,7,8-Penta CDF	2023/02/28		99	%	80 - 134
			2,3,4,7,8-Penta CDF	2023/02/28		101	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2023/02/28		98	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2023/02/28		95	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2023/02/28		89	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2023/02/28		99	%	78 - 130
1,2,3,4,6,7,8-Hepta CDF	2023/02/28		104	%	82 - 122			
1,2,3,4,7,8,9-Hepta CDF	2023/02/28		96	%	78 - 138			
Octa CDF	2023/02/28		98	%	63 - 170			
8524619	YQI	RPD	2,3,7,8-Tetra CDD	2023/02/28	4.9		%	25
			1,2,3,7,8-Penta CDD	2023/02/28	2.1		%	25
			1,2,3,4,7,8-Hexa CDD	2023/02/28	2.1		%	25
			1,2,3,6,7,8-Hexa CDD	2023/02/28	2.0		%	25
			1,2,3,7,8,9-Hexa CDD	2023/02/28	1.0		%	25
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28	1.0		%	25
			Octa CDD	2023/02/28	0		%	25
			2,3,7,8-Tetra CDF	2023/02/28	5.2		%	25
			1,2,3,7,8-Penta CDF	2023/02/28	3.0		%	25
			2,3,4,7,8-Penta CDF	2023/02/28	3.0		%	25
			1,2,3,4,7,8-Hexa CDF	2023/02/28	1.0		%	25
			1,2,3,6,7,8-Hexa CDF	2023/02/28	3.1		%	25
			2,3,4,6,7,8-Hexa CDF	2023/02/28	4.4		%	25
			1,2,3,7,8,9-Hexa CDF	2023/02/28	1.0		%	25
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28	1.9		%	25
			1,2,3,4,7,8,9-Hepta CDF	2023/02/28	0		%	25
			Octa CDF	2023/02/28	1.0		%	25
			8524619	YQI	Method Blank	37CL4 2378 Tetra CDD	2023/02/28	



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-1234678 HeptaCDD	2023/02/28		86	%	23 - 140
			C13-1234678 HeptaCDF	2023/02/28		83	%	28 - 143
			C13-123478 HexaCDD	2023/02/28		92	%	32 - 141
			C13-123478 HexaCDF	2023/02/28		89	%	26 - 152
			C13-1234789 HeptaCDF	2023/02/28		83	%	28 - 138
			C13-123678 HexaCDD	2023/02/28		95	%	28 - 130
			C13-123678 HexaCDF	2023/02/28		91	%	26 - 123
			C13-12378 PentaCDD	2023/02/28		91	%	25 - 181
			C13-12378 PentaCDF	2023/02/28		85	%	24 - 185
			C13-123789 HexaCDF	2023/02/28		86	%	29 - 147
			C13-234678 HexaCDF	2023/02/28		95	%	28 - 136
			C13-23478 PentaCDF	2023/02/28		93	%	21 - 178
			C13-2378 TetraCDD	2023/02/28		75	%	25 - 164
			C13-2378 TetraCDF	2023/02/28		87	%	24 - 169
			C13-OCDD	2023/02/28		86	%	17 - 157
			2,3,7,8-Tetra CDD	2023/02/28	1.43 U, EDL=1.43		pg/L	
			1,2,3,7,8-Penta CDD	2023/02/28	1.04 U, EDL=1.04		pg/L	
			1,2,3,4,7,8-Hexa CDD	2023/02/28	1.01 U, EDL=1.01		pg/L	
			1,2,3,6,7,8-Hexa CDD	2023/02/28	0.967 U, EDL=0.967		pg/L	
			1,2,3,7,8,9-Hexa CDD	2023/02/28	0.919 U, EDL=0.919		pg/L	
			1,2,3,4,6,7,8-Hepta CDD	2023/02/28	1.04 U, EDL=1.04		pg/L	
			Octa CDD	2023/02/28	2.48 J, EDL=1.19		pg/L	
			Total Tetra CDD	2023/02/28	1.43 U, EDL=1.43		pg/L	
			Total Penta CDD	2023/02/28	1.04 U, EDL=1.04		pg/L	
			Total Hexa CDD	2023/02/28	1.12 U, EDL=1.12		pg/L	
			Total Hepta CDD	2023/02/28	1.04 U, EDL=1.04		pg/L	
			2,3,7,8-Tetra CDF	2023/02/28	1.04 U, EDL=1.04		pg/L	
			1,2,3,7,8-Penta CDF	2023/02/28	1.28 U, EDL=1.28		pg/L	
			2,3,4,7,8-Penta CDF	2023/02/28	1.07 U, EDL=1.07		pg/L	
			1,2,3,4,7,8-Hexa CDF	2023/02/28	0.863 U, EDL=0.863		pg/L	
			1,2,3,6,7,8-Hexa CDF	2023/02/28	0.820 U, EDL=0.820		pg/L	
			2,3,4,6,7,8-Hexa CDF	2023/02/28	0.790 U, EDL=0.790		pg/L	
			1,2,3,7,8,9-Hexa CDF	2023/02/28	0.960 U, EDL=0.960		pg/L	
			1,2,3,4,6,7,8-Hepta CDF	2023/02/28	0.860 U, EDL=0.860		pg/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,4,7,8,9-Hepta CDF	2023/02/28	0.950 U, EDL=0.950		pg/L	
			Octa CDF	2023/02/28	1.06 U, EDL=1.06		pg/L	
			Total Tetra CDF	2023/02/28	1.04 U, EDL=1.04		pg/L	
			Total Penta CDF	2023/02/28	1.16 U, EDL=1.16		pg/L	
			Total Hexa CDF	2023/02/28	0.854 U, EDL=0.854		pg/L	
			Total Hepta CDF	2023/02/28	0.902 U, EDL=0.902		pg/L	
8533813	CXU	Spiked Blank	C13-2,44'-TriCB-(28)	2023/04/04		80 (1)	%	30 - 170
			C13-22'33'44'55'6'-NonaCB-(206)	2023/04/04		108	%	40 - 145
			C13-22'33'44'5'-HeptaCB-(170)	2023/04/04		116	%	40 - 145
			C13-22'33'45'5'6'-NonaCB-(208)	2023/04/04		107	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		98	%	40 - 145
			C13-22'33'55'6'-HeptaCB-(178)	2023/04/04		85	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		111	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		77	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		60	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		66	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		40	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		50	%	40 - 145
			C13-22'-DiCB-(4)	2023/04/04		33	%	15 - 145
			C13-233'44'55'6'-OctaCB-(205)	2023/04/04		115	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		123	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		132 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		94	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/04/04		109	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/04/04		121	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/04/04		126 (1)	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/04/04		127 (1)	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		35	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		121	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/04/04		144 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		120	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/04/04		115	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		98 (1)	%	40 - 145
			C13-44'-DiCB-(15)	2023/04/04		73	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		44	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		96	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		114	%	40 - 145
			2-MonoCB-(1)	2023/04/04		108	%	60 - 145
			3-MonoCB-(2)	2023/04/04		118	%	N/A
			4-MonoCB-(3)	2023/04/04		107	%	60 - 145
			22'-DiCB-(4)	2023/04/04		114	%	60 - 145
			2,3-DiCB-(5)	2023/04/04		92	%	N/A
			2,3'-DiCB-(6)	2023/04/04		95	%	N/A
			2,4-DiCB-(7)	2023/04/04		89	%	N/A
			2,4'-DiCB-(8)	2023/04/04		53	%	N/A
			2,5-DiCB-(9)	2023/04/04		92	%	N/A
			2,6-DiCB-(10)	2023/04/04		71	%	N/A



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			3,3'-DiCB-(11)	2023/04/04		126	%	N/A
			DiCB-(12)+(13)	2023/04/04		102	%	N/A
			3,5-DiCB-(14)	2023/04/04		106	%	N/A
			4,4'-DiCB-(15)	2023/04/04		112	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		70	%	N/A
			22'4-TriCB-(17)	2023/04/04		68	%	N/A
			TriCB-(18)+(30)	2023/04/04		59	%	N/A
			22'6-TriCB-(19)	2023/04/04		105	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		92	%	N/A
			TriCB-(21)+(33)	2023/04/04		100	%	N/A
			234'-TriCB-(22)	2023/04/04		101	%	N/A
			235-TriCB-(23)	2023/04/04		90	%	N/A
			236-TriCB-(24)	2023/04/04		81	%	N/A
			23'4-TriCB-(25)	2023/04/04		102	%	N/A
			TriCB-(26)+(29)	2023/04/04		91	%	N/A
			23'6-TriCB-(27)	2023/04/04		60	%	N/A
			24'5-TriCB-(31)	2023/04/04		94	%	N/A
			24'6-TriCB-(32)	2023/04/04		72	%	N/A
			23'5'-TriCB-(34)	2023/04/04		89	%	N/A
			33'4-TriCB-(35)	2023/04/04		115	%	N/A
			33'5-TriCB-(36)	2023/04/04		106	%	N/A
			344'-TriCB-(37)	2023/04/04		107	%	60 - 145
			345-TriCB-(38)	2023/04/04		109	%	N/A
			34'5-TriCB-(39)	2023/04/04		119	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		83	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		94	%	N/A
			22'35-TetraCB-(43)	2023/04/04		84	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		83	%	N/A
			TetraCB-(45)+(51)	2023/04/04		69	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		71	%	N/A
			22'45-TetraCB-(48)	2023/04/04		78	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		77	%	N/A
			TetraCB-(50)+(53)	2023/04/04		68	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		80	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		115	%	60 - 145
			233'4-TetraCB-(55)	2023/04/04		94	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		97	%	N/A
			233'5-TetraCB-(57)	2023/04/04		86	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		88	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		78	%	N/A
			2344'-TetraCB -(60)	2023/04/04		95	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		95	%	N/A
			234'5-TetraCB-(63)	2023/04/04		92	%	N/A
			234'6-TetraCB-(64)	2023/04/04		92	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		96	%	N/A
			23'45-TetraCB-(67)	2023/04/04		89	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		89	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		84	%	N/A
			23'5'6-TetraCB-(73)	2023/04/04		69	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		94	%	60 - 145
			33'45-TetraCB-(78)	2023/04/04		114	%	N/A
			33'45'-TetraCB(79)	2023/04/04		103	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		92	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			344'5-TetraCB-(81)	2023/04/04		99	%	60 - 145
			22'33'4-PentaCB-(82)	2023/04/04		104	%	N/A
			PentaCB-(83)+(99)	2023/04/04		91	%	N/A
			22'33'6-PentaCB-(84)	2023/04/04		83	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		88	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		87	%	N/A
			PentaCB-(88)+(91)	2023/04/04		84	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		98	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		88	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		97	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		78	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		77	%	N/A
			22'35'6-PentaCB-(95)	2023/04/04		94	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		83	%	N/A
			22'45'6-PentaCB-(103)	2023/04/04		84	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		100	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		106	%	60 - 145
			233'45-PentaCB-(106)	2023/04/04		111	%	N/A
			233'4'5-PentaCB-(107)	2023/04/04		91	%	N/A
			PentaCB-(108)+(124)	2023/04/04		98	%	N/A
			PentaCB-(110)+(115)	2023/04/04		99	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		92	%	N/A
			233'56-PentaCB-(112)	2023/04/04		94	%	N/A
			2344'5-PentaCB-(114)	2023/04/04		104	%	60 - 145
			23'44'5-PentaCB-(118)	2023/04/04		97	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		100	%	N/A
			23'45'6-PentaCB-(121)	2023/04/04		83	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		125	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		101	%	60 - 145
			33'44'5-PentaCB-(126)	2023/04/04		98	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		107	%	N/A
			HexaCB-(128)+(166)	2023/04/04		92	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		98	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		91	%	N/A
			22'33'46-HexaCB-(131)	2023/04/04		105	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		89	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		93	%	N/A
			HexaCB-(134)+(143)	2023/04/04		94	%	N/A
			HexaCB-(135)+(151)	2023/04/04		89	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		84	%	N/A
			22'344'5-HexaCB-(137)	2023/04/04		86	%	N/A
			HexaCB-(139)+(140)	2023/04/04		86	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		94	%	N/A
			22'3456-HexaCB-(142)	2023/04/04		94	%	N/A
			22'345'6-HexaCB-(144)	2023/04/04		96	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		82	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		90	%	N/A
			HexaCB-(147)+(149)	2023/04/04		87	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		86	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		80	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		82	%	N/A
			HexaCB-(153)+(168)	2023/04/04		87	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		85	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'44'66'-HexaCB-(155)	2023/04/04		98	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		101	%	N/A
			233'44'6-HexaCB-(158)	2023/04/04		93	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		91	%	N/A
			233'456-HexaCB-(160)	2023/04/04		97	%	N/A
			233'45'6-HexaCB-(161)	2023/04/04		88	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		93	%	N/A
			233'4'5'6-HexaCB-(164)	2023/04/04		95	%	N/A
			233'55'6-HexaCB-(165)	2023/04/04		89	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		105	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		103	%	60 - 145
			22'33'44'5-HeptaCB-(170)	2023/04/04		87	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		93	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		94	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		94	%	N/A
			22'33'45'6-HeptaCB-(175)	2023/04/04		86	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		84	%	N/A
			22'33'45'6'-HeptaCB-(177)	2023/04/04		90	%	N/A
			22'33'55'6-HeptaCB-(178)	2023/04/04		88	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		88	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		99	%	N/A
			22'344'56-HeptaCB-(181)	2023/04/04		93	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		89	%	N/A
			22'344'5'6-HeptaCB-(183)	2023/04/04		92	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		82	%	N/A
			22'3455'6-HeptaCB-(185)	2023/04/04		87	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		87	%	N/A
			22'34'55'6-HeptaCB-(187)	2023/04/04		90	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		100	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		100	%	60 - 145
			233'44'56-HeptaCB-(190)	2023/04/04		91	%	N/A
			233'44'5'6-HeptaCB-(191)	2023/04/04		92	%	N/A
			233'455'6-HeptaCB-(192)	2023/04/04		94	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		100	%	N/A
			22'33'44'56-OctaCB-(195)	2023/04/04		103	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		97	%	N/A
			22'33'44'66'OctaCB-(197)	2023/04/04		91	%	N/A
			OctaCB-(198)+(199)	2023/04/04		98	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		100	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		89	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		92	%	60 - 145
			22'344'55'6-OctaCB-(203)	2023/04/04		101	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		87	%	N/A
			233'44'55'6-OctaCB-(205)	2023/04/04		92	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2023/04/04		91	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		86	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		93	%	60 - 145
			DecaCB-(209)	2023/04/04		108	%	60 - 145
8533813	CXU	Spiked Blank DUP	C13-2,44'-TriCB-(28)	2023/04/04		82	%	30 - 170
			C13-22'33'44'55'6-NonaCB-(206)	2023/04/04		100	%	40 - 145
			C13-22'33'44'5-HeptaCB-(170)	2023/04/04		106	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/04/04		95	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/04/04		91	%	40 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-22'33'55'6-HeptaCB-(178)	2023/04/04		83	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/04/04		102	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/04/04		71	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/04/04		56	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/04/04		66	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/04/04		41	%	15 - 145
			C13-22'6-TriCB-(19)	2023/04/04		52	%	40 - 145
			C13-22'-DiCB-(4)	2023/04/04		37	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2023/04/04		107	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/04/04		111	%	40 - 145
			C13-233'44'-PentaCB-(105)	2023/04/04		125 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/04/04		92	%	30 - 170
			C13-23'44'55'-HexaCB-(167)	2023/04/04		101	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/04/04		115	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/04/04		116	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/04/04		118	%	40 - 145
			C13-2-MonoCB-(1)	2023/04/04		39	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/04/04		112	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/04/04		134 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/04/04		113	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/04/04		110	%	40 - 145
			C13-344'-TriCB-(37)	2023/04/04		96	%	40 - 145
			C13-44'-DiCB-(15)	2023/04/04		75	%	15 - 145
			C13-4-MonoCB-(3)	2023/04/04		49 (1)	%	15 - 145
			C13-DecaCB-(209)	2023/04/04		85	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/04/04		103	%	40 - 145
			2-MonoCB-(1)	2023/04/04		107	%	60 - 145
			3-MonoCB-(2)	2023/04/04		116	%	N/A
			4-MonoCB-(3)	2023/04/04		106	%	60 - 145
			22'-DiCB-(4)	2023/04/04		109	%	60 - 145
			2,3-DiCB-(5)	2023/04/04		96	%	N/A
			2,3'-DiCB-(6)	2023/04/04		95	%	N/A
			2,4-DiCB-(7)	2023/04/04		90	%	N/A
			2,4'-DiCB-(8)	2023/04/04		55	%	N/A
			2,5-DiCB-(9)	2023/04/04		94	%	N/A
			2,6-DiCB-(10)	2023/04/04		72	%	N/A
			3,3'-DiCB-(11)	2023/04/04		127	%	N/A
			DiCB-(12)+(13)	2023/04/04		102	%	N/A
			3,5-DiCB-(14)	2023/04/04		106	%	N/A
			4,4'-DiCB-(15)	2023/04/04		111	%	60 - 145
			22'3-TriCB-(16)	2023/04/04		77	%	N/A
			22'4-TriCB-(17)	2023/04/04		71	%	N/A
			TriCB-(18)+(30)	2023/04/04		61	%	N/A
			22'6-TriCB-(19)	2023/04/04		102	%	60 - 145
			TriCB-(20) + (28)	2023/04/04		97	%	N/A
			TriCB-(21)+(33)	2023/04/04		102	%	N/A
			234'-TriCB-(22)	2023/04/04		101	%	N/A
			235-TriCB-(23)	2023/04/04		93	%	N/A
			236-TriCB-(24)	2023/04/04		75	%	N/A
			23'4-TriCB-(25)	2023/04/04		106	%	N/A
			TriCB-(26)+(29)	2023/04/04		92	%	N/A
			23'6-TriCB-(27)	2023/04/04		66	%	N/A
			24'5-TriCB-(31)	2023/04/04		97	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			24'6-TriCB-(32)	2023/04/04		74	%	N/A
			23'5'-TriCB-(34)	2023/04/04		90	%	N/A
			33'4-TriCB-(35)	2023/04/04		117	%	N/A
			33'5-TriCB-(36)	2023/04/04		106	%	N/A
			344'-TriCB-(37)	2023/04/04		109	%	60 - 145
			345-TriCB-(38)	2023/04/04		112	%	N/A
			34'5-TriCB-(39)	2023/04/04		120	%	N/A
			TetraCB-(40)+(41)+(71)	2023/04/04		86	%	N/A
			22'34'-TetraCB-(42)	2023/04/04		97	%	N/A
			22'35-TetraCB-(43)	2023/04/04		90	%	N/A
			TetraCB-(44)+(47)+(65)	2023/04/04		87	%	N/A
			TetraCB-(45)+(51)	2023/04/04		73	%	N/A
			22'36'-TetraCB-(46)	2023/04/04		73	%	N/A
			22'45-TetraCB-(48)	2023/04/04		82	%	N/A
			TetraCB-(49)+TetraCB-(69)	2023/04/04		80	%	N/A
			TetraCB-(50)+(53)	2023/04/04		72	%	N/A
			22'55'-TetraCB-(52)	2023/04/04		87	%	N/A
			22'66'-TetraCB-(54)	2023/04/04		116	%	60 - 145
			233'4-TetraCB-(55)	2023/04/04		97	%	N/A
			233'4'-Tetra CB(56)	2023/04/04		99	%	N/A
			233'5-TetraCB-(57)	2023/04/04		90	%	N/A
			233'5'-TetraCB-(58)	2023/04/04		91	%	N/A
			TetraCB-(59)+(62)+(75)	2023/04/04		83	%	N/A
			2344'-TetraCB -(60)	2023/04/04		98	%	N/A
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04		99	%	N/A
			234'5-TetraCB-(63)	2023/04/04		96	%	N/A
			234'6-TetraCB-(64)	2023/04/04		96	%	N/A
			23'44'-TetraCB-(66)	2023/04/04		98	%	N/A
			23'45-TetraCB-(67)	2023/04/04		91	%	N/A
			23'45'-TetraCB-(68)	2023/04/04		91	%	N/A
			23'55'-TetraCB-(72)	2023/04/04		89	%	N/A
			23'5'6-TetraCB-(73)	2023/04/04		71	%	N/A
			33'44'-TetraCB-(77)	2023/04/04		98	%	60 - 145
			33'45-TetraCB-(78)	2023/04/04		116	%	N/A
			33'45'-TetraCB(79)	2023/04/04		105	%	N/A
			33'55'-TetraCB-(80)	2023/04/04		95	%	N/A
			344'5-TetraCB-(81)	2023/04/04		100	%	60 - 145
			22'33'4-PentaCB-(82)	2023/04/04		108	%	N/A
			PentaCB-(83)+(99)	2023/04/04		96	%	N/A
			22'33'6-PentaCB-(84)	2023/04/04		87	%	N/A
			PentaCB-(85)+(116)+(117)	2023/04/04		93	%	N/A
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04		92	%	N/A
			PentaCB-(88)+(91)	2023/04/04		89	%	N/A
			22'346'-PentaCB-(89)	2023/04/04		103	%	N/A
			PentaCB-(90)+(101)+(113)	2023/04/04		93	%	N/A
			22'355'-PentaCB-(92)	2023/04/04		101	%	N/A
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04		82	%	N/A
			22'356'-PentaCB-(94)	2023/04/04		80	%	N/A
			22'35'6-PentaCB-(95)	2023/04/04		103	%	N/A
			22'366'-PentaCB-(96)	2023/04/04		88	%	N/A
			22'45'6-PentaCB-(103)	2023/04/04		88	%	N/A
			22'466'-PentaCB-(104)	2023/04/04		102	%	60 - 145
			233'44'-PentaCB-(105)	2023/04/04		105	%	60 - 145



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'45'-PentaCB-(106)	2023/04/04		112	%	N/A
			233'4'5'-PentaCB-(107)	2023/04/04		96	%	N/A
			PentaCB-(108)+(124)	2023/04/04		101	%	N/A
			PentaCB-(110)+(115)	2023/04/04		104	%	N/A
			233'55'-PentaCB-(111)	2023/04/04		96	%	N/A
			233'56'-PentaCB-(112)	2023/04/04		97	%	N/A
			2344'5'-PentaCB-(114)	2023/04/04		106	%	60 - 145
			23'44'5'-PentaCB-(118)	2023/04/04		103	%	60 - 145
			23'455'-PentaCB-(120)	2023/04/04		105	%	N/A
			23'45'6'-PentaCB-(121)	2023/04/04		88	%	N/A
			233'4'5'-PentaCB-(122)	2023/04/04		128	%	N/A
			23'44'5'-PentaCB-(123)	2023/04/04		104	%	60 - 145
			33'44'5'-PentaCB-(126)	2023/04/04		100	%	60 - 145
			33'455'-PentaCB-(127)	2023/04/04		109	%	N/A
			HexaCB-(128)+(166)	2023/04/04		97	%	N/A
			HexaCB-(129)+(138)+(163)	2023/04/04		103	%	N/A
			22'33'45'-HexaCB-(130)	2023/04/04		93	%	N/A
			22'33'46'-HexaCB-(131)	2023/04/04		108	%	N/A
			22'33'46'-HexaCB-(132)	2023/04/04		92	%	N/A
			22'33'55'-HexaCB-(133)	2023/04/04		96	%	N/A
			HexaCB-(134)+(143)	2023/04/04		99	%	N/A
			HexaCB-(135)+(151)	2023/04/04		94	%	N/A
			22'33'66'-HexaCB-(136)	2023/04/04		92	%	N/A
			22'344'5'-HexaCB-(137)	2023/04/04		85	%	N/A
			HexaCB-(139)+(140)	2023/04/04		90	%	N/A
			22'3455'-HexaCB-(141)	2023/04/04		98	%	N/A
			22'3456'-HexaCB-(142)	2023/04/04		96	%	N/A
			22'345'6'-HexaCB-(144)	2023/04/04		97	%	N/A
			22'3466'-HexaCB-(145)	2023/04/04		86	%	N/A
			22'34'55'-HexaCB-(146)	2023/04/04		93	%	N/A
			HexaCB-(147)+(149)	2023/04/04		91	%	N/A
			22'34'56'-HexaCB-(148)	2023/04/04		93	%	N/A
			22'34'66'-HexaCB-(150)	2023/04/04		84	%	N/A
			22'3566'-HexaCB-(152)	2023/04/04		87	%	N/A
			HexaCB-(153)+(168)	2023/04/04		91	%	N/A
			22'44'56'-HexaCB-(154)	2023/04/04		89	%	N/A
			22'44'66'-HexaCB-(155)	2023/04/04		103	%	60 - 145
			HexaCB-(156)+(157)	2023/04/04		105	%	N/A
			233'44'6'-HexaCB-(158)	2023/04/04		96	%	N/A
			233'455'-HexaCB-(159)	2023/04/04		95	%	N/A
			233'456'-HexaCB-(160)	2023/04/04		99	%	N/A
			233'45'6'-HexaCB-(161)	2023/04/04		92	%	N/A
			233'4'55'-HexaCB-(162)	2023/04/04		97	%	N/A
			233'4'5'6'-HexaCB-(164)	2023/04/04		104	%	N/A
			233'55'6'-HexaCB-(165)	2023/04/04		91	%	N/A
			23'44'55'-HexaCB-(167)	2023/04/04		107	%	60 - 145
			33'44'55'-HexaCB-(169)	2023/04/04		106	%	60 - 145
			22'33'44'5'-HeptaCB-(170)	2023/04/04		88	%	60 - 145
			HeptaCB-(171)+(173)	2023/04/04		96	%	N/A
			22'33'455'-HeptaCB-(172)	2023/04/04		98	%	N/A
			22'33'456'-HeptaCB-(174)	2023/04/04		96	%	N/A
			22'33'45'6'-HeptaCB-(175)	2023/04/04		93	%	N/A
			22'33'466'-HeptaCB-(176)	2023/04/04		90	%	N/A



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'45'6'-HeptaCB-(177)	2023/04/04		93	%	N/A
			22'33'55'6'-HeptaCB-(178)	2023/04/04		93	%	N/A
			22'33'566'-HeptaCB-(179)	2023/04/04		94	%	N/A
			HeptaCB-(180)+(193)	2023/04/04		103	%	N/A
			22'344'56-HeptaCB-(181)	2023/04/04		96	%	N/A
			22'344'56'-HeptaCB-(182)	2023/04/04		97	%	N/A
			22'344'5'6-HeptaCB-(183)	2023/04/04		88	%	N/A
			22'344'66'-HeptaCB-(184)	2023/04/04		86	%	N/A
			22'3455'6-HeptaCB-(185)	2023/04/04		103	%	N/A
			22'34566'-HeptaCB-(186)	2023/04/04		91	%	N/A
			22'34'55'6-HeptaCB-(187)	2023/04/04		96	%	N/A
			22'34'566'-HeptaCB-(188)	2023/04/04		103	%	60 - 145
			233'44'55'-HeptaCB-(189)	2023/04/04		104	%	60 - 145
			233'44'56-HeptaCB-(190)	2023/04/04		95	%	N/A
			233'44'5'6-HeptaCB-(191)	2023/04/04		95	%	N/A
			233'455'6-HeptaCB-(192)	2023/04/04		99	%	N/A
			22'33'44'55'-OctaCB-(194)	2023/04/04		101	%	N/A
			22'33'44'56-OctaCB-(195)	2023/04/04		102	%	N/A
			22'33'44'56'-OctaCB-(196)	2023/04/04		99	%	N/A
			22'33'44'66'OctaCB-(197)	2023/04/04		94	%	N/A
			OctaCB-(198)+(199)	2023/04/04		100	%	N/A
			22'33'4566'-OctaCB-(200)	2023/04/04		104	%	N/A
			22'33'45'66'-OctaCB-(201)	2023/04/04		92	%	N/A
			22'33'55'66'-OctaCB-(202)	2023/04/04		95	%	60 - 145
			22'344'55'6-OctaCB-(203)	2023/04/04		103	%	N/A
			22'344'566'-OctaCB-(204)	2023/04/04		91	%	N/A
			233'44'55'6-OctaCB-(205)	2023/04/04		93	%	60 - 145
			22'33'44'55'6-NonaCB-(206)	2023/04/04		93	%	60 - 145
			22'33'44'566'-NonaCB-(207)	2023/04/04		90	%	N/A
			22'33'455'66'-NonaCB-(208)	2023/04/04		97	%	60 - 145
			DecaCB-(209)	2023/04/04		115	%	60 - 145
8533813	CXU	RPD	2-MonoCB-(1)	2023/04/04	1.0		%	30
			3-MonoCB-(2)	2023/04/04	1.9		%	30
			4-MonoCB-(3)	2023/04/04	0.85		%	30
			22'-DiCB-(4)	2023/04/04	4.4		%	30
			2,3-DiCB-(5)	2023/04/04	3.6		%	30
			2,3'-DiCB-(6)	2023/04/04	0		%	30
			2,4-DiCB-(7)	2023/04/04	1.0		%	30
			2,4'-DiCB-(8)	2023/04/04	3.7		%	30
			2,5-DiCB-(9)	2023/04/04	2.3		%	30
			2,6-DiCB-(10)	2023/04/04	2.0		%	30
			3,3'-DiCB-(11)	2023/04/04	1.0		%	30
			DiCB-(12)+(13)	2023/04/04	0.29		%	30
			3,5-DiCB-(14)	2023/04/04	0.38		%	30
			4,4'-DiCB-(15)	2023/04/04	1.2		%	30
			22'3-TriCB-(16)	2023/04/04	9.8		%	30
			22'4-TriCB-(17)	2023/04/04	4.0		%	30
			TriCB-(18)+(30)	2023/04/04	2.5		%	30
			22'6-TriCB-(19)	2023/04/04	2.5		%	30
			TriCB-(20) + (28)	2023/04/04	4.3		%	30
			TriCB-(21)+(33)	2023/04/04	1.7		%	30
			234'-TriCB-(22)	2023/04/04	0.099		%	30
			235-TriCB-(23)	2023/04/04	3.2		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			236-TriCB-(24)	2023/04/04	7.4		%	30
			23'4-TriCB-(25)	2023/04/04	3.3		%	30
			TriCB-(26)+(29)	2023/04/04	1.4		%	30
			23'6-TriCB-(27)	2023/04/04	9.2		%	30
			24'5-TriCB-(31)	2023/04/04	3.2		%	30
			24'6-TriCB-(32)	2023/04/04	2.3		%	30
			23'5'-TriCB-(34)	2023/04/04	1.7		%	30
			33'4-TriCB-(35)	2023/04/04	1.5		%	30
			33'5-TriCB-(36)	2023/04/04	0		%	30
			344'-TriCB-(37)	2023/04/04	2.1		%	30
			345-TriCB-(38)	2023/04/04	2.4		%	30
			34'5-TriCB-(39)	2023/04/04	1.1		%	30
			TetraCB-(40)+(41)+(71)	2023/04/04	4.3		%	30
			22'34'-TetraCB-(42)	2023/04/04	2.5		%	30
			22'35-TetraCB-(43)	2023/04/04	6.9		%	30
			TetraCB-(44)+(47)+(65)	2023/04/04	4.6		%	30
			TetraCB-(45)+(51)	2023/04/04	5.5		%	30
			22'36'-TetraCB-(46)	2023/04/04	3.7		%	30
			22'45-TetraCB-(48)	2023/04/04	5.1		%	30
			TetraCB-(49)+TetraCB-(69)	2023/04/04	4.3		%	30
			TetraCB-(50)+(53)	2023/04/04	6.2		%	30
			22'55'-TetraCB-(52)	2023/04/04	7.4		%	30
			22'66'-TetraCB-(54)	2023/04/04	1.3		%	30
			233'4-TetraCB-(55)	2023/04/04	3.1		%	30
			233'4'-Tetra CB(56)	2023/04/04	2.0		%	30
			233'5-TetraCB-(57)	2023/04/04	4.1		%	30
			233'5'-TetraCB-(58)	2023/04/04	3.5		%	30
			TetraCB-(59)+(62)+(75)	2023/04/04	6.1		%	30
			2344'-TetraCB -(60)	2023/04/04	2.9		%	30
			TetraCB-(61)+(70)+(74)+(76)	2023/04/04	4.1		%	30
			234'5-TetraCB-(63)	2023/04/04	4.2		%	30
			234'6-TetraCB-(64)	2023/04/04	4.5		%	30
			23'44'-TetraCB-(66)	2023/04/04	1.8		%	30
			23'45-TetraCB-(67)	2023/04/04	1.6		%	30
			23'45'-TetraCB-(68)	2023/04/04	2.8		%	30
			23'55'-TetraCB-(72)	2023/04/04	5.7		%	30
			23'5'6-TetraCB-(73)	2023/04/04	3.7		%	30
			33'44'-TetraCB-(77)	2023/04/04	3.3		%	30
			33'45-TetraCB-(78)	2023/04/04	1.7		%	30
			33'45'-TetraCB(79)	2023/04/04	2.8		%	30
			33'55'-TetraCB-(80)	2023/04/04	3.5		%	30
			344'5-TetraCB-(81)	2023/04/04	1.8		%	30
			22'33'4-PentaCB-(82)	2023/04/04	3.5		%	30
			PentaCB-(83)+(99)	2023/04/04	5.9		%	30
			22'33'6-PentaCB-(84)	2023/04/04	4.5		%	30
			PentaCB-(85)+(116)+(117)	2023/04/04	5.1		%	30
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/04/04	5.0		%	30
			PentaCB-(88)+(91)	2023/04/04	6.0		%	30
			22'346'-PentaCB-(89)	2023/04/04	5.1		%	30
			PentaCB-(90)+(101)+(113)	2023/04/04	5.0		%	30
			22'355'-PentaCB-(92)	2023/04/04	3.6		%	30
			PentaCB-(93)+(98)+(100)+(102)	2023/04/04	5.5		%	30
			22'356'-PentaCB-(94)	2023/04/04	3.7		%	30



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'35'6"-PentaCB-(95)	2023/04/04	8.8		%	30
			22'366"-PentaCB-(96)	2023/04/04	6.0		%	30
			22'45'6"-PentaCB-(103)	2023/04/04	4.9		%	30
			22'466"-PentaCB-(104)	2023/04/04	1.6		%	30
			233'44'-PentaCB-(105)	2023/04/04	0.66		%	30
			233'45-PentaCB-(106)	2023/04/04	1.5		%	30
			233'4'5"-PentaCB-(107)	2023/04/04	4.9		%	30
			PentaCB-(108)+(124)	2023/04/04	3.1		%	30
			PentaCB-(110)+(115)	2023/04/04	5.0		%	30
			233'55'-PentaCB-(111)	2023/04/04	4.0		%	30
			233'56-PentaCB-(112)	2023/04/04	4.0		%	30
			2344'5"-PentaCB-(114)	2023/04/04	2.1		%	30
			23'44'5"-PentaCB-(118)	2023/04/04	6.1		%	30
			23'455"-PentaCB-(120)	2023/04/04	5.4		%	30
			23'45'6"-PentaCB-(121)	2023/04/04	6.6		%	30
			233'4'5"-PentaCB-(122)	2023/04/04	2.0		%	30
			23'44'5"-PentaCB-(123)	2023/04/04	3.4		%	30
			33'44'5"-PentaCB-(126)	2023/04/04	2.3		%	30
			33'455"-PentaCB-(127)	2023/04/04	1.5		%	30
			HexaCB-(128)+(166)	2023/04/04	6.0		%	30
			HexaCB-(129)+(138)+(163)	2023/04/04	5.1		%	30
			22'33'45"-HexaCB-(130)	2023/04/04	2.4		%	30
			22'33'46"-HexaCB-(131)	2023/04/04	2.8		%	30
			22'33'46"-HexaCB-(132)	2023/04/04	3.3		%	30
			22'33'55"-HexaCB-(133)	2023/04/04	2.7		%	30
			HexaCB-(134)+(143)	2023/04/04	4.9		%	30
			HexaCB-(135)+(151)	2023/04/04	5.0		%	30
			22'33'66"-HexaCB-(136)	2023/04/04	8.6		%	30
			22'344'5"-HexaCB-(137)	2023/04/04	0.47		%	30
			HexaCB-(139)+(140)	2023/04/04	4.0		%	30
			22'3455"-HexaCB-(141)	2023/04/04	4.7		%	30
			22'3456"-HexaCB-(142)	2023/04/04	2.2		%	30
			22'345'6"-HexaCB-(144)	2023/04/04	1.8		%	30
			22'3466"-HexaCB-(145)	2023/04/04	4.7		%	30
			22'34'55"-HexaCB-(146)	2023/04/04	3.7		%	30
			HexaCB-(147)+(149)	2023/04/04	5.2		%	30
			22'34'56"-HexaCB-(148)	2023/04/04	7.8		%	30
			22'34'66"-HexaCB-(150)	2023/04/04	4.1		%	30
			22'3566"-HexaCB-(152)	2023/04/04	6.5		%	30
			HexaCB-(153)+(168)	2023/04/04	4.8		%	30
			22'44'56"-HexaCB-(154)	2023/04/04	5.4		%	30
			22'44'66"-HexaCB-(155)	2023/04/04	5.3		%	30
			HexaCB-(156)+(157)	2023/04/04	3.4		%	30
			233'44'6"-HexaCB-(158)	2023/04/04	3.6		%	30
			233'455"-HexaCB-(159)	2023/04/04	4.4		%	30
			233'456"-HexaCB-(160)	2023/04/04	2.2		%	30
			233'45'6"-HexaCB-(161)	2023/04/04	4.2		%	30
			233'4'55"-HexaCB-(162)	2023/04/04	4.3		%	30
			233'4'5'6"-HexaCB-(164)	2023/04/04	9.2		%	30
			233'55'6"-HexaCB-(165)	2023/04/04	2.3		%	30
			23'44'55"-HexaCB-(167)	2023/04/04	1.2		%	30
			33'44'55"-HexaCB-(169)	2023/04/04	2.3		%	30
			22'33'44'5"-HeptaCB-(170)	2023/04/04	1.4		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			HeptaCB-(171)+(173)	2023/04/04	3.9		%	30
			22'33'455'-HeptaCB-(172)	2023/04/04	4.6		%	30
			22'33'456'-HeptaCB-(174)	2023/04/04	1.9		%	30
			22'33'45'6-HeptaCB-(175)	2023/04/04	7.6		%	30
			22'33'466'-HeptaCB-(176)	2023/04/04	7.6		%	30
			22'33'45'6'-HeptaCB-(177)	2023/04/04	3.2		%	30
			22'33'55'6-HeptaCB-(178)	2023/04/04	5.2		%	30
			22'33'566'-HeptaCB-(179)	2023/04/04	6.6		%	30
			HeptaCB-(180)+(193)	2023/04/04	3.9		%	30
			22'344'56-HeptaCB-(181)	2023/04/04	3.9		%	30
			22'344'56'-HeptaCB-(182)	2023/04/04	8.6		%	30
			22'344'5'6-HeptaCB-(183)	2023/04/04	4.2		%	30
			22'344'66'-HeptaCB-(184)	2023/04/04	5.0		%	30
			22'3455'6-HeptaCB-(185)	2023/04/04	17		%	30
			22'34566'-HeptaCB-(186)	2023/04/04	4.4		%	30
			22'34'55'6-HeptaCB-(187)	2023/04/04	6.8		%	30
			22'34'566'-HeptaCB-(188)	2023/04/04	3.3		%	30
			233'44'55'-HeptaCB-(189)	2023/04/04	3.4		%	30
			233'44'56-HeptaCB-(190)	2023/04/04	4.3		%	30
			233'44'5'6-HeptaCB-(191)	2023/04/04	3.0		%	30
			233'455'6-HeptaCB-(192)	2023/04/04	5.1		%	30
			22'33'44'55'-OctaCB-(194)	2023/04/04	1.5		%	30
			22'33'44'56-OctaCB-(195)	2023/04/04	0.098		%	30
			22'33'44'56'-OctaCB-(196)	2023/04/04	2.2		%	30
			22'33'44'66'OctaCB-(197)	2023/04/04	2.5		%	30
			OctaCB-(198)+(199)	2023/04/04	1.7		%	30
			22'33'4566'-OctaCB-(200)	2023/04/04	3.6		%	30
			22'33'45'66'-OctaCB-(201)	2023/04/04	2.5		%	30
			22'33'55'66'-OctaCB-(202)	2023/04/04	3.6		%	30
			22'344'55'6-OctaCB-(203)	2023/04/04	2.2		%	30
			22'344'566'-OctaCB-(204)	2023/04/04	3.8		%	30
			233'44'55'6-OctaCB-(205)	2023/04/04	0.86		%	30
			22'33'44'55'6-NonaCB-(206)	2023/04/04	2.2		%	30
			22'33'44'566'-NonaCB-(207)	2023/04/04	4.3		%	30
			22'33'455'66'-NonaCB-(208)	2023/04/04	4.9		%	30
			DecaCB-(209)	2023/04/04	6.0		%	30
8533813	CXU	Method Blank	C13-2,44'-TriCB-(28)	2023/03/03		109	%	30 - 170
			C13-22'33'44'55'6-NonaCB-(206)	2023/03/03		89	%	40 - 145
			C13-22'33'44'5-HeptaCB-(170)	2023/03/03		118	%	40 - 145
			C13-22'33'455'66'-NonaCB-(208)	2023/03/03		94	%	40 - 145
			C13-22'33'55'66'-OctaCB-(202)	2023/03/03		94	%	40 - 145
			C13-22'33'55'6-HeptaCB-(178)	2023/03/03		76	%	40 - 145
			C13-22'344'55'-HeptaCB-(180)	2023/03/03		110	%	40 - 145
			C13-22'34'566'-HeptaCB-(188)	2023/03/03		69	%	40 - 145
			C13-22'44'66'-HexaCB-(155)	2023/03/03		48	%	40 - 145
			C13-22'466'-PentaCB-(104)	2023/03/03		67	%	40 - 145
			C13-22'66'-TetraCB-(54)	2023/03/03		56	%	15 - 145
			C13-22'6-TriCB-(19)	2023/03/03		52	%	40 - 145
			C13-22'1-DiCB-(4)	2023/03/03		37	%	15 - 145
			C13-233'44'55'6-OctaCB-(205)	2023/03/03		109	%	40 - 145
			C13-233'44'55'-HeptaCB-(189)	2023/03/03		113	%	40 - 145
			C13-233'44'1-PentaCB-(105)	2023/03/03		146 (1)	%	40 - 145
			C13-233'55'-PentaCB-(111)	2023/03/03		98	%	30 - 170



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			C13-23'44'55'-HexaCB-(167)	2023/03/03		96	%	40 - 145
			C13-2344'5-PentaCB-(114)	2023/03/03		139	%	40 - 145
			C13-23'44'5-PentaCB-(118)	2023/03/03		143	%	40 - 145
			C13-2'344'5-PentaCB-(123)	2023/03/03		143	%	40 - 145
			C13-2-MonoCB-(1)	2023/03/03		39	%	15 - 145
			C13-33'44'55'-HexaCB-(169)	2023/03/03		101	%	40 - 145
			C13-33'44'5-PentaCB-(126)	2023/03/03		151 (1)	%	40 - 145
			C13-33'44'-TetraCB-(77)	2023/03/03		86	%	40 - 145
			C13-344'5-TetraCB-(81)	2023/03/03		82	%	40 - 145
			C13-344'-TriCB-(37)	2023/03/03		80	%	40 - 145
			C13-44'-DiCB-(15)	2023/03/03		82	%	15 - 145
			C13-4-MonoCB-(3)	2023/03/03		49	%	15 - 145
			C13-DecaCB-(209)	2023/03/03		69	%	40 - 145
			C13-HexaCB-(156)+(157)	2023/03/03		96	%	40 - 145
			2-MonoCB-(1)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			3-MonoCB-(2)	2023/03/03	0.0087 U, EDL=0.0087		ng/L	
			4-MonoCB-(3)	2023/03/03	0.0083 U, EDL=0.0083		ng/L	
			22'-DiCB-(4)	2023/03/03	0.029 U, EDL=0.029		ng/L	
			2,3-DiCB-(5)	2023/03/03	0.0053 U, EDL=0.0053		ng/L	
			2,3'-DiCB-(6)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			2,4-DiCB-(7)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			2,4'-DiCB-(8)	2023/03/03	0.0062 J, EDL=0.0051		ng/L	
			2,5-DiCB-(9)	2023/03/03	0.0055 U, EDL=0.0055		ng/L	
			2,6-DiCB-(10)	2023/03/03	0.0097 U, EDL=0.0097		ng/L	
			3,3'-DiCB-(11)	2023/03/03	0.0834 J, EDL=0.0052		ng/L	
			DiCB-(12)+(13)	2023/03/03	0.0051 U, EDL=0.0051		ng/L	
			3,5-DiCB-(14)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			4,4'-DiCB-(15)	2023/03/03	0.0110 J, EDL=0.0053		ng/L	
			22'3-TriCB-(16)	2023/03/03	0.0279 J, EDL=0.0081		ng/L	
			22'4-TriCB-(17)	2023/03/03	0.0179 J, EDL=0.0061		ng/L	
			TriCB-(18)+(30)	2023/03/03	0.0176 J, EDL=0.0053		ng/L	
			22'6-TriCB-(19)	2023/03/03	0.0081 U, EDL=0.0081		ng/L	
			TriCB-(20) + (28)	2023/03/03	0.0548, EDL=0.0027		ng/L	
			TriCB-(21)+(33)	2023/03/03	0.0405 J, EDL=0.0029		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			234'-TriCB-(22)	2023/03/03	0.0213, EDL=0.0029		ng/L	
			235'-TriCB-(23)	2023/03/03	0.0028 U, EDL=0.0028		ng/L	
			236'-TriCB-(24)	2023/03/03	0.0048 U, EDL=0.0048		ng/L	
			23'4'-TriCB-(25)	2023/03/03	0.0050 U, EDL=0.0050		ng/L	
			TriCB-(26)+(29)	2023/03/03	0.0111 J, EDL=0.0022		ng/L	
			23'6'-TriCB-(27)	2023/03/03	0.0046 U, EDL=0.0046		ng/L	
			24'5'-TriCB-(31)	2023/03/03	0.0613, EDL=0.0026		ng/L	
			24'6'-TriCB-(32)	2023/03/03	0.0157 J, EDL=0.0043		ng/L	
			23'5'-TriCB-(34)	2023/03/03	0.0029 U, EDL=0.0029		ng/L	
			33'4'-TriCB-(35)	2023/03/03	0.0030 U, EDL=0.0030		ng/L	
			33'5'-TriCB-(36)	2023/03/03	0.0025 U, EDL=0.0025		ng/L	
			344'-TriCB-(37)	2023/03/03	0.0127 J, EDL=0.0031		ng/L	
			345'-TriCB-(38)	2023/03/03	0.0029 U, EDL=0.0029		ng/L	
			34'5'-TriCB-(39)	2023/03/03	0.0030 U, EDL=0.0030		ng/L	
			TetraCB-(40)+(41)+(71)	2023/03/03	0.029 J, EDL=0.015		ng/L	
			22'34'-TetraCB-(42)	2023/03/03	0.020 U, EDL=0.020		ng/L	
			22'35'-TetraCB-(43)	2023/03/03	0.018 U, EDL=0.018		ng/L	
			TetraCB-(44)+(47)+(65)	2023/03/03	0.057 U, EDL=0.057 (2)		ng/L	
			TetraCB-(45)+(51)	2023/03/03	0.015 U, EDL=0.015		ng/L	
			22'36'-TetraCB-(46)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			22'45'-TetraCB-(48)	2023/03/03	0.015 U, EDL=0.015		ng/L	
			TetraCB-(49)+TetraCB-(69)	2023/03/03	0.051 J, EDL=0.013		ng/L	
			TetraCB-(50)+(53)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'55'-TetraCB-(52)	2023/03/03	0.150, EDL=0.015		ng/L	
			22'66'-TetraCB-(54)	2023/03/03	0.025 U, EDL=0.025		ng/L	
			233'4'-TetraCB-(55)	2023/03/03	0.0095 U, EDL=0.0095		ng/L	
			233'4'-Tetra CB(56)	2023/03/03	0.0176 J, EDL=0.0097		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			233'5-TetraCB-(57)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			233'5'-TetraCB-(58)	2023/03/03	0.0094 U, EDL=0.0094		ng/L	
			TetraCB-(59)+(62)+(75)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			2344'-TetraCB -(60)	2023/03/03	0.0121 J, EDL=0.0092		ng/L	
			TetraCB-(61)+(70)+(74)+(76)	2023/03/03	0.115 J, EDL=0.0086		ng/L	
			234'5-TetraCB-(63)	2023/03/03	0.0091 U, EDL=0.0091		ng/L	
			234'6-TetraCB-(64)	2023/03/03	0.028 J, EDL=0.013		ng/L	
			23'44'-TetraCB-(66)	2023/03/03	0.0394 J, EDL=0.0086		ng/L	
			23'45-TetraCB-(67)	2023/03/03	0.0080 U, EDL=0.0080		ng/L	
			23'45'-TetraCB-(68)	2023/03/03	0.0085 U, EDL=0.0085		ng/L	
			23'55'-TetraCB-(72)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			23'5'6-TetraCB-(73)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			33'44'-TetraCB-(77)	2023/03/03	0.0098 U, EDL=0.0098		ng/L	
			33'45-TetraCB-(78)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			33'45'-TetraCB(79)	2023/03/03	0.0084 U, EDL=0.0084		ng/L	
			33'55'-TetraCB-(80)	2023/03/03	0.0077 U, EDL=0.0077		ng/L	
			344'5-TetraCB-(81)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'33'4-PentaCB-(82)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			PentaCB-(83)+(99)	2023/03/03	0.059 J, EDL=0.014		ng/L	
			22'33'6-PentaCB-(84)	2023/03/03	0.024, EDL=0.014		ng/L	
			PentaCB-(85)+(116)+(117)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			PentaCB-(86)(87)(97)(109)(119)(125)	2023/03/03	0.068 J, EDL=0.011		ng/L	
			PentaCB-(88)+(91)	2023/03/03	0.012 U, EDL=0.012		ng/L	
			22'346'-PentaCB-(89)	2023/03/03	0.016 U, EDL=0.016		ng/L	
			PentaCB-(90)+(101)+(113)	2023/03/03	0.206, EDL=0.011		ng/L	
			22'355'-PentaCB-(92)	2023/03/03	0.035 J, EDL=0.015		ng/L	
			PentaCB-(93)+(98)+(100)+(102)	2023/03/03	0.013 U, EDL=0.013		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'356'-PentaCB-(94)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'35'6-PentaCB-(95)	2023/03/03	0.210, EDL=0.015		ng/L	
			22'366'-PentaCB-(96)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'45'6-PentaCB-(103)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'466'-PentaCB-(104)	2023/03/03	0.017 U, EDL=0.017		ng/L	
			233'44'-PentaCB-(105)	2023/03/03	0.0276 J, EDL=0.0052		ng/L	
			233'45-PentaCB-(106)	2023/03/03	0.0057 U, EDL=0.0057		ng/L	
			233'4'5-PentaCB-(107)	2023/03/03	0.0081 J, EDL=0.0043		ng/L	
			PentaCB-(108)+(124)	2023/03/03	0.0053 U, EDL=0.0053		ng/L	
			PentaCB-(110)+(115)	2023/03/03	0.122, EDL=0.011		ng/L	
			233'55'-PentaCB-(111)	2023/03/03	0.0092 U, EDL=0.0092		ng/L	
			233'56-PentaCB-(112)	2023/03/03	0.0091 U, EDL=0.0091		ng/L	
			2344'5-PentaCB-(114)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			23'44'5-PentaCB-(118)	2023/03/03	0.0962 J, EDL=0.0048		ng/L	
			23'455'-PentaCB-(120)	2023/03/03	0.0097 U, EDL=0.0097		ng/L	
			23'45'6-PentaCB-(121)	2023/03/03	0.0092 U, EDL=0.0092		ng/L	
			233'4'5'-PentaCB-(122)	2023/03/03	0.0070 U, EDL=0.0070		ng/L	
			23'44'5'-PentaCB-(123)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			33'44'5-PentaCB-(126)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			33'455'-PentaCB-(127)	2023/03/03	0.0054 U, EDL=0.0054		ng/L	
			HexaCB-(128)+(166)	2023/03/03	0.0124 J, EDL=0.0057		ng/L	
			HexaCB-(129)+(138)+(163)	2023/03/03	0.201, EDL=0.0064		ng/L	
			22'33'45'-HexaCB-(130)	2023/03/03	0.0072 J, EDL=0.0069		ng/L	
			22'33'46-HexaCB-(131)	2023/03/03	0.0083 U, EDL=0.0083		ng/L	
			22'33'46'-HexaCB-(132)	2023/03/03	0.0682, EDL=0.0069		ng/L	
			22'33'55'-HexaCB-(133)	2023/03/03	0.0071 U, EDL=0.0071		ng/L	
			HexaCB-(134)+(143)	2023/03/03	0.0135 J, EDL=0.0076		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			HexaCB-(135)+(151)	2023/03/03	0.143, EDL=0.013		ng/L	
			22'33'66'-HexaCB-(136)	2023/03/03	0.0455 J, EDL=0.0099		ng/L	
			22'344'5'-HexaCB-(137)	2023/03/03	0.0065 U, EDL=0.0065		ng/L	
			HexaCB-(139)+(140)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'3455'-HexaCB-(141)	2023/03/03	0.0545, EDL=0.0062		ng/L	
			22'3456-HexaCB-(142)	2023/03/03	0.0074 U, EDL=0.0074		ng/L	
			22'345'6-HexaCB-(144)	2023/03/03	0.022 J, EDL=0.013		ng/L	
			22'3466'-HexaCB-(145)	2023/03/03	0.0093 U, EDL=0.0093		ng/L	
			22'34'55'-HexaCB-(146)	2023/03/03	0.0310 J, EDL=0.0058		ng/L	
			HexaCB-(147)+(149)	2023/03/03	0.274, EDL=0.0055		ng/L	
			22'34'56'-HexaCB-(148)	2023/03/03	0.014 U, EDL=0.014		ng/L	
			22'34'66'-HexaCB-(150)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			22'3566'-HexaCB-(152)	2023/03/03	0.0094 U, EDL=0.0094		ng/L	
			HexaCB-(153)+(168)	2023/03/03	0.237, EDL=0.0050		ng/L	
			22'44'56'-HexaCB-(154)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'44'66'-HexaCB-(155)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			HexaCB-(156)+(157)	2023/03/03	0.0088 J, EDL=0.0035		ng/L	
			233'44'6-HexaCB-(158)	2023/03/03	0.0167 J, EDL=0.0042		ng/L	
			233'455'-HexaCB-(159)	2023/03/03	0.0033 U, EDL=0.0033		ng/L	
			233'456-HexaCB-(160)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			233'45'6-HexaCB-(161)	2023/03/03	0.0048 U, EDL=0.0048		ng/L	
			233'4'55'-HexaCB-(162)	2023/03/03	0.0032 U, EDL=0.0032		ng/L	
			233'4'5'6-HexaCB-(164)	2023/03/03	0.0103 J, EDL=0.0046		ng/L	
			233'55'6-HexaCB-(165)	2023/03/03	0.0052 U, EDL=0.0052		ng/L	
			23'44'55'-HexaCB-(167)	2023/03/03	0.0041 J, EDL=0.0035		ng/L	
			33'44'55'-HexaCB-(169)	2023/03/03	0.0038 U, EDL=0.0038		ng/L	
			22'33'44'5'-HeptaCB-(170)	2023/03/03	0.0208 J, EDL=0.0054		ng/L	



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			HeptaCB-(171)+(173)	2023/03/03	0.013 U, EDL=0.013 (2)		ng/L	
			22'33'455'-HeptaCB-(172)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'33'456'-HeptaCB-(174)	2023/03/03	0.0523, EDL=0.0054		ng/L	
			22'33'45'6-HeptaCB-(175)	2023/03/03	0.010 U, EDL=0.010		ng/L	
			22'33'466'-HeptaCB-(176)	2023/03/03	0.0140 J, EDL=0.0076		ng/L	
			22'33'45'6'-HeptaCB-(177)	2023/03/03	0.0308 J, EDL=0.0059		ng/L	
			22'33'55'6-HeptaCB-(178)	2023/03/03	0.014 J, EDL=0.011		ng/L	
			22'33'566'-HeptaCB-(179)	2023/03/03	0.0419 J, EDL=0.0074		ng/L	
			HeptaCB-(180)+(193)	2023/03/03	0.0737 J, EDL=0.0047		ng/L	
			22'344'56-HeptaCB-(181)	2023/03/03	0.0056 U, EDL=0.0056		ng/L	
			22'344'56'-HeptaCB-(182)	2023/03/03	0.0098 U, EDL=0.0098		ng/L	
			22'344'5'6-HeptaCB-(183)	2023/03/03	0.0419 J, EDL=0.0048		ng/L	
			22'344'66'-HeptaCB-(184)	2023/03/03	0.0073 U, EDL=0.0073		ng/L	
			22'3455'6-HeptaCB-(185)	2023/03/03	0.0058 U, EDL=0.0058		ng/L	
			22'34566'-HeptaCB-(186)	2023/03/03	0.0079 U, EDL=0.0079		ng/L	
			22'34'55'6-HeptaCB-(187)	2023/03/03	0.085, EDL=0.010		ng/L	
			22'34'566'-HeptaCB-(188)	2023/03/03	0.0080 U, EDL=0.0080		ng/L	
			233'44'55'-HeptaCB-(189)	2023/03/03	0.0039 U, EDL=0.0039		ng/L	
			233'44'56-HeptaCB-(190)	2023/03/03	0.0049 J, EDL=0.0043		ng/L	
			233'44'5'6-HeptaCB-(191)	2023/03/03	0.0042 U, EDL=0.0042		ng/L	
			233'455'6-HeptaCB-(192)	2023/03/03	0.0047 U, EDL=0.0047		ng/L	
			22'33'44'55'-OctaCB-(194)	2023/03/03	0.0078 U, EDL=0.0078		ng/L	
			22'33'44'56-OctaCB-(195)	2023/03/03	0.0084 U, EDL=0.0084		ng/L	
			22'33'44'56'-OctaCB-(196)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'33'44'66'OctaCB-(197)	2023/03/03	0.0081 U, EDL=0.0081		ng/L	
			OctaCB-(198)+(199)	2023/03/03	0.013 U, EDL=0.013		ng/L	
			22'33'4566'-OctaCB-(200)	2023/03/03	0.0082 U, EDL=0.0082		ng/L	



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			22'33'45'66'-OctaCB-(201)	2023/03/03	0.0076 U, EDL=0.0076		ng/L	
			22'33'55'66'-OctaCB-(202)	2023/03/03	0.0090 U, EDL=0.0090		ng/L	
			22'344'55'6'-OctaCB-(203)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'344'566'-OctaCB-(204)	2023/03/03	0.0075 U, EDL=0.0075		ng/L	
			233'44'55'6'-OctaCB-(205)	2023/03/03	0.0060 U, EDL=0.0060		ng/L	
			22'33'44'55'6'-NonaCB-(206)	2023/03/03	0.011 U, EDL=0.011		ng/L	
			22'33'44'566'-NonaCB-(207)	2023/03/03	0.0076 U, EDL=0.0076		ng/L	
			22'33'455'66'-NonaCB-(208)	2023/03/03	0.0079 U, EDL=0.0079		ng/L	
			DecaCB-(209)	2023/03/03	0.012 U, EDL=0.012		ng/L	
			Total PCB	2023/03/03	3.21, EDL=0.057		ng/L	
8534937	HBJ	Spiked Blank	13C2-4:2-Fluorotelomersulfonic Acid	2023/03/05		97	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/03/05		95	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/03/05		95	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/03/05		94	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/03/05		85	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/03/05		99	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/03/05		81	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/03/05		89	%	50 - 150
			13C3-HFPO-DA	2023/03/05		100	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/03/05		96	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/03/05		98	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/03/05		97	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/03/05		97	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/03/05		96	%	50 - 150
			13C5-Perfluorononanoic acid	2023/03/05		95	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/03/05		98	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/03/05		92	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/03/05		100	%	50 - 150
			D3-MeFOSA	2023/03/05		79	%	50 - 150
			D3-MeFOSAA	2023/03/05		88	%	50 - 150
			D5-EtFOSA	2023/03/05		77	%	50 - 150
			D5-EtFOSAA	2023/03/05		81	%	50 - 150
			D7-MeFOSE	2023/03/05		84	%	50 - 150
			D9-EtFOSE	2023/03/05		82	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/03/05		89	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/03/05		90	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/03/05		90	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/03/05		90	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/03/05		90	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/03/05		90	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/03/05		90	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2023/03/05		88	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/03/05		90	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/03/05		93	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorotetradecanoic acid(PFTEDA)	2023/03/05		87	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/03/05		90	%	70 - 130
			Perfluoropentanesulfonic acid PFPes	2023/03/05		89	%	70 - 130
			Perfluorohexanesulfonic acid(PFHxS)	2023/03/05		88	%	70 - 130
			Perfluoroheptanesulfonic acid PFHpS	2023/03/05		87	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/03/05		90	%	70 - 130
			Perfluorononanesulfonic acid (PFNS)	2023/03/05		87	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/03/05		89	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/03/05		90	%	70 - 130
			EtFOSA	2023/03/05		91	%	70 - 130
			MeFOSA	2023/03/05		89	%	70 - 130
			EtFOSE	2023/03/05		88	%	70 - 130
			MeFOSE	2023/03/05		89	%	70 - 130
			EtFOSAA	2023/03/05		90	%	70 - 130
			MeFOSAA	2023/03/05		87	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/03/05		87	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/03/05		89	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/03/05		88	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/03/05		89	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/03/05		91	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/03/05		87	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/03/05		84	%	70 - 130
8534937	HBJ	Spiked Blank DUP	13C2-4:2-Fluorotelomersulfonic Acid	2023/03/05		93	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/03/05		90	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/03/05		93	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/03/05		95	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/03/05		86	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/03/05		95	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/03/05		72	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/03/05		87	%	50 - 150
			13C3-HFPO-DA	2023/03/05		89	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/03/05		95	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/03/05		96	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/03/05		96	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/03/05		95	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/03/05		94	%	50 - 150
			13C5-Perfluorononanoic acid	2023/03/05		94	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/03/05		97	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/03/05		91	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/03/05		94	%	50 - 150
			D3-MeFOSA	2023/03/05		76	%	50 - 150
			D3-MeFOSAA	2023/03/05		85	%	50 - 150
			D5-EtFOSA	2023/03/05		77	%	50 - 150
			D5-EtFOSAA	2023/03/05		85	%	50 - 150
			D7-MeFOSE	2023/03/05		81	%	50 - 150
			D9-EtFOSE	2023/03/05		80	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/03/05		92	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2023/03/05		91	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2023/03/05		93	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2023/03/05		91	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2023/03/05		93	%	70 - 130
			Perfluorononanoic acid (PFNA)	2023/03/05		91	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2023/03/05		91	%	70 - 130



BUREAU
VERITAS

Bureau Veritas Job #: C351279

Report Date: 2023/04/21

Apex Laboratories

Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoroundecanoic acid (PFUnA)	2023/03/05		92	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2023/03/05		90	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2023/03/05		102	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2023/03/05		89	%	70 - 130
			Perfluorobutanesulfonic acid (PFBS)	2023/03/05		92	%	70 - 130
			Perfluoropentanesulfonic acid PFPes	2023/03/05		90	%	70 - 130
			Perfluorohexanesulfonic acid(PFHxS)	2023/03/05		92	%	70 - 130
			Perfluoroheptanesulfonic acid PFHpS	2023/03/05		90	%	70 - 130
			Perfluorooctanesulfonic acid (PFOS)	2023/03/05		93	%	70 - 130
			Perfluorononanesulfonic acid (PFNS)	2023/03/05		87	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2023/03/05		87	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2023/03/05		92	%	70 - 130
			EtFOSA	2023/03/05		91	%	70 - 130
			MeFOSA	2023/03/05		89	%	70 - 130
			EtFOSE	2023/03/05		91	%	70 - 130
			MeFOSE	2023/03/05		93	%	70 - 130
			EtFOSAA	2023/03/05		89	%	70 - 130
			MeFOSAA	2023/03/05		92	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2023/03/05		92	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2023/03/05		94	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2023/03/05		91	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2023/03/05		103	%	70 - 130
			4,8-Dioxa-3H-perfluorononanoic acid	2023/03/05		93	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2023/03/05		89	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2023/03/05		89	%	70 - 130
8534937	HBJ	RPD	Perfluorobutanoic acid (PFBA)	2023/03/05	2.9		%	30
			Perfluoropentanoic acid (PFPeA)	2023/03/05	1.2		%	30
			Perfluorohexanoic acid (PFHxA)	2023/03/05	3.1		%	30
			Perfluoroheptanoic acid (PFHpA)	2023/03/05	0.88		%	30
			Perfluorooctanoic acid (PFOA)	2023/03/05	3.2		%	30
			Perfluorononanoic acid (PFNA)	2023/03/05	0.97		%	30
			Perfluorodecanoic acid (PFDA)	2023/03/05	1.1		%	30
			Perfluoroundecanoic acid (PFUnA)	2023/03/05	4.5		%	30
			Perfluorododecanoic acid (PFDoA)	2023/03/05	0.25		%	30
			Perfluorotridecanoic acid (PFTRDA)	2023/03/05	9.8		%	30
			Perfluorotetradecanoic acid(PFTEDA)	2023/03/05	1.2		%	30
			Perfluorobutanesulfonic acid (PFBS)	2023/03/05	2.2		%	30
			Perfluoropentanesulfonic acid PFPes	2023/03/05	0.86		%	30
			Perfluorohexanesulfonic acid(PFHxS)	2023/03/05	4.9		%	30
			Perfluoroheptanesulfonic acid PFHpS	2023/03/05	2.9		%	30
			Perfluorooctanesulfonic acid (PFOS)	2023/03/05	2.8		%	30
			Perfluorononanesulfonic acid (PFNS)	2023/03/05	0.79		%	30
			Perfluorodecanesulfonic acid (PFDS)	2023/03/05	1.7		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2023/03/05	1.7		%	30
			EtFOSA	2023/03/05	0.73		%	30
			MeFOSA	2023/03/05	0.49		%	30
			EtFOSE	2023/03/05	2.6		%	30
			MeFOSE	2023/03/05	3.8		%	30
			EtFOSAA	2023/03/05	0.60		%	30
			MeFOSAA	2023/03/05	6.3		%	30
			4:2 Fluorotelomer sulfonic acid	2023/03/05	5.3		%	30
			6:2 Fluorotelomer sulfonic acid	2023/03/05	5.8		%	30
			8:2 Fluorotelomer sulfonic acid	2023/03/05	3.5		%	30



BUREAU
VERITAS

Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
8534937	HBJ	Method Blank	Hexafluoropropyleneoxide dimer acid	2023/03/05	14		%	30
			4,8-Dioxa-3H-perfluorononanoic acid	2023/03/05	1.7		%	30
			9Cl-PF3ONS (F-53B Major)	2023/03/05	2.0		%	30
			11Cl-PF3OUdS (F-53B Minor)	2023/03/05	5.4		%	30
			13C2-4:2-Fluorotelomersulfonic Acid	2023/03/05		99	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2023/03/05		99	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2023/03/05		97	%	50 - 150
			13C2-Perfluorodecanoic acid	2023/03/05		90	%	50 - 150
			13C2-Perfluorododecanoic acid	2023/03/05		79	%	50 - 150
			13C2-Perfluorohexanoic acid	2023/03/05		97	%	50 - 150
			13C2-perfluorotetradecanoic acid	2023/03/05		45 (3)	%	50 - 150
			13C2-Perfluoroundecanoic acid	2023/03/05		83	%	50 - 150
			13C3-HFPO-DA	2023/03/05		97	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2023/03/05		99	%	50 - 150
			13C4-Perfluorobutanoic acid	2023/03/05		98	%	50 - 150
			13C4-Perfluoroheptanoic acid	2023/03/05		97	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2023/03/05		91	%	50 - 150
			13C4-Perfluorooctanoic acid	2023/03/05		95	%	50 - 150
			13C5-Perfluorononanoic acid	2023/03/05		93	%	50 - 150
			13C5-Perfluoropentanoic acid	2023/03/05		99	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2023/03/05		89	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2023/03/05		97	%	50 - 150
			D3-MeFOSA	2023/03/05		73	%	50 - 150
			D3-MeFOSAA	2023/03/05		84	%	50 - 150
			D5-EtFOSA	2023/03/05		76	%	50 - 150
			D5-EtFOSAA	2023/03/05		83	%	50 - 150
			D7-MeFOSE	2023/03/05		85	%	50 - 150
			D9-EtFOSE	2023/03/05		80	%	50 - 150
			Perfluorobutanoic acid (PFBA)	2023/03/05		0.0015 U, MDL=0.0015		ug/L
			Perfluoropentanoic acid (PFPeA)	2023/03/05		0.0025 U, MDL=0.0025		ug/L
			Perfluorohexanoic acid (PFHxA)	2023/03/05		0.0038 U, MDL=0.0038		ug/L
			Perfluoroheptanoic acid (PFHpA)	2023/03/05		0.0018 U, MDL=0.0018		ug/L
			Perfluorooctanoic acid (PFOA)	2023/03/05		0.0030 U, MDL=0.0030		ug/L
Perfluorononanoic acid (PFNA)	2023/03/05		0.0021 U, MDL=0.0021		ug/L			
Perfluorodecanoic acid (PFDA)	2023/03/05		0.0016 U, MDL=0.0016		ug/L			
Perfluoroundecanoic acid (PFUnA)	2023/03/05		0.0024 U, MDL=0.0024		ug/L			
Perfluorododecanoic acid (PFDoA)	2023/03/05		0.0029 U, MDL=0.0029		ug/L			
Perfluorotridecanoic acid (PFTRDA)	2023/03/05		0.0026 U, MDL=0.0026		ug/L			
Perfluorotetradecanoic acid(PFTEDA)	2023/03/05		0.0016 U, MDL=0.0016		ug/L			
Perfluorobutanesulfonic acid (PFBS)	2023/03/05		0.0021 U, MDL=0.0021		ug/L			
Perfluoropentanesulfonic acid PFPes	2023/03/05		0.0023 U, MDL=0.0023		ug/L			



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorohexanesulfonic acid(PFHxS)	2023/03/05	0.0022 U, MDL=0.0022		ug/L	
			Perfluoroheptanesulfonic acid PFHpS	2023/03/05	0.0039 U, MDL=0.0039		ug/L	
			Perfluorooctanesulfonic acid (PFOS)	2023/03/05	0.0035 U, MDL=0.0035		ug/L	
			Perfluorononanesulfonic acid (PFNS)	2023/03/05	0.0037 U, MDL=0.0037		ug/L	
			Perfluorodecanesulfonic acid (PFDS)	2023/03/05	0.0048 U, MDL=0.0048		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2023/03/05	0.0034 U, MDL=0.0034		ug/L	
			EtFOSA	2023/03/05	0.0095 U, MDL=0.0095		ug/L	
			MeFOSA	2023/03/05	0.0084 U, MDL=0.0084		ug/L	
			EtFOSE	2023/03/05	0.0070 U, MDL=0.0070		ug/L	
			MeFOSE	2023/03/05	0.0073 U, MDL=0.0073		ug/L	
			EtFOSAA	2023/03/05	0.0046 U, MDL=0.0046		ug/L	
			MeFOSAA	2023/03/05	0.0045 U, MDL=0.0045		ug/L	
			4:2 Fluorotelomer sulfonic acid	2023/03/05	0.0033 U, MDL=0.0033		ug/L	
			6:2 Fluorotelomer sulfonic acid	2023/03/05	0.0015 U, MDL=0.0015		ug/L	
			8:2 Fluorotelomer sulfonic acid	2023/03/05	0.0031 U, MDL=0.0031		ug/L	
			Hexafluoropropyleneoxide dimer acid	2023/03/05	0.0052 U, MDL=0.0052		ug/L	
			4,8-Dioxa-3H-perfluoronanoic acid	2023/03/05	0.0027 U, MDL=0.0027		ug/L	
			9Cl-PF3ONS (F-53B Major)	2023/03/05	0.0043 U, MDL=0.0043		ug/L	
			11Cl-PF3OUdS (F-53B Minor)	2023/03/05	0.0035 U, MDL=0.0035		ug/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The extracted internal standard analyte exhibited high recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. For results that were not detected (ND), this potential high bias has no impact.

(2) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(3) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (PFTeDA, PFTrDA). La récupération de l'analyte standard interne extrait était inférieure à la limite de contrôle inférieure définie (LCL), ce qui peut entraîner une variabilité accrue du résultat de l'analyte natif associé (PFTeDA, PFTrDA).



Bureau Veritas Job #: C351279
Report Date: 2023/04/21

Apex Laboratories
Client Project #: A3B0674

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Angel Guerrero, Supervisor, Ultra Trace Analysis, HRMS and SVOC

Colm McNamara, Senior Analyst, Liquid Chromatography

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

SUBCONTRACT ORDER

Apex Laboratories
A3B0674

RAM

AKC 2/21/23

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

BV Labs / Maxxam
C/O FEDEX DEPOT 299 Cayuga Rd
Cheektowaga, NY 14225
Phone : (800) 668-0639
Fax: (905) 332-9169

Sample Name: MW1-20230220-GW-70

Water **Sampled: 02/20/23 10:26**

(A3B0674-01)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	03/06/23 17:00	02/20/24 10:26	
1668C PCB Congeners (SUB)	03/06/23 17:00	02/20/24 10:26	
1699 Insecticides/Pesticides (SUB)	03/06/23 17:00	<u>02/27/23 10:26</u>	waters
537M - PFOAs (SUB)	03/06/23 17:00	02/27/23 10:26	
<i>Containers Supplied:</i>			
(F)Other-Non Preserved			
(G)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(T)1 L Amber Glass - Non Preserved			

Sample Name: MW2-20230220-GW-60

Water **Sampled: 02/20/23 14:41**

(A3B0674-02)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	03/06/23 17:00	02/20/24 14:41	
1668C PCB Congeners (SUB)	03/06/23 17:00	02/20/24 14:41	
1699 Insecticides/Pesticides (SUB)	03/06/23 17:00	<u>02/27/23 14:41</u>	waters
537M - PFOAs (SUB)	03/06/23 17:00	02/27/23 14:41	
<i>Containers Supplied:</i>			
(F)Other-Non Preserved			
(G)Other-Non Preserved			
(Q)1 L Amber Glass - Non Preserved			
(R)1 L Amber Glass - Non Preserved			
(S)1 L Amber Glass - Non Preserved			
(T)1 L Amber Glass - Non Preserved			

22-Feb-23 12:20

Lori Dufour
C351279

KSS ENV-1648

Standard TAT

WATCH HOLD TIMES

Released By *[Signature]* Date *2-21-23* Fed Ex (Shipper) Received By *[Signature]* Date *2023/02/22*

Released By Date Received By Date

Temp. B. 6.0/6.0/3.7 2.7/2.9/3.5 3.6/3.3/4.1 Temp. B. 4.7/3.6/3.9

APPENDIX D

DATA VALIDATION MEMORANDA



DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. M0830.03.006 | DECEMBER 16, 2022 | CITY OF ST. HELENS

Maul Foster & Alongi, Inc. (MFA), conducted an independent Stage 2A review of the quality of analytical results for a 50-part incremental sampling methodology (ISM) sediment sample collected by MFA from the wastewater treatment lagoon located at 451 Plymouth Street, St. Helens, Oregon, on August 10, 2022.

Apex Laboratories, LLC (Apex), Bureau Veritas (BV), and Weck Laboratories, Inc. (Weck), performed the analyses. MFA reviewed Apex report number A2H0382 and BV report number C2O0154. Portions of samples submitted to Apex were subcontracted to BV for dioxins and furans analysis and to Weck for chlorinated herbicides analysis. BV results were reported in C2O0154 and Weck analytical results were appended to Apex report A2H0382. The analyses performed and sample analyzed are listed below.

Analysis	References
Chlorinated herbicides	EPA 8151A
Diesel- and oil-range hydrocarbons	NWTPH-Dx
Dioxins and furans	EPA 8290A, EPA 1613B
Gasoline-range hydrocarbons	NWTPH-Gx
Hexavalent chromium	EPA 7196A
Organochlorine pesticides	EPA 8270E
Organophosphorus pesticides	EPA 8270E
Percent moisture	Carter, 2008
Percent solids	EPA 8000D
Polychlorinated biphenyls as congeners	EPA 1668C
Per- and polyfluoroalkyl substances	ASTM D7968-17A
Semivolatile organic compounds	EPA 8270E
Total metals	EPA 6020B
Volatile organic compounds	EPA 8260D, EPA 8260D-SIM
<p>Notes ASTM = ASTM International. EPA = U.S. Environmental Protection Agency. NWTPH = Northwest Total Petroleum Hydrocarbons. SIM = selected ion monitoring.</p>	

Sample Analyzed
Reports A2H0382, C2O0154
DU1-20220810-ISM-COMP

DATA QUALIFICATION

Analytical results were evaluated according to applicable sections of U.S. Environmental Protection Agency (EPA) guidelines for data review (EPA 2014, 2020a, 2020b, 2020c) and appropriate laboratory- and method-specific guidelines (Apex 2022, BV 2021, EPA 1986, Weck 2020).

Data validation procedures were modified, as appropriate, to accommodate quality control requirements for methods that EPA data review procedures do not specifically address (e.g., Northwest Total Petroleum Hydrocarbons [NWTPH]-Dx).

Based on the results of the data quality review procedures described below, the data, with the appropriate final data qualifiers assigned, are considered acceptable for their intended use. Final data qualifiers represent qualifiers originating from the laboratory and accepted by the reviewer, and data qualifiers assigned by the reviewer during validation.

Final data qualifiers:

- J = result is estimated.
- R = result is rejected. The analyte may or may not be present in the sample.
- U = result is non-detect at the estimated detection limit (EDL), laboratory detection limit (LDL), method detection limit (MDL), or method reporting limit (MRL).
- UJ = result is non-detect with an estimated LDL or MRL.

According to report A2H0382, the NWTPH-Dx diesel-range hydrocarbons result for sample DU1-20220810-ISM-COMP and the associated laboratory duplicate sample (22H0779-DUP1) was flagged by Apex as having a chromatographic pattern that did not resemble the diesel fuel standard used for quantitation. The result was reported as diesel-range hydrocarbons instead of a specific fuel product; thus, qualification was not required.

According to report A2H0382, the EPA Method 8270E 3,3'-dichlorobenzidine result for sample DU1-20220810-ISM-COMP was flagged by Apex as estimated due to known erratic recoveries. Apex noted that the analyte may not have passed all quality control requirements for the method. The result has been qualified by the reviewer with R.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A2H0382	DU1-20220810-ISM-COMP	3,3'-Dichlorobenzidine	2,830 U	2,830 R
Notes R = result is rejected. The analyte may or may not be present in the sample. U = result is non-detect at the laboratory detection limit. ug/kg = micrograms per kilogram.				

According to report A2H0382, Apex noted that the EPA Method 7196A hexavalent chromium analysis for sample DU1-20220810-ISM-COMP included compensation for background color and/or sample turbidity, in accordance with the analytical method. Qualification was not required.

Positive identification of 2,3,7,8-TCDF cannot be achieved using typical EPA Method 1613B analytical columns; therefore, 2,3,7,8-TCDF results detected above the MRL are confirmed by analysis with a second column having 2,3,7,8-TCDF resolution capacity. The confirmation analysis is referenced by BV to both EPA Methods 8290A and 1613B. In report C2O0154, the following 2,3,7,8-TCDF result was confirmed by second column analysis and is considered the result of record:

Report	Sample	Component	Primary Analysis (pg/g)	Confirmation Analysis (pg/g)	Result of Record (pg/g)
C2O0154	DU1-20220810-ISM-COMP	2,3,7,8-TCDF	58.3	59.5	59.5
Note pg/g = picograms per gram.					

According to report C2O0154, the ASTM International (ASTM) Method D7968-17A perfluorohexanesulfonic acid (PFHxS) result for sample DU1-20220810-ISM-COMP was flagged by BV as estimated due to exceedance of confirmation criteria. The result has been qualified by the reviewer with J, as shown in the following table:

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
C2O0154	DU1-20220810-ISM-COMP	PFHxS	3.5	3.5 J
Notes J = result is estimated. ug/kg = micrograms per kilogram.				

SAMPLE CONDITIONS

Sample Custody

Sample custody was appropriately documented on the chain-of-custody (COC) forms accompanying the reports.

According to the subcontract COC form provided with report C2O0154, cooler custody seals were not observed on the sample coolers received by BV on August 23, 2022.

Holding Times

According to report A2H0382, the EPA Method 8260D-SIM analysis of sample DU1-20220810-ISM-COMP was performed two days after the 14-day method-recommended holding time. All associated results were non-detect and have been qualified by the reviewer

with R. The same analytes were also analyzed by EPA Method 8260D within the method-recommended holding time and were included in report A2H0382 to provide an unqualified analytical dataset. The EPA Method 8260D results will be used as the results of record. The EPA Method 8260D-SIM and 8260D data qualification and use is summarized in the following table:

Report A2H0382				
Sample	Component	EPA 8260D-SIM Original Result (ug/kg)	EPA 8260D-SIM Qualified Result (ug/kg)	EPA 8260D Result of Record (ug/kg)
DU1-20220810-ISM-COMP	Benzene	36.5 U	36.5 R	182 U
	Toluene	182 U	182 R	911 U
	Ethylbenzene	91.1 U	91.1 R	456 U
	m,p-Xylene	182 U	182 R	911 U
	o-Xylene	91.1 U	91.1 R	456 U
	1,2,4-Trimethylbenzene	182 U	182 R	911 U
	1,3,5-Trimethylbenzene	182 U	182 R	911 U
	Chloroform	182 U	182 R	911 U
	1,2-Dibromo-3-chloropropane	91.1 U	91.1 R	4,560 U
	1,2-Dibromoethane	36.5 U	36.5 R	911 U
	1,1-Dichloroethane	36.5 U	36.5 R	456 U
	1,2-Dichloroethane	36.5 U	36.5 R	456 U
	1,1-Dichloroethene	72.9 U	72.9 R	456 U
	cis-1,2-Dichloroethene	36.5 U	36.5 R	456 U
	trans-1,2-Dichloroethene	36.5 U	36.5 R	456 U
	1,2-Dichloropropane	36.5 U	36.5 R	456 U
	cis-1,3-Dichloropropene	36.5 U	36.5 R	911 U
	trans-1,3-Dichloropropene	36.5 U	36.5 R	911 U
	Methyl tert-butyl ether	36.5 U	36.5 R	911 U
	Tetrachloroethene	583 U	583 R	456 U
	1,1,2,2-Tetrachloroethane	91.1 U	91.1 R	911 U
	Trichloroethene	36.5 U	36.5 R	456 U
	1,2,3-Trichloropropane	91.1 U	91.1 R	911 U
Vinyl chloride	182 U	182 R	456 U	
1,1,2-Trichloroethane	91.1 U	91.1 R	456 U	

Note
EPA = U.S. Environmental Protection Agency.
R = result is rejected. The analyte may or may not be present in the sample.
SIM = selected ion monitoring.
U = result is non-detect at the laboratory detection limit.
ug/kg = micrograms per kilogram.

According to report A2H0382, the EPA Method 8270E organochlorine pesticide analysis was performed by Apex 33 days after the 14-day method-recommended holding time. Apex noted that the ISM-processed sample had been frozen at -18 degrees Celsius to extend the holding

time and when accounting for the time spent in frozen storage, the 14-day holding time had been met. The reviewer confirmed that the total amount of time that the sample spent in standard storage (at 4 degrees Celsius) was fewer than 14 days. Qualification based on holding time exceedance was not required.

According to the general comments provided with report C2O0154, ASTM D7968-17A batch 8213841 analysis for sample DU1-20220810-ISM-COMP was performed 9 days after the method-recommended holding time of 28 days. BV noted that a reanalysis was required for quality control purposes. BV also noted that due to their chemical nature, PFAS compounds are chemically and biologically stable in the environment, resist typical environmental degradation, and that reanalysis outside of the method-defined holding time should not have a significant impact on the data. The reviewer noted that there are no EPA guidelines for validation of PFAS analytical results. The associated sample results have been qualified with J for detected results and UJ for non-detect results.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
C2O0154	DU1-20220810-ISM-COMP	PFTrDA	3.9	3.9 J ^(a)
		PFTeDA	2.2	2.2 J ^(a)
		PFOSA	0.20 U	0.20 UJ ^(a)
		EtFOSA	0.31 U	0.31 UJ ^(a)
		MeFOSA	0.39 U	0.39 UJ ^(a)
		EtFOSE	1.7	1.7 J ^(a)
		MeFOSE	3.6	3.6 J
Notes J = result is estimated. U = result is non-detect at the method detection limit. ug/kg = micrograms per kilogram. UJ = result is non-detect with an estimated method detection limit. ^(a) Result is also qualified based on labeled surrogate exceedance. Final qualification is shown.				

The remaining extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The reviewer confirmed with the MFA field sampler that sample DU1-20220810-ISM-COMP was collected as a 50-part ISM sample from St. Helens wastewater lagoon decision unit 1. Apex performed representative sampling methodology processing, as requested on the COC form provided with report A2H0382. Apex noted that the sample was processed prior to extraction and analysis; the reviewer confirmed representative sampling methodology was performed consistent with standard ISM guidance. Apex air-dried and ground the entire dried sample to 70-micron particle size. The reviewer confirmed with Apex that dried fragments of the sample were examined for debris and large pieces of visible trash had been removed prior to grinding. Gravel and sticks were not observed in the sample. Apex noted in a separate email communication that small particles of plastic and synthetic fibers had been observed in the

dried material, and at MFA's request, these small particles were retained and processed with the sample. The ground material was mixed and then subsampled for analysis. A separate 50-part ISM sample container with methanol preservative was submitted for NWTPH-Gx, EPA Method 8260D, and EPA Method 8260D-SIM analysis.

According to the general comments section of report C2O0154, the sample cooler received by BV on August 23, 2022, had an average temperature of 10.5 degrees Celsius. A temperature blank was also present and had an acceptable average temperature at 4.1 degrees Celsius. The reviewer confirmed that wet ice was also present in the cooler upon receipt. Based on the acceptable temperature blank temperature, qualification was not required. A second sample cooler received by BV on September 15, 2022, with the portion of sample provided for EPA Method 1668C polychlorinated biphenyl congener analysis had an average cooler temperature of 15.2 degrees Celsius. BV noted on the COC form that a temperature blank was not found. The reviewer confirmed that wet ice was present in the cooler when BV received it. Based on the presence of wet ice and known polychlorinated biphenyl congener thermal stability, the reviewer determined that qualification was not necessary.

The remaining samples were preserved and stored appropriately.

REPORTING LIMITS

Apex and Weck reported non-detect results to LDLs. Apex also raised some LDLs to MRLs, and these results are discussed below. BV reported non-detect EPA Method 1613B and 1668C results to EDLs and ASTM D7968-17A results to MDLs. Results detected between LDLs, EDLs, or MDLs and the associated MRLs were flagged by the laboratories with J as estimated. Samples requiring dilutions because of high analyte concentrations and/or matrix interferences were reported with raised detection and/or reporting limits. BV labeled MRLs as reporting detection limits.

The reviewer confirmed that NWTPH-Gx and EPA Method 8260D results were reported with a base dilution factor of 50 and EPA Method 8260D-SIM results were reported with a base dilution factor of 100 due to dilutions required for analysis.

According to report A2H0382, Apex raised NWTPH-Gx gasoline-range hydrocarbon and EPA Method 8260D bromomethane and 2-hexanone LDLs to MRLs. The reviewer confirmed that the gasoline-range hydrocarbon LDL had been raised due to matrix interference and that the bromomethane and 2-hexanone LDLs had been raised due to interference from coeluting organic compounds. No qualification was required.

According to report A2H0382, the EPA Method 8270E organophosphorus pesticide analysis of sample DU1-20220810-ISM-COMP and the associated laboratory duplicate was performed at a dilution of 40 due to requirements for sample preparation and/or analysis. The reviewer confirmed with Apex that the dilution was required due to matrix interference. LDLs for merphos, ethyl parathion, tetrachlorvinphos, and trichloroate were additionally raised by Apex to MRLs due to interference from coeluting organic compounds. The reviewer confirmed that LDLs for coumaphos, merphos, methyl parathion, monocrotophos were also raised to MRLs by Apex due to interference from coeluting organic compounds. No qualification was required.

According to report A2H0382, EPA Method 8270E organochlorine pesticide LDLs for dieldrin, endosulfan I, and endosulfan II for sample DU1-20220810-ISM-COMP were raised by Apex to the detected sample concentration due to interference from coeluting organic compounds. No qualification was required.

According to report A2H0382, the EPA Method 7196A analysis was performed at a dilution of 50. The reviewer confirmed that the dilution was performed due to matrix interference. No qualification was required.

According to report A2H0382, the EPA Method 8151A analysis was performed at a dilution of 10 due to matrix interference. The reviewer confirmed that Weck also diluted the sample prior to extraction due to matrix interference. No qualification was required.

BLANKS

Method Blanks

Laboratory method blanks are used to assess whether laboratory contamination was introduced during sample preparation and analysis. Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the laboratory method blanks were associated with all samples prepared in the analytical batch.

According to report A2H0382, the EPA Method 8260D-SIM batch 22H0946 laboratory method blank (22H0946-BLK1) had a detection of toluene between the LDL and MRL, at a concentration of 2.96 micrograms per kilogram, and a detection of tetrachloroethene above the MRL, at a concentration of 13.4 micrograms per kilogram. The associated sample results were non-detect; thus, qualification was not required.

According to report C2O0154 the EPA Method 1613B batch 8212445 laboratory method blank total HxCDD EDL was raised to 0.424 picograms per gram due to an estimated maximum potential concentration detection. The reviewer confirmed that the total HxCDD estimated maximum potential concentration was below the MRL. The reviewer applied validation guidance based on laboratory method blank evaluation of OCDD and OCDF so qualification was not required.

According to report C2O0154, the EPA Method 1668C batch 8239765 laboratory method blank analysis detected 3,3'-DiCB-11, TriCB-20+28, TetraCB-44+47+65, PentaCB-90+101+113, PentaCB-110+115, 2,3',4,4',5-PentaCB-118, HexaCB-129+138+163, HexaCB-147+149, and HexaCB-153+168 between EDLs and MRLs, ranging from concentrations of 0.00027 nanograms per gram to 0.00323 nanograms per gram. All associated sample results were detected above MRLs and significantly greater than the laboratory method blank concentrations; thus, qualification was not required.

All remaining laboratory method blank results were non-detect to LDLs, EDLs, or MDLs for all target analytes.

Equipment Rinsate Blanks

Equipment rinsate blanks are used to evaluate field equipment decontamination. These blanks were not required for this sampling event, as all samples were collected using dedicated, single-use equipment.

Trip Blanks

Trip blanks are used to evaluate whether volatile organic compound contamination was introduced during sample storage and shipment between the sampling location and the laboratory.

Trip blank samples were not submitted for analysis. The associated sample was non-detect for all volatile organic compounds.

LABORATORY CONTROL SAMPLE AND LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample (LCS) and a laboratory control sample duplicate (LCSD) are spiked with target analytes to provide information about laboratory precision and accuracy. The LCS and LCSD samples were extracted and analyzed at the required frequency. LCSD results were not reported by Apex; batch precision was evaluated with laboratory duplicate sample results. BV labeled LCS and LCSD results as “spiked blank” and “spiked blank dup” results, respectively.

According to report A2H0382, the EPA Method 8260D batch 22H0476 LCS (22H0476-BS1) exceeded the upper percent recovery acceptance limit of 120 percent for acetone, bromomethane, chloroethane, and 2,2-dichloropropane, ranging from 122 percent to 139 percent. The associated sample results were non-detect; thus, qualification was not required. The LCS results for 2-hexanone and naphthalene were below the lower percent recovery acceptance limit of 80 percent, at 76 percent and 67 percent, respectively. Apex noted that MRL sensitivity had been confirmed for these two analytes. The associated sample LDL for 2-hexanone had been raised to the MRL by Apex. The reviewer raised the associated sample LDL for naphthalene to the MRL and qualified both the 2-hexanone and naphthalene results, which were non-detect, with UJ, at the MRL.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A2H0382	DU1-20220810-ISM-COMP	2-Hexanone	18,200 U	18,200 UJ
		Naphthalene	1,820 U	3,650 UJ
Notes U = result is non-detect at the laboratory detection limit or method reporting limit. ug/kg = micrograms per kilogram. UJ = result is non-detect with an estimated method reporting limit.				

According to report A2H0382, the EPA Method 8260D-SIM batch 22H0946 LCS (22H0946-BS1) exceeded the upper percent recovery acceptance limit of 120 percent for

tetrachloroethane, at 136 percent. The associated sample result was non-detect; thus, qualification was not required. The LCS result for 1,1-dichloroethene was below the lower percent recovery acceptance limit of 80 percent, at 67 percent. Apex noted that the associated sample result may be biased low. The associated sample result was already qualified by the reviewer as rejected based on analysis after the holding time; additional qualification was not required.

According to report A2H0382, the EPA Method 8270E batch 22H0777 LCS (22H0777-BS1) result for 3,3'-dichlorobenzidine exceeded the upper percent recovery acceptance limit of 121 percent, at 282 percent. Apex had also flagged the associated sample result as estimated based on known erratic quality control. The associated sample result is discussed by the reviewer in the Data Qualifications section above; additional qualification was not required.

All remaining LCS and LCSD results were within acceptance limits for percent recovery and relative percent difference (RPD).

LABORATORY DUPLICATE RESULTS

Laboratory duplicate results are used to evaluate laboratory precision. All laboratory duplicate samples were prepared and analyzed at the required frequency. When laboratory duplicate sample results were not reported, batch precision was evaluated with matrix spike (MS) and matrix spike duplicate (MSD) sample results.

Laboratory duplicate results greater than five times the MRL were evaluated using laboratory RPD control limits. Laboratory duplicate results less than five times the MRL, including non-detects, were evaluated using a control limit of the MRL of the parent sample; the absolute difference of the laboratory duplicate sample result and the parent sample result or the MRL for non-detects was compared to the MRL of the parent sample.

All laboratory duplicate results, including those flagged by the laboratory, met RPD acceptance criteria.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS

MS and MSD results are used to evaluate laboratory precision and accuracy as well as the effect of the sample matrix on sample preparation and analysis. When MS and MSD results were not reported, batch precision and accuracy were evaluated with laboratory duplicate and LCS results, respectively.

When MS and MSD were prepared from samples with high concentrations of target analytes, associated MS and/or MSD percent recovery and/or RPD control limit exceedances did not require qualification because spike concentrations could not be accurately quantified. High concentrations of target analytes are defined as four times the spike amount for all analyses.

When MS and MSD were prepared with samples from unrelated projects, the MS and/or MSD percent recovery and/or RPD control limit exceedances did not require qualification because these sample matrices were not representative of project sample matrices.

According to report A2H0382, Apex flagged the EPA Method 8260D batch 22H0476 MS (22H0476-MS1) because the associated parent sample was received by Apex at a temperature outside of the recommended storage temperature range. The MS was prepared with a sample from an unrelated project; thus, qualification was not required.

According to report A2H0382, a MS was not reported for EPA Method 8270E batch 22H0777 or 22H0778 because high dilutions had been required for analysis for the sample used to prepare the MSs; expected MS spike concentrations were below LDLs, so analyte recovery could not be calculated. Batch accuracy was evaluated with LCS results.

According to report A2H0382, the EPA Method 7196A batch 22H0747 MS (22H0747-MS1) had no hexavalent chromium recovery. A second MS (22H0747-MS2) that was analyzed at a higher dilution also had no hexavalent chromium recovery. Apex noted that MS recoveries were likely caused by reducing conditions present in the sample. Apex analyzed a post-digestion MS (22H0747-PS1), where the digested sample was spiked with hexavalent chromium prior to analysis. The post-digestion MS had acceptable hexavalent chromium recovery; thus, the associated sample result, which was non-detect, was qualified by the reviewer with UJ, as shown in the following table.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A2H0382	DU1-20220810-ISM-COMP	Hexavalent chromium	10.7 U	10.7 UJ
Notes U = result is non-detect at the laboratory detection limit. mg/kg = milligrams per kilogram. UJ = result is non-detect with an estimated laboratory detection limit.				

According to report A2H0382, EPA Method 8151A batch W2H1928 MS (W2H1928-MS1) results for 2,4-D, 2,4-DB, 2,4,5-T, 2,4,5-TP, dalapon, dicamba, MCP, pentachlorophenol, and pichloram were below lower percent recovery acceptance limits or were non-detect. The associated surrogate percent recovery was below the lower percent recovery acceptance limit of 13 percent, at 8 percent. Weck noted that the low MS and surrogate recoveries were likely caused by matrix interference. The associated MSD (W2H1928-MSD1) had acceptable percent recoveries for all chlorinated herbicides, ranging from 30 percent to 118 percent, and the surrogate, at 67 percent. The associated sample surrogate recovery was acceptable, at 67 percent, which indicates that matrix interference may have been minimal; however, based on the variable MS and MSD recoveries, all associated sample results, which were non-detect, have been qualified by the reviewer with UJ, as shown in the following table. MS and MSD RPDs provided by Weck appeared to be incorrect and so were recalculated by the reviewer. All MS and MSD RPDs exceeded the RPD control limit of 25 percent. The associated sample was non-detect for all chlorinated herbicides, so additional qualification based on MS and MSD RPD was not required.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A2H0382	DU1-20220810-ISM-COMP	2,4-D	330 U	330 UJ
		2,4-DB	580 U	580 UJ
		2,4,5-T	150 U	150 UJ
		2,4,5-TP (Silvex)	180 U	180 UJ
		Dalapon	260 U	260 UJ
		Dicamba	240 U	240 UJ
		Dichloroprop	240 U	240 UJ
		Dinoseb	83 U	83 UJ
		MCPA	54,000 U	54,000 UJ
		MCPP	140,000 U	140,000 UJ
		Pentachlorophenol	230 U	230 UJ
		Picloram	220 U	220 UJ
Notes U = result is non-detect at the method detection limit. UJ = result is non-detect with an estimated method detection limit. ug/kg = micrograms per kilogram.				

All remaining MS and MSD results were within acceptance limits for percent recovery and RPD.

SURROGATE RECOVERY RESULTS

The samples were spiked with surrogate compounds to evaluate laboratory performance for individual samples. The laboratory appropriately documented and qualified surrogate outliers. The reviewer took no action on surrogate percent recoveries associated with high sample dilutions. The reviewer confirmed that batch quality assurance/quality control results for samples with surrogate outliers were within acceptance limits.

All remaining surrogate results were within percent recovery acceptance limits.

LABELED ANALOG RECOVERY RESULTS

According to report C2O0154, ASTM D7968-17A, EPA Method 1613B, and EPA Method 1668C samples were spiked with carbon-13 labeled standards to quantify the relative response of analytes in each sample. For EPA Method 1613B, a chlorine-37 labeled standard was also used to evaluate the efficiency of the extract cleanup process.

According to report C2O0154, ASTM D7968-17A, EPA Method 1613B, and EPA Method 1668C labeled standard percent recovery acceptance limits were not shown for sample DU1-20220810-ISM-COMP. The reviewer confirmed with BV that all sample DU1-20220810-ISM-COMP labeled standard percent recovery acceptance limits were shown with quality control

results and that all percent recovery exceedances were noted. No additional action was required.

According to report C2O0154, EPA Method 1668C labeled standard 13C-2,2',6,6'-TetraCB-54 and ¹³C-2,2'-DiCB-4 results for the batch 8239765 laboratory method blank were flagged by BV as meeting method criteria. The review confirmed with BV that the labeled standard acceptance limits had been expanded based on labeled standard recovery in the LCS. The associated samples and LCS had acceptable labeled analog standard recoveries; thus, qualification was not required.

According to report C2O0154, the ASTM D7968-17A labeled standards ¹³C₂-perfluorotetradecanoic acid (PFTeDA), ¹³C₈-perfluorooctane sulfonamide (PFOSA), d3-N-methyl perfluorooctane sulfonamide (MeFOSA), d5-N-ethyl perfluorooctane sulfonamide (EtFOSA), and d9-N-ethyl perfluorooctane sulfonamido ethanol (EtFOSE) were below lower percent recovery acceptance limits of 50 percent, at 38 percent, 27 percent, 23 percent, 18 percent, and 17 percent, respectively, for sample DU1-20220810-ISM-COMP. The results were confirmed by reanalysis and are likely related to matrix interference. BV noted that PFTeDA sample results were also associated with the PFTeDA surrogate. The associated sample results have been qualified with J for detected results and UJ for non-detect results. All associated results were also qualified based on holding time exceedance, which is discussed in the Holding Times section above. Additional qualification was not required, but a summary of qualified results is presented for clarity:

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
C2O0154	DU1-20220810-ISM-COMP	Perfluorotridecanoic acid (PFTeDA)	3.9	3.9 J ^(a)
		Perfluorotetradecanoic acid (PFTeDA)	2.2	2.2 J ^(a)
		Perfluorooctane sulfonamide (PFOSA)	0.20 U	0.20 UJ ^(a)
		N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.31 U	0.31 UJ ^(a)
		N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.39 U	0.39 UJ ^(a)
		N-Ethyl perfluorooctane sulfonamido ethanol (EtFOSE)	1.7	1.7 J ^(a)
Notes J = result is estimated. U = result is non-detect at the method detection limit. ug/kg = micrograms per kilogram. UJ = result is non-detect with an estimated method detection limit. ^(a) Result is also qualified based on holding time exceedance. Final qualification is shown.				

All remaining labeled standard recoveries were within acceptance limits.

CONTINUING CALIBRATION VERIFICATION RESULTS

Continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy through the end of the sample batch. The laboratories did not report CCV

results, but appropriately flagged results associated with CCV exceedances. Surrogate or batch quality control results flagged by the laboratory based on CCV exceedances but meeting percent recovery and/or RPD acceptance criteria required no action from the reviewer.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. Duplicate and triplicate samples were not submitted for analysis.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies.

Chemical names provided in this report can be found in the referenced analytical methods or the United States National Institutes of Health National Library of Medicine PubChem database <https://pubchem.ncbi.nlm.nih.gov/>.

Report A2H0382 was amended and reissued by Apex on December 12, 2022, to include LDLs for EPA Method 8151A results and to correct the EPA Method 8270E merphos result for sample DU1-20220810-ISM-COMP.

According to the COC form provided with report A2H0382, EPA Method 8151A chlorinated herbicide analysis was requested twice for sample DU1-20220810-ISM-COMP. The reviewer confirmed that the second analysis had been requested in error and that along with the first request for EPA Method 8151A, the remaining analytical methods on the COC form represented the complete list of required laboratory analyses. No additional action was required.

According to the COC form provided with report A2H0382, EPA Method 537 modified was requested for the per- and polyfluoroalkylated substances analysis; however, ASTM Method D7968-17A was performed. The reviewer confirmed that ASTM Method D7968-17A was an appropriate analytical method for the analysis. No additional action was required.

According to the COC form provided with report A2H0382, EPA Method 1699 modified was requested for the organochlorine pesticide analysis; however, EPA Method 8270E was ultimately performed. The reviewer confirmed that EPA Method 8270E was an appropriate analytical method for the analysis. No additional action was required.

C2O0154 was revised and reissued by BV on November 16, 2022, with a correction to sample name DU1-20220810-ISM-COMP.

No additional issues were found.

REFERENCES

- Apex. 2022. *Quality Systems Manual*. Rev. 10. Apex Laboratories, LLC: Tigard, OR. June 20.
- BV. 2021. *Corporate Quality Manual*. Rev. 22. Bureau Veritas: Mississauga, ON, Canada. September 7.
- EPA. 1986. *Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods*. EPA publication SW-846. 3rd ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), VI phase III (2019), VII phase I (2019), and VII phase II (2020).
- EPA. 2014. *R10 Data Validation and Review Guidelines for Polychlorinated Dibenzop-dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) using Method 1613B and SW846 Method 8290A*. EPA-910-R-14-003. U.S. Environmental Protection Agency, Region 10 Office of Environmental Assessment. Seattle, WA. May.
- EPA. 2020a. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA 542-R-20-006. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.
- EPA. 2020b. *National Functional Guidelines for Organic Superfund Methods Data Review*. EPA 540-R-20-005. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.
- EPA. 2020c. *National Functional Guidelines for High Resolution Superfund Methods Data Review*. EPA 542-R-20-007. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.
- Weck. 2020. *Quality Assurance Manual*. Rev. 20.6. Weck Laboratories, Inc.: Industry, CA. April 17.

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. M0830.03.006 | JUNE 7, 2023 | CITY OF ST. HELENS

Maul Foster & Alongi, Inc. (MFA), conducted an independent Stage 2A review of the quality of analytical results for groundwater, sediment, and associated quality control samples collected by MFA in January and February 2023 from the wastewater treatment lagoon located at 451 Plymouth Street, St. Helens, Oregon.

Apex Laboratories, LLC (Apex), Bureau Veritas (BV), and Weck Laboratories, Inc. (Weck), performed the analyses. MFA reviewed Apex report numbers A3A1010, A3B0217, A3B0522, and A3B0674. Portions of samples submitted to Apex were subcontracted to BV for dioxins and furans, polychlorinated biphenyl, and per- and polyfluoroalkylated substance analyses and to Weck for chlorinated herbicides analysis. MFA reviewed BV reports C338911, C338927, C347690, C347713, and C351279. Weck analytical results were appended to Apex reports. The analyses performed and the samples analyzed are listed in the following tables. Not all samples were analyzed for all the methods listed below.

Analysis	References
Chlorinated herbicides	EPA 8151A
Diesel- and oil-range hydrocarbons	NWTPH-Dx
Dioxins and furans	EPA 1613B, EPA 8290A
Gasoline-range hydrocarbons	NWTPH-Gx
Hexavalent chromium (sediment)	EPA 7196A
Hexavalent chromium (water)	EPA 218.6
Organochlorine pesticides (sediment)	EPA 8270E
Organochlorine pesticides (water)	EPA 1699
Organophosphorus pesticides	EPA 8270E
Percent moisture	Carter, 2008
Percent solids	EPA 8000D
Polychlorinated biphenyls as congeners	EPA 1668C
Per- and polyfluoroalkyl substances (sediment)	ASTM D7968-17A
Per- and polyfluoroalkyl substances (water)	EPA 537.1
Semivolatile organic compounds	EPA 8270E
Total metals	EPA 6020B
Volatile organic compounds	EPA 8260D, EPA 8260D-SIM
Notes ASTM = ASTM International. EPA = U.S. Environmental Protection Agency. NWTPH = Northwest Total Petroleum Hydrocarbons. SIM = selected ion monitoring.	

Samples Analyzed		
Reports A3A1010, C338927, C347690,	Reports A3B0217, C338911	Reports A3B0522, C347713
MFA-B1-20230130-21.9 ^(a)	MFA-B3A-20230207-GW-36.0	MW3-20230214-GW-35
MFA-B3-20230131-31.0 ^(a)	Field Blank	MW3-20230214-GW-35-DUP
MFA-B2-20230131-23.0 ^(a)	Trip Blank	MW5-20230214-GW-40
MFA-B4-20230202-SL-26.5 ^(a)	--	MW4-20230214-GW-40
MFA-B5-20230203-SL-27.0 ^(a)	--	MW6-20230214-GW-40.25
MFA-B1-B5-COMP-SL ^(b)	--	Field Blank-02
MFA-B1-B5-COMP-SL-PRO ^(c)	--	Trip Blank
Reports A3B0674, C351279	--	--
MW1-20230220-GW-70	--	--
MW2-20230220-GW-60	--	--
Trip Blank	--	--
Notes -- = no value. ^(a) Discrete sample submitted to laboratory for compositing. ^(b) Sample composited by Apex Laboratories, LLC for gasoline-range hydrocarbon and volatile organic compound analysis and composited by Bureau Veritas for per- and polyfluoroalkylated substance analysis. ^(c) Sample composited by Apex Laboratories, LLC and analyzed for all except per- and polyfluoroalkylated substances.		

DATA QUALIFICATION

Analytical results were evaluated according to applicable sections of U.S. Environmental Protection Agency (EPA) guidelines for data review (EPA 2014, 2020a, 2020b, 2020c) and appropriate laboratory- and method-specific guidelines (Apex 2022, BV 2021, EPA 1986, Weck 2020).

Data validation procedures were modified, as appropriate, to accommodate quality control requirements for methods that EPA data review procedures do not specifically address (e.g., Northwest Total Petroleum Hydrocarbons [NWTPH]-Dx).

Based on the results of the data quality review procedures described below, the data, with the appropriate final data qualifiers assigned, are considered acceptable for their intended use. Final data qualifiers represent qualifiers originating from the laboratory and accepted by the reviewer, and data qualifiers assigned by the reviewer during validation.

Final data qualifiers:

- J = result is estimated.
- J+ = result is estimated but may be biased high.
- J- = result is estimated but may be biased low.
- R = result is rejected. The analyte may or may not be present in the sample.

- U = result is non-detect at the estimated detection limit (EDL), laboratory detection limit (LDL), method detection limit (MDL), or method reporting limit (MRL).
- UJ = result is non-detect with an estimated EDL, LDL, or MRL.
- UK = result is non-detect at the estimated maximum potential concentration.

According to report A3A1010, the NWTPH-Dx diesel-range hydrocarbon result for sample MFA-B1-B5-COMP-SL-PRO and the associated laboratory duplicate sample (23B07695-DUP1) were flagged by Apex as elevated because of the presence of individual analyte peaks within the diesel hydrocarbon quantitation range that were not representative of diesel fuel. Apex also noted that the diesel-range hydrocarbon chromatographic pattern was similar to weathered diesel, mineral oil, or a related component. The reviewer qualified the associated sample result with J+ as shown in the following table. The result was also qualified by the reviewer as estimated in the Holding Times section below based on holding time exceedance; the reviewer determined that a final qualification of J+ based on both holding time and the chromatographic pattern was appropriate.

Report	Sample	Component	Original Result (mg/kg)	Qualified Result (mg/kg)
A3A1010	MFA-B1-B5-COMP-SL-PRO	Diesel-range hydrocarbons	26,100	26,100 J+(^a)
Notes J+ = result is estimated but may be biased high. mg/kg = milligrams per kilogram. (^a)Final qualification of J+ based on both chromatographic pattern and holding time exceedance.				

According to report A3A1010, Apex flagged all 3,3'-dichlorobenzidine results for sample MFA-B1-B5-COMP-SL-PRO and associated quality control samples as estimated based on known erratic recovery. The reviewer qualified the sample result with UJ in the following table. The result was also qualified by the reviewer as estimated in the Holding Times section below based on holding time exceedance; the reviewer determined that a final qualification of UJ based on both holding time and known erratic recovery was appropriate.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A3A1010	MFA-B1-B5-COMP-SL-PRO	3,3'-Dichlorobenzidine	3,960 U	3,960 UJ(^a)
Notes ug/kg = micrograms per kilogram. UJ = result is non-detect with an estimated laboratory detection limit. (^a)Final qualification of UJ based on both known erratic recovery and holding time exceedance.				

According to reports A3B0217, A3B0522, and A3B0674, Apex flagged all results detected between MDLs or LDLs and MRLs with Ja. The reviewer qualified these results with J. Results that were additionally qualified by the review are discussed in this validation report.

According to report A3A1010, Apex noted that EPA Method 7196A analysis of sample MFA-B1-B5-COMP-SL-PRO included compensation for background color and/or turbidity, and that this was performed in accordance with the analytical method. No qualification was required.

According to report C338927, the ASTM International (ASTM) Method D7968-17A PFHxS result for sample MFA-B1-B5-COMP-SL was flagged by BV as estimated due to exceedance of ion ratio confirmation criteria. The result has been qualified by the reviewer with J, as shown in the following table:

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
C338927	MFA-B1-B5-COMP-SL	PFHxS	2.2	2.2 J
Notes J = result is estimated. ug/kg = micrograms per kilogram.				

In accordance with EPA Region 10 guidance for dioxin and furan data validation (EPA 2014) and EPA national functional guidelines for high-resolution Superfund methods data review (EPA 2020a), the reviewer qualified EPA Method 1613B results because of laboratory EMPC detections. The reviewer applied the same guidance to EPA Method 1613B, 1664C and 1699 results that were flagged by BV as EMPCs.

The following results were identified by BV as EMPCs and were reported by BV as non-detect at the EMPC value. The reviewer qualified results identified as EMPCs with UK, as shown in the following table.

Report	Sample	Analyte	Units	Original Results	Qualified Results
C338911	MFA-B3A-20230207-GW-36.0	Aldrin	ng/L	0.19 U	0.19 UK
		beta-BHC		0.13 U	0.13 UK
		Dieldrin		0.090 U	0.090 UK
		Endosulfan sulfate		0.091 U	0.091 UK
		Methoxychlor		1.8 U	1.8 UK
C347690	MFA-B1-B5-COMP-SL-PRO	1,2,3,7,8,9-HxCDF	pg/g	0.453 U	0.453 UK
C347713	MW4-20230214-GW-40	OCDD	ng/L	4.17 U	4.17 UK
C351279	MW1-20230220-GW-70	TetraCB-(45)+(51)	pg/L	0.020 U	0.020 UK
		PentaCB-(90)+(101)+(113)		0.016 U	0.016 UK
		22'466'-PentaCB-(104)		0.016 U	0.016 UK
		22'33'566'-HeptaCB-(179)		0.013 U	0.013 UK
		beta-BHC	ng/L	0.020 U	0.020 UK

Report	Sample	Analyte	Units	Original Results	Qualified Results
	MW2-20230220-GW-60	23'44'-TetraCB-(66)		0.011 U	0.011 UK
		HexaCB-(128)+(166)		0.011 U	0.011 UK
Notes ng/L = nanograms per liter. pg/g = picograms per gram. pg/L = picograms per liter. U = result is non-detect at the laboratory detection limit. UK = result is non-detect at the estimated maximum potential concentration.					

Positive identification of 2,3,7,8-TCDF cannot be achieved using typical EPA Method 1613B analytical columns; therefore, 2,3,7,8-TCDF results detected above the MRL are confirmed by analysis with a second column having 2,3,7,8-TCDF-resolution capacity. The confirmation analysis is referenced by BV to both EPA Methods 8290A and 1613B. In report C338911, the following 2,3,7,8-TCDF result was confirmed by second-column analysis and is considered the result of record:

Report	Sample	Component	Units	Primary Analysis	Confirmation Analysis	Result of Record
C338911	MFA-B3A-20230207-GW-36.0	2,3,7,8-TCDF	pg/L	48.6	51.5	51.5
C347690	MFA-B1-B5-COMP-SL-PRO		pg/g	498	440	440
Note pg/g = picograms per gram. pg/L = picograms per liter.						

SAMPLE CONDITIONS

Sample Custody

According to reports C338927, C347690, and C347713, BV recorded sample receipt date and time on only the first page of multi-page chain-of-custody (COC) forms. The reviewer confirmed that all samples recorded on the COC forms had been received at the time recorded on the first page.

Sample custody was appropriately documented on the remaining COC forms accompanying the reports.

Holding Times

According to report A3A1010, Apex extracted sample MFA-B1-B5-COMP-SL-PRO for NW/TPH-Dx, EPA Method 8270E semivolatile organic compounds, and EPA Method 8270E organophosphorus pesticides analyses eight days after the 14-day method-recommended extraction holding time. Apex extracted sample MFA-B1-B5-COMP-SL-PRO for EPA Method 8270E organochlorine pesticides 17 days after the 14-day method-recommended

holding time. The reviewer determined extraction holding times based on the earliest collection date of the composited component samples, which was January 30, 2023. The reviewer confirmed that, after the final composite component sample was received by Apex on February 6, 2023, all five component samples were air dried, which took approximately three days. Samples were then frozen at -18 degrees Celsius until the morning of the extraction date. All associated sample results have been qualified by the reviewer as estimated, with UJ applied to non-detect results and J applied to detected results. Results already qualified by Apex as estimated based on detection below the MRL did not require additional qualification.

Report	Sample	Analysis	Original Results	Qualification
A3A1010	MFA-B1-B5-COMP-SL-PRO	NWTPH-Dx	Non-Detect	UJ
			Detect	J
		EPA 8270E (SVOCs)	Non-Detect	UJ
			Detect	J
		EPA 8270E (OP Pest)	Non-Detect	UJ
			Detect	J
		EPA 8270E (OC Pest)	Non-Detect	UJ
			Detect	J
Notes EPA = U.S. Environmental Protection Agency. J = result is estimated. NWTPH = Northwest Total Petroleum Hydrocarbon. OC Pest = organochlorine pesticide. OP Pest = organophosphorus pesticide. SVOC = semivolatfile organic compound. UJ = result is non-detect with an estimated laboratory detection limit.				

All remaining extractions and/or analyses were performed within the recommended holding times.

Preservation and Sample Storage

According to report A3A1010, samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27 were collected from January 30, 2023, to February 3, 2023, and submitted by MFA field staff to Apex in four sample delivery groups. Apex composited the five samples based on instructions provided on the COC form. A description of the composting process is summarized below:

According to report A3A1010, composite sample MFA-B1-B5-COMP-SL was prepared by Apex by combining equal volumes of methanol from the methanol-preserved volatile organics analysis containers for samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27. Sample MFA-B1-B5-COMP-SL was analyzed for NWTPH-Gx, EPA Method 8260D, and EPA Method 8260D-SIM. Apex noted that an average of discrete sample dry weights was used to calculate NWTPH-Gx, EPA Method 8260D, and EPA Method 8260D-SIM dry weight results.

According to report A3A1010, sample MFA-B1-B5-COMP-SL-PRO was prepared by Apex by combining equal weights of sample material from samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27. The composited sample was air dried, ground to approximately 70-micron particle size with a zirconia puck mill, and mixed to distribute the material prior to analysis. The sample name was appended with -PRO by Apex to distinguish the compositing processes. The reviewer referenced the Apex-modified sample name in the data validation report for clarity; however, sample name MFA-B1-B5-COMP-SL will be used for final reporting purposes.

According to report C338927, samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27.0 were air-dried and then composited by BV as requested on the original COC. The composited sample was assigned sample name MFA-B1-B5-COMP-SL.

According to the cooler receipt form provided with report A3B0217, all volatile organic analysis (VOA) containers received for sample MFA-B3A-20230207-GW-36.0 contained visible sediment. Qualification based on the presence of sediment was not required.

According to report A3B0217, the NWTPH-Gx, EPA Method 8260D, and EPA Method 8260D-SIM analyses of sample MFA-B3A-20230207-GW-36.0 were performed with a sample composited from multiple VOA containers due to the presence of sediment in the sample containers. The reviewer confirmed that the composite sample was prepared by pouring samples from the original VOA containers. Because sample preparation required opening the discrete sample VOAs, the results have been qualified by the reviewer as estimated. All associated non-detect sample results have been qualified with UJ and all associated detected sample results have been qualified with J, as shown in the following table. Results also flagged as estimated due to detection below the MRL did not require additional qualification.

Report	Sample	Analysis	Original Results	Qualification
A3B0217	MFA-B3A-20230207-GW-36.0	NWTPH-Gx	Detect	J
			Non-Detect	UJ
		EPA 8260D	Detect	J
			Non-Detect	UJ
		EPA 8260D-SIM	Detect	J ^(a)
			Non-Detect	UJ
Notes EPA = U.S. Environmental Protection Agency. J = result is estimated. NWTPH = Northwest Total Petroleum Hydrocarbon. SIM = selected ion monitoring. UJ = result is non-detect with an estimated laboratory detection limit. ^(a) EPA Method 8260D-SIM chloroform result qualified based on a trip blank detection; the final qualification is shown in the Trip Blanks section below.				

According to report A3B0522, Apex flagged the NWTPH-Dx results for sample MW5-20230214-GW-40 because the sample was received by Apex with incomplete preservation. The sample pH was adjusted by Apex prior to extraction; thus, qualification was not required.

The remaining samples were preserved and stored appropriately.

REPORTING LIMITS

Apex reported results to LDLs. Weck reported results to MDLs. Samples that required dilutions because of high analyte concentrations, matrix interferences, and/or dilutions necessary for preparation and/or analysis were reported with raised LDLs, MDLs, and MRLs. Apex and Weck qualified results between the LDL or MDL and the MRL with J, as estimated.

According to report A3A1010, the sample MFA-B1-B5-COMP-SL-PRO LDLs for EPA Method 8270E organophosphorus pesticides coumaphos, merphos, ethyl parathion, tetrachlorvinphos, and trichloronate and the LDLs for EPA Method 8270E organochlorine pesticides alpha-hexachlorocyclohexane (reported by Apex as alpha-BHC), beta-hexachlorocyclohexane (reported by Apex as beta-BHC), 2,4'-DDD, heptachlor, dieldrin, endosulfan I, and endosulfan II were raised to MRLs because of interference from coeluting organic compounds present in the sample. No qualification was necessary.

According to report A3A1010, the EPA Method 7196A sample MFA-B1-B5-COMP-SL-PRO LDL and MRL were raised because the sample required a 1:50 dilution for analysis. The reviewer confirmed that the dilution was required due to matrix interference. No qualification was required.

According to report A3B0522, all EPA Method 8151A sample extracts were diluted 1:5 prior to analysis due to matrix interference. Additionally, EPA Method 218.6 hexavalent chromium analysis was performed at 1:5 dilution for samples MW5-20230214-GW-40, MW4-20230214-GW-40, and MW6-20230214-GW-40.25 due to matrix interference. No qualification was required.

According to the case narrative provided with report C338911, BV performed all analyses for sample MFA-B3A-20230207-GW-36.0 at a 1:10 dilution because of matrix interferences. No qualification was required.

BLANKS

Method Blanks

Laboratory method blanks are used to assess whether laboratory contamination was introduced during sample preparation and analysis. Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the laboratory method blanks were associated with all samples prepared in the analytical batch. Where an analyte was detected in both a sample and its associated blank, sample results were qualified if the concentration was less than five times the laboratory method blank concentration for organic method analyses or less than ten times the laboratory method blank concentration for inorganic method analyses. Non-detect sample results and sample results greater than five times the laboratory method blank (for organic methods) or ten times (for inorganic methods) did not require qualification.

According to report A3B0522, the EPA Method 8270D batch 23B0739 laboratory method blank (23B0739-BLK1) had detections of merphos and tetraethyl pyrophosphate (reported by Apex as TEPP) between the LDL and MRL, at 0.491 micrograms per liter (ug/L) and 0.346 ug/L, respectively. The associated sample results were non-detect; thus, qualification was not required.

According to report C338911, the EPA Method 1699 batch 8503096 laboratory method blank had a detection of endrin between the MDL and MRL, at 0.061 nanograms per liter. The associated sample result was detected above the MRL and was greater than five times the laboratory method blank concentration; thus, qualification was not required.

According to reports C338911, C347713, and C351279, the EPA Method 1668C batch 8533813 laboratory method blank had several detections between EDLs and MRLs, as well as some detections above MRLs. The reviewer qualified sample concentrations detected below MRLs and less than five times the laboratory method blank concentrations with UJ at the reported sample concentrations. The reviewer qualified sample concentrations detected above MRLs, below the laboratory method blank concentration, and less than five times the laboratory method blank concentration with U at the reported sample concentration. Sample concentrations detected above MRLs, above laboratory method blank concentrations, and less than five times the laboratory method blank concentration were qualified by the reviewer with J+. Associated non-detect sample results did not require qualification. The laboratory method blank results for tetraCB-(44)+(47)+(65) and HeptaCB-(171)+(173) were flagged by BV as non-detect and EMPCs. The reviewer confirmed that the associated tetraCB-(44)+(47)+(65) and HeptaCB-(171)+(173) sample results were non-detect and at detection limits that were higher than that of the laboratory method blank; qualification was not required based on the laboratory method blank EMPC results.

Report	Sample	Analyte	Method Blank Result (ng/L)	Original Result (ng/L)	Qualified Result (ng/L)
C338911	MFA-B3A-20230207-GW-36.0	3,3'-DiCB-(11)	0.0834 J	0.78 J	0.78 UJ
		PentaCB-(90)+(101)+(113)	0.206	0.43 J	0.43 UJ
		PentaCB-(110)+(115)	0.122	0.49 J	0.49 UJ
		23'44'5-PentaCB-(118)	0.0962 J	0.127 J	0.127 UJ
		HexaCB-(129)+(138)+(163)	0.201	0.52 J	0.52 UJ
		HexaCB-(153)+(168)	0.237	0.32 J	0.32 UJ
C347713	MW3-20230214-GW-35-DUP	3,3'-DiCB-(11)	0.0834 J	0.118 J	0.118 UJ
		TriCB-(20) + (28)	0.0548	0.0125 J	0.0125 UJ
		TriCB-(21)+(33)	0.0405 J	0.0078 J	0.0078 UJ
		24'5-TriCB-(31)	0.0613	0.012 J	0.012 UJ
		22'55'-TetraCB-(52)	0.15	0.02 J	0.02 UJ
		TetraCB-(61)+(70)+(74)+(76)	0.115 J	0.026 J	0.026 UJ
		23'44'-TetraCB-(66)	0.0394 J	0.0093 J	0.0093 UJ

Report	Sample	Analyte	Method Blank Result (ng/L)	Original Result (ng/L)	Qualified Result (ng/L)
		PentaCB-(86)(87)(97)(109)(119)(125)	0.068 J	0.0152 J	0.0152 UJ
		PentaCB-(90)+(101)+(113)	0.206	0.0361 J	0.0361 UJ
		22'35'6-PentaCB-(95)	0.21	0.033 J	0.033 UJ
		PentaCB-(110)+(115)	0.122	0.0241 J	0.0241 UJ
		23'44'5-PentaCB-(118)	0.0962 J	0.0144 J	0.0144 UJ
		HexaCB-(129)+(138)+(163)	0.201	0.025 J	0.025 UJ
		HexaCB-(147)+(149)	0.274	0.0323 J	0.0323 UJ
		HexaCB-(153)+(168)	0.237	0.0253 J	0.0253 UJ
		HeptaCB-(180)+(193)	0.0737 J	0.0089 J	0.0089 UJ
	MW5-20230214-GW-40	2,4'-DiCB-(8)	0.0062 J	0.0086 J	0.0086 UJ
		3,3'-DiCB-(11)	0.0834 J	0.117 J	0.117 UJ
		TriCB-(20) + (28)	0.0548	0.0084 J	0.0084 UJ
		PentaCB-(90)+(101)+(113)	0.206	0.013 J	0.013 UJ
	MW4-20230214-GW-40	3,3'-DiCB-(11)	0.0834 J	0.0738 J	0.0738 UJ
		TriCB-(20) + (28)	0.0548	0.0095 J	0.0095 UJ
		24'5-TriCB-(31)	0.0613	0.0076 J	0.0076 UJ
		PentaCB-(90)+(101)+(113)	0.206	0.018 J	0.018 UJ
		PentaCB-(110)+(115)	0.122	0.015 J	0.015 UJ
		HexaCB-(147)+(149)	0.274	0.013 J	0.013 UJ
	MW6-20230214-GW-40.25	HexaCB-(153)+(168)	0.237	0.0128 J	0.0128 UJ
		2,4'-DiCB-(8)	0.0062 J	0.0203 J	0.0203 UJ
		3,3'-DiCB-(11)	0.0834 J	0.139 J	0.139 UJ
		4,4'-DiCB-(15)	0.011 J	0.0092 J	0.0092 UJ
		TriCB-(18)+(30)	0.0176 J	0.0131 J	0.0131 UJ
		TriCB-(21)+(33)	0.0405 J	0.0168 J	0.0168 UJ
		344'-TriCB-(37)	0.0127 J	0.0101 J	0.0101 UJ
		22'55'-TetraCB-(52)	0.15	0.038 J	0.038 UJ
		TetraCB-(61)+(70)+(74)+(76)	0.115 J	0.047 J	0.047 UJ
		23'44'-TetraCB-(66)	0.0394 J	0.0204 J	0.0204 UJ
		TetraCB-(49)+TetraCB-(69)	0.051 J	0.017 J	0.017 UJ
		PentaCB-(90)+(101)+(113)	0.206	0.0692 J	0.0692 UJ
		22'35'6-PentaCB-(95)	0.21	0.058	0.058 U
		233'44'-PentaCB-(105)	0.0276 J	0.0178 J	0.0178 UJ
PentaCB-(110)+(115)		0.122	0.0521 J	0.0521 UJ	
23'44'5-PentaCB-(118)		0.0962 J	0.0314 J	0.0314 UJ	
HexaCB-(129)+(138)+(163)		0.201	0.056 J	0.056 UJ	

Report	Sample	Analyte	Method Blank Result (ng/L)	Original Result (ng/L)	Qualified Result (ng/L)
		22'33'46'-HexaCB-(132)	0.0682	0.019 J	0.019 UJ
		HexaCB-(135)+(151)	0.143	0.038 J	0.038 UJ
		22'34'55'-HexaCB-(141)	0.0545	0.014 J	0.014 UJ
		HexaCB-(147)+(149)	0.274	0.063 J	0.063 UJ
		HexaCB-(153)+(168)	0.237	0.0594 J	0.0594 UJ
		22'33'45'6'-HeptaCB-(174)	0.0523	0.0101 J	0.0101 UJ
		22'33'56'6'-HeptaCB-(179)	0.0419 J	0.009 J	0.009 UJ
		HeptaCB-(180)+(193)	0.0737 J	0.018 J	0.018 UJ
		22'344'5'6'-HeptaCB-(183)	0.0419 J	0.009 J	0.009 UJ
		22'34'55'6'-HeptaCB-(187)	0.085	0.0191 J	0.0191 UJ
C351279	MW1-20230220-GW-70	2,4'-DiCB-(8)	0.0062 J	0.0091 J	0.0091 UJ
		3,3'-DiCB-(11)	0.0834 J	0.365	0.365 J+
		4,4'-DiCB-(15)	0.011 J	0.0138 J	0.0138 UJ
		TriCB-(18)+(30)	0.0176 J	0.0123	0.0123 U
		TriCB-(20) + (28)	0.0548	0.0059 J	0.0059 UJ
		TriCB-(21)+(33)	0.0405 J	0.0038 J	0.0038 UJ
		24'5'-TriCB-(31)	0.0613	0.0114 J	0.0114 UJ
		22'55'-TetraCB-(52)	0.15	0.031 J	0.031 UJ
		TetraCB-(61)+(70)+(74)+(76)	0.115 J	0.032 J	0.032 UJ
		PentaCB-(86)(87)(97)(109)(119)(125)	0.068 J	0.026 J	0.026 UJ
	22'35'6'-PentaCB-(95)	0.21	0.052	0.052 U	
	233'44'-PentaCB-(105)	0.0276 J	0.01 J	0.01 UJ	
	PentaCB-(110)+(115)	0.122	0.046 J	0.046 UJ	
	23'44'5'-PentaCB-(118)	0.0962 J	0.031 J	0.031 UJ	
	HexaCB-(129)+(138)+(163)	0.201	0.061 J	0.061 UJ	
	HexaCB-(135)+(151)	0.143	0.037 J	0.037 UJ	
	HexaCB-(147)+(149)	0.274	0.072 J	0.072 UJ	
	HexaCB-(153)+(168)	0.237	0.062 J	0.062 UJ	
	HeptaCB-(180)+(193)	0.0737 J	0.023 J	0.023 UJ	
	22'34'55'6'-HeptaCB-(187)	0.085	0.022 J	0.022 UJ	
MW2-20230220-GW-60	3,3'-DiCB-(11)	0.0834 J	0.102 J	0.102 UJ	
	TriCB-(20) + (28)	0.0548	0.0077 J	0.0077 UJ	
	TriCB-(21)+(33)	0.0405 J	0.0047 J	0.0047 UJ	
	234'-TriCB-(22)	0.0213	0.007 J	0.007 UJ	
	24'5'-TriCB-(31)	0.0613	0.0148 J	0.0148 UJ	
	344'-TriCB-(37)	0.0127 J	0.0077 J	0.0077 UJ	

Report	Sample	Analyte	Method Blank Result (ng/L)	Original Result (ng/L)	Qualified Result (ng/L)
		22'55'-TetraCB-(52)	0.15	0.049 J	0.049 UJ
		TetraCB-(61)+(70)+(74)+(76)	0.115 J	0.058 J	0.058 UJ
		22'33'6'-PentaCB-(84)	0.024	0.019 J	0.019 UJ
		PentaCB-(86)(87)(97)(109)(119)(125)	0.068 J	0.05 J	0.05 UJ
		PentaCB-(90)+(101)+(113)	0.206	0.12 J	0.12 UJ
		22'35'6'-PentaCB-(95)	0.21	0.104	0.104 U
		233'44'-PentaCB-(105)	0.0276 J	0.0196 J	0.0196 UJ
		PentaCB-(110)+(115)	0.122	0.102	0.102 UJ
		23'44'5'-PentaCB-(118)	0.0962 J	0.0617 J	0.0617 UJ
		HexaCB-(129)+(138)+(163)	0.201	0.139 J	0.139 UJ
		22'33'46'-HexaCB-(132)	0.0682	0.044 J	0.044 UJ
		HexaCB-(135)+(151)	0.143	0.076 J	0.076 UJ
		22'33'66'-HexaCB-(136)	0.0455 J	0.023 J	0.023 UJ
		22'3455'-HexaCB-(141)	0.0545	0.029 J	0.029 UJ
		22'34'55'-HexaCB-(146)	0.031 J	0.018 J	0.018 UJ
		HexaCB-(147)+(149)	0.274	0.134	0.134 U
		HexaCB-(153)+(168)	0.237	0.125	0.125 U
		HexaCB-(156)+(157)	0.0088 J	0.0098 J	0.0098 UJ
		233'44'6'-HexaCB-(158)	0.0167 J	0.0113 J	0.0113 UJ
		22'33'44'5'-HeptaCB-(170)	0.0208 J	0.0163 J	0.0163 UJ
		22'33'456'-HeptaCB-(174)	0.0523	0.0298 J	0.0298 UJ
		22'33'45'6'-HeptaCB-(177)	0.0308 J	0.019 J	0.019 UJ
		22'33'566'-HeptaCB-(179)	0.0419 J	0.0204 J	0.0204 UJ
		HeptaCB-(180)+(193)	0.0737 J	0.0498 J	0.0498 UJ
		22'344'5'6'-HeptaCB-(183)	0.0419 J	0.0193 J	0.0193 UJ
		22'34'55'6'-HeptaCB-(187)	0.085	0.038 J	0.038 UJ
Notes J = result is estimated. J+ = result is estimated with a potential high bias. ng/L = nanograms per liter. U = result is non-detect with a raised reporting limit. UJ = result is non-detect with an estimated detection limit.					

According to report C347713, the EPA Method 1699 batch 8513671 laboratory method blank had a detection of 4,4'-DDE and endrin between EDLs and MRLs, at 0.012 nanograms per liter (ng/L) and 0.083 ng/L, respectively. Associated samples with 4,4'-DDE or endrin detections were qualified in the following table. Associated non-detect results did not require qualification.

Report	Sample	Analyte	Method Blank Result (ng/L)	Original Result (ng/L)	Qualified Result (ng/L)
C347713	MW3-20230214-GW-35	Endrin	0.083 J	0.048 J	0.048 UJ
	MW5-20230214-GW-40	4,4'-DDE	0.012 J	0.012 J	0.012 UJ
		Endrin	0.083 J	0.189 J	0.189 UJ
	MW4-20230214-GW-40	Endrin	0.083 J	0.101 J	0.101 UJ
		4,4'-DDE	0.012 J	0.012 J	0.012 UJ
	MW6-20230214-GW-40.25	Endrin	0.083 J	0.133 J	0.133 UJ
4,4'-DDE		0.012 J	0.019 J	0.019 UJ	
Notes J = result is estimated. ng/L = nanograms per liter. UJ = result is non-detect with an estimated detection limit.					

According to reports C347713 and C351279, the EPA Method 1613B batch 8524619 laboratory method blank had a detection of OCDD between the EDL and MRL, at 2.48 picograms per liter. Associated samples were qualified as shown in the following table.

Report	Sample	Analyte	Method Blank Result (pg/L)	Original Result (pg/L)	Qualified Result (ng/L)
C347713	MW3-20230214-GW-35	OCDD	2.48 J	2.11 J	2.11 UJ
	MW3-20230214-GW-35-DUP			3.24 J	3.24 UJ
	MW6-20230214-GW-40.25			7.62 J	7.62 UJ
C351279	MW2-20230220-GW-60			3.63 J	3.63 UJ
Notes J = result is estimated. pg/L = picograms per liter. UJ = result is non-detect with an estimated detection limit.					

According to report C347690, the EPA Method 1613B batch 8520730 laboratory method blank had detections of OCDD and OCDF between the EDL and MRL, at 0.514 picograms per gram (pg/g) and 0.268 pg/g, respectively. Additionally, BV raised the EDL for 1,2,3,4,6,7,8-Hepta CDD to 0.201 pg/g due to an EMPC detection. The associated sample results were all detected above the MRL at concentrations greater than five times the laboratory method blank detections and EMPCs. No qualification was required.

According to report C347690, the EPA Method 1668C batch 8576352 laboratory method blank had several detections between EDLs and MRLs, ranging from 0.0002 nanograms per gram to 0.0108 nanograms per gram. All associated sample results were detected at concentrations greater than five times the laboratory method blank concentrations; thus, qualification was not required.

According to report C351579, the EPA Method 1699 batch 8523575 laboratory method blank had a detection of endrin between the EDL and MRL, at 0.063 ng/L. Associated samples with

endrin detections were qualified in the following table. Associated non-detect results did not require qualification.

Report	Sample	Analyte	Method Blank Result (ng/L)	Original Result (ng/L)	Qualified Result (ng/L)
C347713	MW1-20230220-GW-70	Endrin	0.063 J	0.093 J	0.093 UJ
Notes J = result is estimated. ng/L = nanograms per liter. UJ = result is non-detect with an estimated detection limit.					

All remaining laboratory method blank results were non-detect to EDLs, LDLs, MDLs, or MRLs.

Equipment Rinse Blanks

Equipment rinse blanks are used to evaluate field equipment decontamination. These blanks were not required for this sampling event, as all samples were collected using dedicated, single-use equipment.

Field Blanks

Field blanks are used to assess if contamination from field conditions was introduced during sampling, preservation, and shipment to the laboratory. Field blank samples were submitted with sample delivery groups A3B0217 and A3B0522 and subcontracted by Apex to BV for EPA Method 537.1 analysis. The results were reported in C338911 and C347713. The field blank was non-detect to EDLs for all per- and polyfluoroalkylated substance analytes.

Trip Blanks

Trip blanks are used to evaluate whether volatile organic compound contamination was introduced during sample storage and during shipment between the sampling location and the laboratory.

Trip blank samples (identified with sample name Trip Blank) were submitted with sample delivery groups A3B0217, A3B0522, and A3B0674 for EPA Method 8260D and 8260D-SIM analyses. According to reports A3B0217, A3B0522, and A3B0674, all trip blank samples had EPA Method 8260D-SIM detections of chloroform. Associated non-detect sample results did not require qualification. The sample MFA-B3A-20230207-GW-36.0 chloroform detection was also qualified based on sample preparation. The reviewer determined that final qualification with J+ based on both sample preparation and trip blank detection was appropriate. The final associated detected sample results were qualified by the reviewer in the following table.

Report	Sample	Analyte	Trip Blank Result (ug/L)	Original Result (ug/L)	Qualified Result (ug/L)
A3B0217	MFA-B3A-20230207-GW-36.0	Chloroform	0.0693 J	0.122	0.122 J+ ^(a)
A3B0674	MW1-20230220-GW-70		0.202	0.0838 J	0.100 U
Notes J = result is estimated. J+ = result is estimated, but the result may be biased high. U = result is non-detect at the reported sample value. ug/L = micrograms per liter. ^(a) Qualified based on both sample preparation and trip blank detection.					

The remaining trip blank results were non-detect to LDLs.

LABORATORY CONTROL SAMPLE AND LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample (LCS) and a laboratory control sample duplicate (LCSD) are spiked with target analytes to provide information about laboratory precision and accuracy. The LCS and LCSD samples were extracted and analyzed at the required frequency. When LCSD results were not reported by the laboratory, batch precision was evaluated with laboratory duplicate sample results. BV labeled LCS and LCSD results as spiked blank and spiked blank dup results, respectively.

According to report A3A1010, the EPA Method 8260D batch 23B0290 LCS (23B0290-BS1) exceeded upper percent recovery acceptance limits of 120 percent for acetone, acrylonitrile, bromochloromethane, bromomethane, 2-butanone, 1,2-dichloroethane, and vinyl chloride, ranging from 123 percent to 209 percent. The associated sample results were non-detect; thus, qualification was not required. The LCS also had a result for chloroethane that was below the lower percent recovery acceptance limit of 80 percent, at 77 percent. Apex noted that reporting limit sensitivity was confirmed for chloroethane and it was reported with the LDL raised to the MRL. The reviewer qualified the associated sample result with UJ.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
A3A1010	MFA-B1-B5-COMP-SL-PRO	Chloroethane	5,330 U	5,330 UJ
Notes ug/kg = micrograms per kilogram. UJ = result is non-detect with an estimated laboratory detection limit. U = result is non-detect at the method reporting limit.				

According to report A3A1010, the EPA Method 8270E batch 23B0782 LCS (23B0782-BS1) and LCSD (23B0782-BSD1) results for 3,3'-dichlorobenzidine exceeded the upper percent recovery acceptance limit of 121 percent, at 189 percent and 184 percent, respectively. The associated sample result, which was non-detect, did not require qualification based on the LCS and LCSD percent recoveries. Apex also flagged the 3,3'-dichlorobenzidine LCS result due to

known erratic recovery; this flag and the associated data qualification are discussed in the Data Qualification section above.

According to report A3B0217, the EPA Method 8260D batch 23B0344 LCS (23B0344-BS1) results for chloroethane and trichlorofluoromethane were above the upper percent recovery acceptance limit of 120 percent, at 139 percent and 133 percent, respectively. The associated sample results were non-detect; thus, qualification was not required.

According to report A3B0217, the EPA Method 8260D batch 23B0509 LCS (23B0509-BS1) results for bromomethane, chloroethane, and trichlorofluoromethane were above the upper percent recovery acceptance limit of 120 percent, at 121 percent, 175 percent, and 137 percent, respectively. The associated sample results were non-detect; thus, qualification was not required.

According to report A3B0217, the EPA Method 8270D batch 23B0481 LCS (23B0481-BS1) results for acenaphthene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, dibenzofuran, 2-chloronaphthalene, 1,2,4-trichlorobenzene, 4-bromophenyl phenyl ether, 4-chlorophenyl phenyl ether, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene were below lower percent recovery acceptance limits, ranging from 24 percent to 48 percent. The associated LCSD results were within percent recovery acceptance limits. An associated detected sample result was qualified by the reviewer with J-. The associated non-detect sample results were qualified with UJ. The LCS and LCSD 3,3'-dichlorobenzidine results exceeded upper percent recovery acceptance limits of 129 percent, at 182 percent and 189 percent, respectively. Apex also flagged these LCS and LCSD 3,3'-dichlorobenzidine results as estimated because they were associated with a continuing calibration verification result that exceeded upper control limits and 3,3'-dichlorobenzidine has known erratic recoveries. The associated sample results have been qualified by the reviewer with UJ. The LCS and LCSD exceeded relative percent difference (RPD) control limits of 30 percent for several semivolatiles organic compounds, ranging from 32 percent to 45 percent. The associated sample results were either non-detect or were detected below the MRL and already flagged as estimated; thus, qualification based on RPD control limit exceedances was not required.

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0217	MFA-B3A-20230207-GW-36.0	Acenaphthene	0.0128 U	0.0256 UJ
		1-Methylnaphthalene	0.0256 U	0.0513 UJ
		2-Methylnaphthalene	0.0256 U	0.0513 UJ
		Naphthalene	0.0256 U	0.0513 UJ
		Dibenzofuran	0.0128 U	0.0256 UJ
		2-Chloronaphthalene	0.0128 U	0.0256 UJ
		1,2,4-Trichlorobenzene	0.0321 U	0.0641 UJ
		4-Bromophenyl phenyl ether	0.0321 U	0.0641 UJ
		4-Chlorophenyl phenyl ether	0.0321 U	0.0641 UJ
		3,3'-Dichlorobenzidine	0.641 U	0.641 UJ

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
		1,2-Dichlorobenzene	0.0321 U	0.0641 UJ
		1,3-Dichlorobenzene	0.0432 J	0.0432 J-
		1,4-Dichlorobenzene	0.0321 U	0.0641 U
Notes J = result is estimated. J- = result is estimated but may be biased low. U = result is non-detect at the laboratory detection limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated laboratory detection limit.				

According to reports C338911, C347713, and C351279, the EPA Method 1668C batch 8533813 LCS and LCSD were reported by BV with several polychlorinated biphenyl (PCB) congener results that had calculated percent recoveries but no control limits. The reviewer confirmed that LCS and LCSD quality control limits were reported for only a selected list of PCB congeners and that, due to limitations of the laboratory's reporting system, the entire list of PCB congeners had been reported. No additional action was required.

According to reports A3B0522 and A3B0674, the EPA Method 8260D batch 23B0828 LCS (23B0828-BS1) results for bromomethane, carbon tetrachloride, chloroethane, dichlorodifluoromethane, and trichlorofluoromethane were above the upper percent recovery acceptance limit of 120 percent, ranging from 121 percent to 169 percent. The associated sample results were non-detect; thus, qualification was not required. The LCS also had results for 2-hexanone and naphthalene below the lower percent recovery acceptance limit of 80 percent, at 79 percent and 75 percent, respectively. Apex noted that reporting limit sensitivity was confirmed for these compounds, and they were reported with LDLs raised to MRLs. These associated sample results were non-detect and have been qualified by the reviewer with UJ.

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0522	MW3-20230214-GW-35	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	MW3-20230214-GW-35-DUP	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	MW5-20230214-GW-40	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	MW4-20230214-GW-40	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	MW6-20230214-GW-40.25	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	Trip Blank	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0674	MW1-20230220-GW-70	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	MW2-20230220-GW-60	2-Hexanone	10.0 U	10.0 UJ
		Naphthalene	2.00 U	2.00 UJ
	Trip Blank	2-Hexanone	10.0 U	10.0 UJ
Naphthalene		2.00 U	2.00 UJ	
Notes U = result is non-detect at the method reporting limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated method reporting limit.				

According to report A3B0522, the EPA Method 8270E batch 23B0761 LCS (23B0761-BS1) and LCSD (23B0761-BSD1) results for 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, hexachlorobutadiene, hexachloroethane, 2-chloronaphthalene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene were below lower percent recovery acceptance limits, ranging from 14 percent to 39 percent. The LCSD result for hexachlorocyclopentadiene was also below the lower percent recovery acceptance limit of 10 percent, at 9 percent. Associated non-detect sample results have been qualified by the reviewer with R and associated detected results, including those detected below MRLs, have been qualified by the reviewer with J-, as shown in the table below. These sample results were also associated with base/neutral EPA Method 8270E surrogate percent recovery exceedances; the reviewer determined that LCS and LCSD-based qualifications have precedence over those applied based on surrogate percent recovery exceedances. These qualified results are considered final and are shown in the following table:

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0522	MW3-20230214-GW-35	1-Methylnaphthalene	0.0239 J	0.0239 J-
		2-Methylnaphthalene	0.0192 U	R
		Naphthalene	0.0722	0.0722 J-
		Hexachlorobutadiene	0.0358 J	0.0358 J-
		Hexachlorocyclopentadiene	0.0481 U	R
		Hexachloroethane	0.0378 J	0.0378 J-
		2-Chloronaphthalene	0.0513	0.0513 J-
		1,2,4-Trichlorobenzene	0.0240 U	R
		1,2-Dichlorobenzene	0.0240 U	R
		1,3-Dichlorobenzene	0.0950	0.0950 J-
	1,4-Dichlorobenzene	0.0240 U	R	
	MW3-20230214-GW-35-DUP	1-Methylnaphthalene	0.0189 U	R
		2-Methylnaphthalene	0.0189 U	R
Naphthalene		0.0362 J	0.0362 J-	

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
		Hexachlorobutadiene	0.0236 U	R
		Hexachlorocyclopentadiene	0.0472 U	R
		Hexachloroethane	0.0236 U	R
		2-Chloronaphthalene	0.0206	0.0206 J-
		1,2,4-Trichlorobenzene	0.0236 U	R
		1,2-Dichlorobenzene	0.0236 U	R
		1,3-Dichlorobenzene	0.0939	0.0939 J-
		1,4-Dichlorobenzene	0.0236 U	R
	MW5-20230214-GW-40	1-Methylnaphthalene	0.0235 U	R
		2-Methylnaphthalene	0.0235 U	R
		Naphthalene	0.0235 U	R
		Hexachlorobutadiene	0.0118 U	R
		Hexachlorocyclopentadiene	0.0294 U	R
		Hexachloroethane	0.0588 U	R
		2-Chloronaphthalene	0.0294 U	R
		1,2,4-Trichlorobenzene	0.0118 U	R
		1,2-Dichlorobenzene	0.0294 U	R
		1,3-Dichlorobenzene	0.108	0.108 J-
	MW4-20230214-GW-40	1,4-Dichlorobenzene	0.0294 U	R
		1-Methylnaphthalene	0.0247 U	R
		2-Methylnaphthalene	0.0247 U	R
		Naphthalene	0.0247 U	R
		Hexachlorobutadiene	0.0309 U	R
		Hexachlorocyclopentadiene	0.0617 U	R
		Hexachloroethane	0.0309 U	R
		2-Chloronaphthalene	0.0123 U	R
		1,2,4-Trichlorobenzene	0.0309 U	R
		1,2-Dichlorobenzene	0.0309 U	R
	MW6-20230214-GW-40.25	1,3-Dichlorobenzene	0.122	0.122 J-
		1,4-Dichlorobenzene	0.0309 U	R
		1-Methylnaphthalene	0.0222 U	R
		2-Methylnaphthalene	0.0222 U	R
		Naphthalene	0.0222 U	R
		Hexachlorobutadiene	0.0278 U	R
		Hexachlorocyclopentadiene	0.0556 U	R
Hexachloroethane		0.0278 U	R	
	2-Chloronaphthalene	0.0255	0.0255 J-	
	1,2,4-Trichlorobenzene	0.0278 U	R	

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
		1,2-Dichlorobenzene	0.0278 U	R
		1,3-Dichlorobenzene	0.0919	0.0919 J-
		1,4-Dichlorobenzene	0.0278 U	R
Notes J = result is estimated. J- = result is estimated but may be biased low. R = result is rejected. The analyte may or may not be present in the sample. U = result is non-detect at the laboratory detection limit. ug/L = micrograms per liter.				

According to report A3B0522, the EPA Method 8270D batch 23B0761 LCS (23B0761-BS1) and LCSD (23B0761-BSD1) results for 3,3'-dichlorobenzidine exceeded the upper percent recovery acceptance limit of 129 percent, at 159 percent and 151 percent, respectively. The results were also flagged by Apex as estimated because they were associated with continuing calibration verification that exceeded upper control limits and this chemical has known erratic recoveries. The associated 3,3'-dichlorobenzidine sample results were non-detect and have been qualified by the reviewer with UJ, as shown in the following table. The 3,3'-dichlorobenzidine results were also associated with EPA Method 8270E base/neutral surrogate percent recovery exceedances; the reviewer determined that qualifications based on LCS and LCSD percent recovery have precedence over those applied based on surrogate percent recovery exceedances. These qualified results are considered final and are shown in the following table:

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0522	MW3-20230214-GW-35	3,3'-Dichlorobenzidine	0.495 U	0.495 UJ
	MW3-20230214-GW-35-DUP		0.485 U	0.485 UJ
	MW5-20230214-GW-40		0.532 U	0.532 UJ
	MW4-20230214-GW-40		0.568 U	0.568 UJ
	MW6-20230214-GW-40.25		0.575 U	0.575 UJ
Notes U = result is non-detect at the laboratory detection limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated laboratory detection limit.				

According to report A3B0522, the EPA Method 8151A batch W3B1728 LCSD result for acifluorfen exceeded the upper percent recovery acceptance limit of 134 percent, at 150 percent and the LCS and LCSD exceeded the RPD control limit of 25 percent, at 34 percent. The associated sample results were non-detect; thus, qualification was not required.

According to report A3B0674, the EPA Method 8270D-SIM batch 23C0033 LCS (23C0033-BS1) result for 1,1,2,2-tetrachloroethane exceeded the upper percent recovery acceptance limit of 120 percent, at 126 percent. The associated sample results were non-detect; thus, qualification was not required.

According to report A3B0674, the EPA method 8270E batch 23B0916 LCS (23B0916-BS1) and LCSD (23B0916-BSD1) 3,3'-dichlorobenzidine results exceeded upper percent recovery acceptance limits of 129 percent, at 187 percent and 188 percent, respectively. Apex also flagged the LCS and LCSD 3,3'-dichlorobenzidine results as estimated because they were associated with continuing calibration verification that exceeded upper control limits and noted that 3,3'-dichlorobenzidine has known erratic recoveries. The associated 3,3'-dichlorobenzidine sample results were non-detect and have been qualified by the reviewer with UJ as shown in the following table. The LCSD also had results for hexachlorobutadiene, hexachloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene below lower percent recovery acceptance limits, ranging from 17 percent to 55 percent. The batch 23B0916 LCS results were within percent recovery acceptance limit, but were also significantly low; thus, the associated sample results, which were non-detect, have been qualified by the reviewer with R, as shown in the following table. The LCS and LCSD exceeded the RPD control limit of 30 percent for N-nitrosodimethylamine and pyridine at 55 percent and 41 percent, respectively. The associated samples were non-detect for N-nitrosodimethylamine and pyridine; thus, qualification was not required.

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0674	MW1-20230220-GW-70	Hexachlorobutadiene	0.0253 U	R
		Hexachloroethane	0.0253 U	R
		1,2,4-Trichlorobenzene	0.0253 U	R
		3,3'-Dichlorobenzidine	0.505 U	0.505 UJ
		1,2-Dichlorobenzene	0.0253 U	R
		1,3-Dichlorobenzene	0.0253 U	R
		1,4-Dichlorobenzene	0.0253 U	R
	MW2-20230220-GW-60	Hexachlorobutadiene	0.0266 U	R
		Hexachloroethane	0.0266 U	R
		1,2,4-Trichlorobenzene	0.0266 U	R
		3,3'-Dichlorobenzidine	0.532 U	0.532 UJ
		1,2-Dichlorobenzene	0.0266 U	R
		1,3-Dichlorobenzene	0.0266 U	R
		1,4-Dichlorobenzene	0.0266 U	R
Notes R = result is rejected. The analyte may or may not be present in the sample. U = result is non-detect at the laboratory detection limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated method reporting limit.				

According to report C347690, the EPA Method 1668C batch 8576352 LCS and LCSD exceeded RPD control limits of 30 percent for HexaCB-(128)+(166) and 22'345'6-HexaCB-(144), and 22'344'56-HeptaCB-(181), at 157 percent, 156 percent, and 194 percent respectively. The reviewer confirmed that these three PCB compounds were not part of the LCS and LCSD percent recovery evaluation but had been included in the final report with percent recoveries and RPDs due to reporting system constraints. All associated sample results were also qualified

by the reviewer based on labeled internal standard recovery, as discussed in the Labeled Analog Recovery Results section; additional qualification was not required.

All remaining LCS and LCSD results were within acceptance limits for percent recovery and relative percent difference (RPD).

LABORATORY DUPLICATE RESULTS

Laboratory duplicate results are used to evaluate laboratory precision. All laboratory duplicate samples were prepared and analyzed at the required frequency. When laboratory duplicate sample results were not reported, batch precision was evaluated with LCS and LCD results and/or matrix spike (MS) and matrix spike duplicate (MSD) sample results.

Laboratory duplicate results greater than five times the MRL were evaluated using laboratory RPD control limits. Laboratory duplicate results less than five times the MRL, including non-detects, were evaluated using a control limit of the MRL of the parent sample; the absolute difference of the laboratory duplicate sample result and the parent sample result, or the MRL for non-detects, was compared to the MRL of the parent sample.

According to report A3A1010, Apex noted that an NWTPH-Gx and EPA Method 8260D batch 23B0290 laboratory duplicate (23B0290-DUP1) was prepared by subsampling from the sample container within 48 hours of sample collection. The laboratory duplicate was prepared with a sample from an unrelated project and no qualification was required. All laboratory duplicate results met the acceptance criteria.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS

Matrix spike (MS) and matrix spike duplicate (MSD) results are used to evaluate laboratory precision, accuracy, and the effect of the sample matrix on sample preparation and analysis. When MS and MSD results were not reported, batch precision and accuracy were evaluated with laboratory duplicate, LCS, and LCSD results.

When MS and MSD were prepared from samples with high concentrations of target analytes, associated MS and/or MSD percent recovery and/or RPD control limit exceedances did not require qualification because spike concentrations could not be accurately quantified. High concentrations of target analytes are defined as four times the spike amount for all analyses.

When MS and MSD were prepared with samples from unrelated projects, the MS and/or MSD percent recovery and/or RPD control limit exceedances did not require qualification because these sample matrices were not representative of project sample matrices.

According to report A3A1010, the EPA Method 8270E batch 23B0782 MS (23B0782-MS1) had several results that were non-detect or were below lower percent recovery acceptance limits. The reviewer confirmed that the MS had been analyzed at a 1:40 dilution, so many of the results were not detected or were at or near the MRL. Based on the MS dilution, qualification of the associated sample results was not required.

According to report A3A1010, the EPA Method 8270E batch 23B0783 MS (23B0783-MS1) had several results that were non-detect or were below lower percent recovery acceptance limits. The reviewer confirmed that the MS had been analyzed at a 1:40 dilution, so the expected MS results were below LDLs. Based on the MS dilution, qualification of the associated sample results was not required.

According to report A3A1010, an EPA Method 8270E batch 23C0074 MS was not reported because there was significant interference from organic compounds that were present in the sample used to prepare the MS.

According to report A3A1010, the EPA Method 6020B batch 23B0914 MS (23B0914-MS1) result for antimony was below the lower percent recovery acceptance limit of 75 percent, at 71 percent. The reviewer qualified the associated sample result with J-.

Report	Sample	Analyte	Original Result (mg/kg)	Qualified Result (mg/kg)
A3A1010	MFA-B1-B5-COMP-SL-PRO	Antimony	0.944	0.944 J-
Notes J- = result is estimated but may be biased low. mg/kg = milligrams per kilogram.				

According to reports A3B0217 and A3B0522, the EPA Method 8260D-SIM batch 23B0743 MS (23B0743-MS1) had several results below lower percent recovery acceptance limits, ranging from 66 percent to 78 percent. The associated sample results were non-detect. The reviewer raised the associated sample LDLs to MRLs and qualified the results with UJ, as shown in the following table:

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0522	MW6-20230214-GW-40.25	Ethylbenzene	0.0500 U	0.100 UJ
		m,p-Xylene	0.100 U	0.200 UJ
		o-Xylene	0.0500 U	0.100 UJ
		1,2,4-Trimethylbenzene	0.0500 U	0.100 UJ
		1,3,5-Trimethylbenzene	0.0500 U	0.100 UJ
		1,2-Dibromoethane	0.0100 U	0.0200 UJ
		1,1,2-Trichloroethane	0.0100 U	0.0200 UJ
Notes U = result is non-detect at the laboratory detection limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated method reporting limit.				

According to report A3B0674, the EPA Method 8260D-SIM MS (23C0033-MS1) exceeded upper percent recovery acceptance limits for benzene, chloroform, 1,1-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, and vinyl chloride, ranging from 128 percent to 163 percent. The associated sample result for benzene has been qualified by the reviewer with J. The remaining associated sample results were non-detect and so did not require qualification.

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
A3B0674	MW2-20230220-GW-60	Benzene	0.176	0.176 J
Notes J = result is estimated. ug/L = micrograms per liter.				

The remaining MS and MSD results were within acceptance limits for percent recovery and RPD.

LABELED ANALOG RECOVERY RESULTS

According to reports C338911, C338927, C347713, C347690, and C351279, the samples were spiked with carbon-13 labeled standards to quantify the relative response of analytes in each sample for the ASTM D7968-17A, EPA Method 537.1, EPA Method 1613B, EPA Method 1668C, and EPA Method 1699 analyses.

According to report C338911, the EPA Method 537.1 labeled standard ¹³C₂-PFTeDA was below lower percent recovery acceptance limits of 50 percent, at 46 percent, for sample MFA-B3A20230207-GW-36.0. The reviewer confirmed with BV that the samples were not reanalyzed to confirm the recoveries and that the recoveries demonstrated sufficient instrument sensitivity. BV noted that the associated analytes, PFTrDA and PFTeDA may have had increased variability. The associated sample results were non-detect and have been qualified by the reviewer with UJ, as shown in the following table.

Report	Sample	Component	Original Result (ug/L)	Qualified Result (ug/L)
C338911	MFA-B3A-20230207-GW-36.0	PfTrDA	0.0026 U	0.0026 UJ
		PfTeDA	0.0016 U	0.0016 UJ
Notes U = result is non-detect at the estimated detection limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated detection limit.				

According to reports C338911, C347713, and C351279 the EPA Method 1668C batch 8533813 LCS labeled standards C₁₃-2,44'-TriCB-(28), C₁₃-233'44'-PentaCB-(105), C₁₃-23'44'5-PentaCB-(118), C₁₃-2'344'5-PentaCB-(123), C₁₃-33'44'5-PentaCB-(126), and C₁₃-344'-TriCB-(37), and the LCSD labeled standards C₁₃-4-MonoCB-(3), C₁₃-233'44'-PentaCB-(105), and C₁₃-33'44'5-PentaCB-(126) were flagged by BV as estimated with high bias due to association with an internal standard that exceeded upper recovery acceptance limits. All labeled standard results were within percent recovery acceptance limits; thus, qualification was not required.

According to reports C338911 and C347713, the EPA Method 1668C batch 8533813 laboratory method blank labeled standards C₁₃-233'44'-PentaCB-(105) and C₁₃-33'44'5-PentaCB-(126) exceeded upper recovery acceptance limits of 145 percent, at 146 percent and 151 percent, respectively. The laboratory method blank had some detected results, which are addressed in the Method Blanks section above. No additional action was required.

According to report C338927, the ASTM D7968-17A labeled standards ¹³C₂-PFDA and ¹³C₂-PFTeDA were below lower percent recovery acceptance limits of 50 percent, at 47 percent and 37 percent, respectively, for sample MFA-B1-B5-COMP-SL. The reviewer confirmed with BV that the internal standard recoveries demonstrated sufficient instrument sensitivity to report the associated sample results. BV noted that the associated analytes, PFDA, PFDS, PfTrDA, and PFTeDA may have had increased variability. The sample results have been qualified by the reviewer with J for detected results, as shown in the following table. Results already flagged by BV as estimated due to detection below the MRL did not require additional qualification but are included in the table for clarity.

Report	Sample	Component	Original Result (ug/kg)	Qualified Result (ug/kg)
C338927	MFA-B1-B5-COMP-SL	PFDA	1.5	1.5 J
		PFDS	0.92 J	0.92 J ^(a)
		PfTrDA	0.61 J	0.61 J ^(a)
		PFTeDA	0.46 J	0.46 J ^(a)
Notes J = result is estimated. MRL = method reporting limit. ug/kg = micrograms per kilogram. ^(a) Result qualified as estimated based on detection below the MRL. Additional qualification not required.				

According to report C347690, most EPA Method 1668C labeled standards associated with the analysis of sample MFA-B1-B5-COMP-SL-PRO had results below lower percent recovery acceptance limits, ranging from 5.0 percent to 39 percent. Due to significantly low recovery of labeled standards C₁₃-2-MonoCB-(1) and C₁₃-22'-DiCB-(4), at 5.0 percent, BV did not report the associated mono- and di-chlorinated PCB congeners (PCB-001 through PCB-014). The reviewer confirmed that the low recoveries were caused by matrix interference, and that the sample had been re-extracted and reanalyzed to confirm the matrix interference. BV also attempted additional extract cleanup. Due to widespread internal standard recovery issues, all associated detected sample results were qualified by the reviewer with J- and all non-detect results were qualified with R.

Report	Sample	Analysis	Original Results	Qualification
C347690	MFA-B1-B5-COMP-SL-PRO	EPA 1668C	Detected	J-
			Non-detect	R
Notes J- = result is estimated but may be biased low. R = result is rejected. The analyte may or may not be present in the sample.				

According to report C347690, the EPA Method 1613B batch 8520730 MS labeled standards C₁₃-123678 HxCDD and C₁₃-123678 HxCDF exceeded upper percent recovery acceptance limits, at 137 percent, and 125 percent, respectively. The reviewer confirmed that the MS had been prepared by BV with a sample from an unrelated project. No qualification was required.

According to report C347690, the EPA Method 1668C batch 8576352 laboratory method blank labeled standard C₁₃-22'44'66'-HexaCB-(155) result was below the lower percent recovery acceptance limit of 40 percent, at 37 percent. The reviewer confirmed that the remaining hexachlorobiphenyl labeled standards had acceptable percent recoveries. Qualification of sample results based on the laboratory method blank labeled standard recovery was not required.

According to report C347713, the EPA Method 537.1 labeled standards D₃-MeFOSA and D₅-EtFOSA were below lower percent recovery acceptance limits of 50 percent, at 44 percent and 43 percent, respectively, for sample MFA-20230214-GW-40 and both were at 47 percent for sample MW4-20230214-GW-40. BV noted that the associated analytes, MeFOSA and EtFOSA may have had increased variability. The associated sample results were non-detect and have been qualified by the reviewer with UJ, as shown in the following table.

Report	Sample	Component	Original Result (ug/L)	Qualified Result (ug/L)
C347713	MFA5-20230214-GW-40	MeFOSA	0.0084 U	0.0084 UJ
		EtFOSA	0.0095 U	0.0095 UJ
	MFA4-20230214-GW-40	MeFOSA	0.0084 U	0.0084 UJ
		EtFOSA	0.0095 U	0.0095 UJ

Notes

U = result is non-detect at the estimated detection limit.
 ug/L = micrograms per liter.
 UJ = result is non-detect with an estimated detection limit.

According to report C347713, the EPA Method 1668C labeled standard ¹³C₁₂-22'6-TriCB-(19) results for samples MW3-20230214-GW-35-DUP and MW4-20230214-GW-40 were below lower percent recovery acceptance limits of 40 percent, at 35 percent and 39 percent, respectively. The reviewer confirmed with BV that the internal standard recoveries demonstrated sufficient instrument sensitivity to report the associated sample results. The associated non-detect results were qualified by the reviewer with UJ. The associated detected sample results were already flagged by BV as estimated due to detection below the MRL; additional qualification of detected sample results was not required. The qualified results are shown in the following table:

Report	Sample	Component	Original Result (ng/L)	Qualified Result (ng/L)
C347713	MW3-20230214-GW-35-DUP	22'6-TriCB-(19)	0.017 U	0.017 UJ
		234'-TriCB-(22)	0.0060 U	0.0060 UJ
		235-TriCB-(23)	0.0061 U	0.0061 UJ
		236-TriCB-(24)	0.0074 U	0.0074 UJ
		23'4-TriCB-(25)	0.0061 U	0.0061 UJ
		TriCB-(26)+(29)	0.0056 U	0.0056 UJ
		23'6-TriCB-(27)	0.0069 U	0.0069 UJ
	MW4-20230214-GW-40	22'6-TriCB-(19)	0.019 U	0.019 UJ
		TriCB-(21)+(33)	0.0076 U	0.0076 UJ
		234'-TriCB-(22)	0.0076 U	0.0076 UJ
		235-TriCB-(23)	0.0077 U	0.0077 UJ
		236-TriCB-(24)	0.0094 U	0.0094 UJ
		23'4-TriCB-(25)	0.0078 U	0.0078 UJ
		TriCB-(26)+(29)	0.0071 U	0.0071 UJ
	23'6-TriCB-(27)	0.0088 U	0.0088 UJ	
Notes				
ng/L = nanograms per liter. U = result is non-detect at the estimated detection limit. UJ = result is non-detect with an estimated detection limit.				

According to report C347713, the EPA Method 1699 labeled standard ¹³C₁₀-heptachlor results for samples MW3-20230214-GW-35, MW3-20230214-GW-35-DUP, MW4-20230214-GW-40, and the MS prepared with sample MW3-20230214-GW-35-DUP exceeded the upper percent recovery acceptance limit of 120 percent, at 164 percent, 160 percent, and 125 percent, respectively. The labeled standard ¹³C-methoxychlor results for samples MW3-20230214-GW-35 and MW3-20230214-GW-35-DUP also exceeded the upper percent recovery acceptance limit of 120 percent, both at 140 percent. The associated non-detect sample results did not require qualification. The associated detected sample results were qualified by the reviewer with J+ in the following table:

L:\Projects\0830.03 City of St. Helens\06_Scope 1B\Draft Documents\Phase IB Report\Appendix D - DVM\DVM_StHelens_Scope1B_Jan2023.docx

Report	Sample	Component	Original Result (ng/L)	Qualified Result (ng/L)
C347713	MW3-20230214-GW-35	Methoxychlor	0.085 J	0.085 J+
	MW3-20230214-GW-35-DUP		0.065 J	0.065 J+
Notes J = result is estimated. J+ = result is estimated but may be biased high. ng/L = nanograms per liter.				

According to report C351279, the EPA Method 1699 labeled standard ¹³C-methoxychlor result for the batch 8523575 MS prepared with sample MW1-20230220-GW-70 exceeded the upper percent recovery acceptance limit of 120 percent, at 125 percent. The ¹³C-methoxychlor recovery for sample MW1-20230220-GW-70 was within percent recovery acceptance limits; thus, qualification was not required.

According to report C351279, the EPA Method 537.1 labeled standard ¹³C₂-PFTeDA was below lower percent recovery acceptance limits of 50 percent, at 45 percent, for the batch 8534937 laboratory method blank. BV indicated that the associated laboratory method blank PFTeDA and PFTTrDA results may have increased variability. The laboratory method blank was non-detect for PFTeDA and PFTTrDA and the associated sample had acceptable labeled standard recovery; thus, qualification was not required.

SURROGATE RECOVERY RESULTS

The samples were spiked with surrogate compounds to evaluate laboratory performance for individual samples for organic analyses.

The laboratory appropriately documented and qualified surrogate outliers. When surrogate percent recoveries were outside of acceptance limits because of dilutions necessary to quantify high concentrations of target analytes, qualification by the reviewer was not required. The reviewer confirmed that batch quality control results for samples with surrogate outliers were within acceptance limits.

The reviewer associated EPA Method 8270E acid-fraction surrogates phenol-d6, 2-fluorophenol, and 2,4,6-tribromophenol with all phenolic semivolatle organic compounds, benzoic acid, and benzyl alcohol. The base/neutral fraction surrogates nibrobenzene-d5, 2-fluorobiphenyl, and p-terphenyl were associated with all remaining semivolatle organic compounds.

According to report A3B0217, the EPA Method 8270E base/neutral surrogate 2-fluorobiphenyl result for sample MFA-B3A-20230207-GW-36.0 was below the lower percent recovery acceptance limit of 44 percent, at 40 percent. The remaining two base/neutral surrogate results were within percent recovery acceptance limits; thus, qualification was not required.

According to report A3B0522, samples MW3-20230214-GW-35 and MW3-20230214-GW-35-DUP had EPA Method 8270E nibrobenzene-d5 and 2-fluorobiphenyl surrogate results

that were below lower percent recovery acceptance limits, ranging from 27 percent to 42 percent. Because two of the three base/neutral surrogates for each sample exceeded percent recovery acceptance limits, all associated base/neutral semivolatile organic compound results are considered estimated. The reviewer qualified non-detect results with UJ and detected results with J-. The sample results that were also associated LCS and LCSD percent recovery exceedances were previously qualified by the reviewer in the Laboratory Control Sample and Laboratory Control Sample Duplicate Results section above; the LCS and LCSD qualifications take precedent over surrogate qualifications and are considered final; additional qualifications were not required for these compounds. The following results were qualified by the reviewer:

Analyte	MW3-20230214-GW-35		MW3-20230214-GW-35-DUP	
	Original Result (ug/L)	Qualified Result (ug/L)	Original Result (ug/L)	Qualified Result (ug/L)
Acenaphthene	0.0419	0.0419 J-	0.0167	0.0167 J-
Acenaphthylene	0.034	0.034 J-	0.0129	0.0129 J-
Anthracene	0.0165	0.0165 J-	0.00943 U	0.00943 UJ
Benzo(a)anthracene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Benzo(a)pyrene	0.0144 U	0.0144 UJ	0.0142 U	0.0142 UJ
Benzo(b)fluoranthene	0.0144 U	0.0144 UJ	0.0142 U	0.0142 UJ
Benzo(k)fluoranthene	0.0144 U	0.0144 UJ	0.0142 U	0.0142 UJ
Benzo(g,h,i)perylene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Chrysene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Dibenz(a,h)anthracene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Fluoranthene	0.024	0.024 J-	0.0106	0.0106 J-
Fluorene	0.0586	0.0586 J-	0.0201	0.0201 J-
Indeno(1,2,3-cd)pyrene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Phenanthrene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Pyrene	0.00962 U	0.00962 UJ	0.00943 U	0.00943 UJ
Carbazole	0.0178	0.0178 J-	0.0142 U	0.0142 UJ
Dibenzofuran	0.0174	0.0174 J-	0.00943 U	0.00943 UJ
Bis(2-ethylhexyl)phthalate	0.192 U	0.192 UJ	0.189 U	0.189 UJ
Butyl benzyl phthalate	0.192 U	0.192 UJ	0.189 U	0.189 UJ
Diethylphthalate	0.192 U	0.192 UJ	0.189 U	0.189 UJ
Dimethylphthalate	0.192 U	0.192 UJ	0.189 U	0.189 UJ
Di-n-butylphthalate	0.192 U	0.192 UJ	0.189 U	0.189 UJ
Di-n-octyl phthalate	0.192 U	0.192 UJ	0.189 U	0.189 UJ
N-Nitrosodimethylamine	0.024 U	0.024 UJ	0.0236 U	0.0236 UJ
N-Nitroso-di-n-propylamine	0.024 U	0.024 UJ	0.0236 U	0.0236 UJ
N-Nitrosodiphenylamine	0.0257	0.0257 J-	0.0236 U	0.0236 UJ
Bis(2-Chloroethoxy) methane	0.0623	0.0623 J-	0.0257	0.0257 J-
Bis(2-Chloroethyl) ether	0.0407	0.0407 J-	0.0236 U	0.0236 UJ

Analyte	MW3-20230214-GW-35		MW3-20230214-GW-35-DUP	
	Original Result (ug/L)	Qualified Result (ug/L)	Original Result (ug/L)	Qualified Result (ug/L)
2,2'-Oxybis(1-Chloropropane)	0.0264	0.0264 J-	0.0236 U	0.0236 UJ
Hexachlorobenzene	0.0179	0.0179 J-	0.00943 U	0.00943 UJ
4-Bromophenyl phenyl ether	0.0493	0.0493 J-	0.0236 U	0.0236 UJ
4-Chlorophenyl phenyl ether	0.0507	0.0507 J-	0.0236 U	0.0236 UJ
Aniline	0.0481 U	0.0481 UJ	0.0472 U	0.0472 UJ
4-Chloroaniline	0.024 U	0.024 UJ	0.0236 U	0.0236 UJ
2-Nitroaniline	0.192 U	0.192 UJ	0.189 U	0.189 UJ
3-Nitroaniline	0.192 U	0.192 UJ	0.189 U	0.189 UJ
4-Nitroaniline	0.192 U	0.192 UJ	0.189 U	0.189 UJ
Nitrobenzene	0.0962 U	0.0962 UJ	0.0943 U	0.0943 UJ
2,4-Dinitrotoluene	0.0962 U	0.0962 UJ	0.0943 U	0.0943 UJ
2,6-Dinitrotoluene	0.0962 U	0.0962 UJ	0.0943 U	0.0943 UJ
Isophorone	0.0272	0.0272 J-	0.0236 U	0.0236 UJ
Azobenzene	0.024 U	0.024 UJ	0.0236 U	0.0236 UJ
Bis(2-Ethylhexyl) adipate	0.240 U	0.24 UJ	0.236 U	0.236 UJ
1,2-Dinitrobenzene	0.240 U	0.240 UJ	0.236 U	0.236 UJ
1,3-Dinitrobenzene	0.240 U	0.240 UJ	0.236 U	0.236 UJ
1,4-Dinitrobenzene	0.240 U	0.240 UJ	0.236 U	0.236 UJ
Pyridine	0.0962 U	0.0962 UJ	0.0943 U	0.0943 UJ
Notes J- = the result is estimated but may be biased low. U = result is non-detect at the estimated detection limit. ug/L = micrograms per liter. UJ = result is non-detect with an estimated detection limit.				

All remaining surrogate results were within percent recovery acceptance limits.

INITIAL AND CONTINUING CALIBRATION VERIFICATION RESULTS

Initial calibration verification and continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy prior to analysis and through the end of analysis of a sample batch. The laboratories did not report CCV results, but appropriately flagged results associated with CCV exceedances. Surrogate or batch quality control results flagged by the laboratory based on CCV exceedances but meeting percent recovery and/or RPD acceptance criteria required no action from the reviewer.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. The following field duplicate and parent sample pair were submitted for analysis:

L:\Projects\0830.03 City of St. Helens\06_Scope 1B\Draft Documents\Phase IB Report\Appendix D - DVM\DVM_StHelens_Scope1B_Jan2023.docx

Reports	Parent Sample	Field Duplicate Sample
A3B0522, C347713	MW3-20230214-GW-35	MW3-20230214-GW-35-DUP

MFA uses acceptance criteria of 100 percent RPD for results that are less than five times the MRL or 50 percent RPD for results that are greater than five times the MRL. RPD was not evaluated when both results in the sample pair were non-detect. When one result in the sample pair was non-detect, RPD was evaluated using the EDL, LDL, MDL or MRL of the non-detect result. Field duplicate results that exceeded the acceptance criteria were qualified by the reviewer with J for detected results and UJ for non-detect results, as shown in the following table. All detected EPA Method 1668C sample MW3-20230214-GW-35-DUP results were qualified by the reviewer in the Method Blanks section above. These results are included in the table below with final qualifiers based on both laboratory method blank and field blank qualification. Results already reported as estimated due to detection below the MRL did not require additional qualification but are included in the table below for clarity.

Report	Sample	Analyte	RPD (%)	Original Result (ng/L)	Qualified Result (ng/L)
C347713	MW3-20230214-GW-35	3,3'-DiCB-(11)	189	0.0032 U	0.0032 UJ
	MW3-20230214-GW-35-DUP			0.118 J	0.118 UJ ^(a)
	MW3-20230214-GW-35	TriCB-(20) + (28)	116	0.0033 U	0.0033 UJ
	MW3-20230214-GW-35-DUP			0.0125 J	0.0125 UJ ^(a)
	MW3-20230214-GW-35	24'5-TriCB-(31)	116	0.0032 U	0.0032 UJ
	MW3-20230214-GW-35-DUP			0.0120 J	0.0120 UJ ^(a)
	MW3-20230214-GW-35	TetraCB-(61)+(70)+(74)+(76)	111	0.0074 U	0.0074 UJ
	MW3-20230214-GW-35-DUP			0.0260 J	0.0260 UJ ^(a)
	MW3-20230214-GW-35	PentaCB-(90)+(101)+(113)	132	0.0074 U	0.0074 UJ
	MW3-20230214-GW-35-DUP			0.0361 J	0.0361 UJ ^(a)
	MW3-20230214-GW-35	22'35'6-PentaCB-(95)	108	0.0099 U	0.0099 UJ
	MW3-20230214-GW-35-DUP			0.033 J	0.033 UJ ^(a)
	MW3-20230214-GW-35	PentaCB-(110)+(115)	113	0.0067 U	0.0067 UJ
	MW3-20230214-GW-35-DUP			0.0241 J	0.0241 UJ ^(a)
	MW3-20230214-GW-35	23'44'5-PentaCB-(118)	100	0.0048 U	0.0048 UJ
	MW3-20230214-GW-35-DUP			0.0144 J	0.0144 UJ ^(a)
	MW3-20230214-GW-35	HexaCB-(129)+(138)+(163)	108	0.0075 U	0.0075 UJ
	MW3-20230214-GW-35-DUP			0.025 J	0.025 UJ ^(a)
	MW3-20230214-GW-35	HexaCB-(147)+(149)	128	0.0071 U	0.0071 UJ
	MW3-20230214-GW-35-DUP			0.0323 J	0.0323 UJ ^(a)
MW3-20230214-GW-35	HexaCB-(153)+(168)	123	0.0060 U	0.0060 UJ	
MW3-20230214-GW-35-DUP			0.0253 J	0.0253 UJ ^(a)	

Report	Sample	Analyte	RPD (%)	Original Result (ng/L)	Qualified Result (ng/L)
Notes J = result is estimated. ng/L = nanograms per liter. RPD = relative percent difference. U = result is non-detect at the estimated detection limit. UJ = result is non-detect with an estimated detection limit. (a)Result also qualified as non-detect based on laboratory method blank detection, as described in the Method Blanks section above.					

All remaining field duplicate results met the RPD acceptance criteria.

DATA PACKAGE

The data package was reviewed for transcription errors, omissions, and anomalies.

According to report A3A1010, sample MFA-B1-20230130-21.9 was recorded on the COC form as MFA-B1-2023013-21.9. The sample name was corrected by MFA project manager request after samples had been received by Apex. No additional action was required.

The reviewer confirmed that, for report A3A1010, the EPA Method 8151A chlorinated herbicide analysis was canceled for composite sample MFA-B1-B5-COMP-SL-PRO because insufficient sample material was available for the analysis.

Report A3B0522 was amended and reissued on May 2, 2023, to replace EPA Method 8270E results that had been extracted after the method-recommended holding time (batch 23B0895) with results from the original extraction and analysis (batch 23B0761) that were extracted within the holding time but had low LCS recoveries. The results associated with batch 23B0761 were reported and are qualified in the Laboratory Control Sample and Laboratory Control Sample Duplicate Results section above.

Report C338927 was reissued by BV on April 20, 2023, to correct an internal standard reference.

According to report C338927, a sample identified as MFA-SL-Composite was listed on the COC form but was crossed out and annotated by Apex that it would be shipped the following week. The reviewer confirmed that this sample had not been included in the C338927 sample delivery group. The reviewer confirmed that compositing instructions were provided to BV in a separate email communication, in which BV was instructed to composite samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27.0, name the composite sample as MFA-B1-B5-COMP-SL, and air dry the composited sample prior to ASTM D7968-17A extraction and analysis. Percent moisture of the composited sample was also performed by BV for dry-weight reporting purposes.

According to report C347690, the COC form referenced samples MFA-B1-20230130-21.9, MFA-B3-20230131-31.0, MFA-B2-20230131-23.0, MFA-B4-20230202-SL-26.5, and MFA-B5-20230203-SL-27.0, which had already been received by BV with sample delivery group

C338927. These sample names were appropriately crossed out and annotated by Apex as having already been received by BV. The reviewer confirmed that only one sample MFA-SL-Composite After Processing was included in the sample delivery group for report C347690. Report C347690 was reissued by BV on June 6, 2023, to correct sample ID MFA-SL-Composite After Processing to MFA-B1-B5-COMP-SL-PRO.

Report C347713 was reissued on May 17, 2023, to include the complete list of EPA Method 537.1 per- and polyfluoroalkylated substances.

No additional issues were found.

REFERENCES

Apex. 2022. *Quality Systems Manual*. Rev. 10. Apex Laboratories, LLC: Tigard, OR. June 20.

BV. 2021. *Corporate Quality Manual*. Rev. 22. Bureau Veritas: Mississauga, ON, Canada. September 7.

EPA. 1986. *Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods*. EPA publication SW-846. 3rd ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), VI phase III (2019), VII phase I (2019), and VII phase II (2020).

EPA. 2014. *R10 Data Validation and Review Guidelines for Polychlorinated Dibenz α -p-dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) using Method 1613B and SW846 Method 8290A*. EPA-910-R-14-003. U.S. Environmental Protection Agency, Region 10 Office of Environmental Assessment. Seattle, WA. May.

EPA. 2020a. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA 542-R-20-006. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.

EPA. 2020b. *National Functional Guidelines for Organic Superfund Methods Data Review*. EPA 540-R-20-005. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.

EPA. 2020c. *National Functional Guidelines for High Resolution Superfund Methods Data Review*. EPA 542-R-20-007. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.

Weck. 2020. *Quality Assurance Manual*. Rev. 20.6. Weck Laboratories, Inc.: Industry, CA. April 17.

APPENDIX E

PHOTO LOG





Photographs

Project Name: Phase IB Environmental Investigation
Project Number: M0830.03.006
Location: St. Helens, Oregon

Photo No. 1.

Description

ISM sampling set up: a ponar sampler is attached to a wench line on the front of a small barge.



Photo No. 2.

Description

Shallow lagoon sludge sample retained inside ponar sampler.





Photographs

Project Name: Phase IB Environmental Investigation
Project Number: M0830.03.006
Location: St. Helens, Oregon

Photo No. 3.

Description

Representative photo of shallow lagoon sludge collected with ponar, emptied into a stainless steel bowl.



Photo No. 4.

Description

50-point ISM shallow lagoon sludge sample at lab prior to drying.





Photographs

Project Name: Phase IB Environmental Investigation
Project Number: M0830.03.006
Location: St. Helens, Oregon

Photo No. 5.

Description

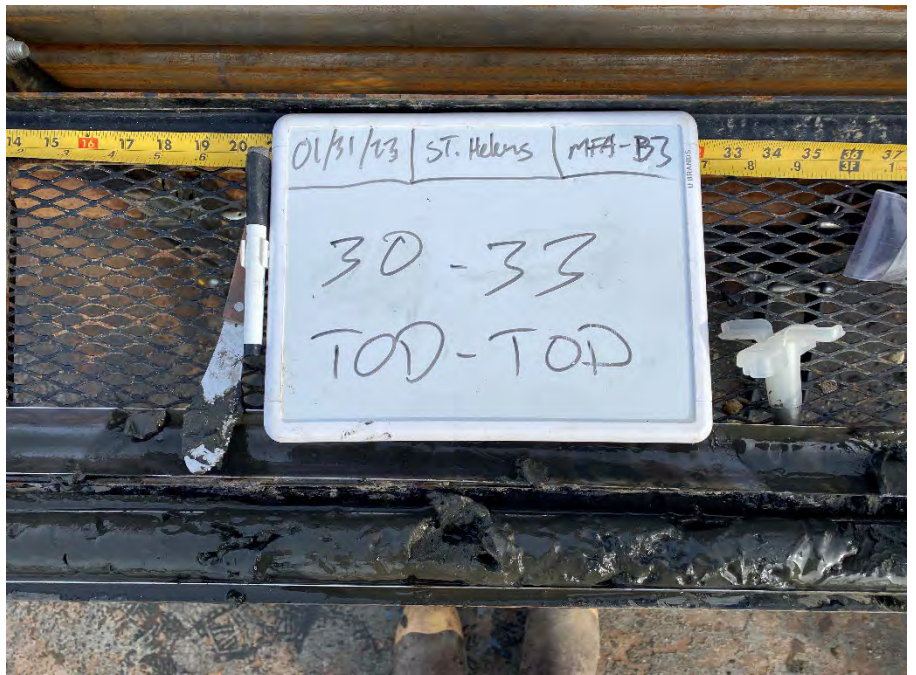
Representative photo of deeper sludge at boring MFA B-1.



Photo No. 6.

Description

Representative photo of deeper sludge at boring MFA B-3.



Photographs

Project Name: Phase IB Environmental Investigation
 Project Number: M0830.03.006
 Location: St. Helens, Oregon

Photo No. 7.

Description

Boring MFA B-3A.
 Representative sand layers where the reconnaissance groundwater sample was collected are shown to the far right in the top two cores tubes and to the far left in the bottom core tube. The underlying silt is at the right in the bottom core tube.



Photo No. 8.

Description

Representative photo of silt in boring MFA B-4.



Photographs

Project Name: Phase IB Environmental Investigation
Project Number: M0830.03.006
Location: St. Helens, Oregon

Photo No. 9.

Description

Weathered basalt
bedrock at refusal depth
in boring MFA B-1.



Photo No. 10.

Description

Vesicular basalt at
refusal depth in boring
MFA B-2.





Photographs

Project Name: Phase IB Environmental Investigation
Project Number: M0830.03.006
Location: St. Helens, Oregon

Photo No. 11.

Description

Vesicular basalt at refusal depth in boring MFA B-5.



Photo No. 12.

Description

Barge and direct-push drilling rig set-up.



APPENDIX F

GRI REPORT



Preliminary Phase I Geotechnical Investigation Wastewater Lagoon Repurposing

City of St. Helens, Oregon

September 15, 2023

Prepared for

Maul Foster & Alongi, Inc.
3140 NE Broadway Street
Portland, OR 97232

Prepared by



16520 SW Upper Boones Ferry Road, Suite 100
Tigard, OR 97224-7661
(503) 641-3478 | www.gri.com

TABLE OF CONTENTS

1	INTRODUCTION	1
2	PROJECT DESCRIPTION	1
3	SITE DESCRIPTION	3
	3.1 General.....	3
	3.2 Geologic Setting.....	3
	3.3 Geologic Reconnaissance	4
4	SUBSURFACE CONDITIONS	5
	4.1 General.....	5
	4.2 Soils.....	6
	4.3 Groundwater.....	8
5	CONCLUSIONS AND RECOMMENDATIONS	8
	5.1 General.....	8
	5.2 Seismic Considerations.....	9
	5.3 Embankment Stability Under Seismic Loading.....	16
	5.4 Embankment Stability Under Static Loading.....	19
	5.5 Settlements.....	19
	5.6 Groundwater Management.....	21
	5.7 Foundation Support.....	21
	5.8 Workplan for Phase II Geotechnical Investigation.....	22
6	LIMITATIONS	23
7	REFERENCES	25

TABLES

Table 5-1:	Site-Specific 2,475-Year Spectral Values for B/C Boundary Condition.....	10
Table 5-2:	Summary Of Ground-Motion Records Selected For Site-Response Analyses.....	11
Table 5-3:	Modeled DSM Columns Improvement Block Dimensions	18
Table 5-4:	Concept-Level DSM Columns Improvement Block Dimensions	19

FIGURES

Figure 1:	Vicinity Map
Figure 2:	Site Map
Figure 3:	Results of the Dynamic Response Analysis for V_s Profile 1
Figure 4:	Results of the Dynamic Response Analysis for V_s Profile 2
Figure 5:	Permanent Seismic Displacement Curves

FIGURES (continued)

- Figure 6: Cross Section A-A' (Seismic, Partially Softened Undrained Shear Strength)
- Figure 7: Cross Section A-A' (Seismic, Softened Undrained Shear Strength)
- Figure 8: Cross Section B-B' (Seismic, Partially Softened Undrained Shear Strength)
- Figure 9: Cross Section B-B' (Seismic, Softened Undrained Shear Strength)
- Figure 10: Cross Section C-C' (Seismic, Partially Softened Undrained Shear Strength)
- Figure 11: Cross Section C-C' (Seismic, Softened Undrained Shear Strength)

APPENDICES

- Appendix A: Existing Conditions Survey (AKS Engineering and Forestry, 2019)
- Appendix B: Field Explorations and Laboratory Testing
- Appendix C: Site-Specific Geologic Hazards
- Appendix D: Earth Dynamics LLC – Geophysical Exploration for St. Helens Water Treatment Plant
- Appendix E: Maul Foster & Alongi Boring Logs (2019 and 2023)
- Appendix F: Maul Foster & Alongi – Atterberg Limits Results (2023)
- Appendix G: Shannon and Wilson Exploration Logs (1968 and 1969)
- Appendix H: U.S. Department of Agriculture Soil Map
- Appendix I: Geoprofessional Business Association Guidance Document

1 INTRODUCTION

At your request, GRI completed a preliminary Phase I geotechnical investigation as part of the Oregon Department of Environmental Quality (DEQ) Phase I Site Characterization for the proposed Wastewater Lagoon Repurposing in St. Helens, Oregon. The Vicinity Map, Figure 1, shows the general location of the site. The purpose of our investigation was to evaluate subsurface conditions at the site and develop preliminary geotechnical conclusions and recommendations for site improvements associated with filling in the existing wastewater treatment plant (WWTP) lagoon as part of the Phase I Site Characterization, along with recommendations for additional geotechnical explorations and analysis for Phase II Site Characterization. The investigation included a review of available geologic and geotechnical information for the area, subsurface explorations, laboratory testing, and engineering analyses. This report describes the work accomplished and provides our preliminary conclusions and recommendations regarding foundation support, slope stability, seismic design considerations, and ground improvement.

In addition, GRI reviewed boring logs completed by Maul Foster & Alongi, Inc. (MFA) as part of their work for the Phase I Site Characterization and older boring and test-pit logs completed prior to construction of the Aeration Lagoon.

2 PROJECT DESCRIPTION

The proposed project includes repurposing the existing 43-acre WWTP as a sediment disposal facility for the City of St. Helens (City). As part of the plan, the existing lagoon will be drained, and the solids from it will be collected and stored in cells within the facility. The lagoon will be partially to fully filled with sediment, soil, and the City's wastewater treatment sludge as fill material. Imported materials will likely be delivered to the site by barges that dock at either the existing Boise Cascade dock structure south of the lagoon or a new dock structure near the existing Boise Cascade dock, and/or by train and truck.

Based on review of MFAs October 5, 2020, report titled "Preliminary Conceptual Site Development Plan," the existing lagoon will be dredged to about elevation 10 feet (North American Vertical Datum of 1988 [NAVD88]) with cut slopes of 2H:1V (Horizontal to Vertical) on the west side of the excavation and cut slopes of 3H:1V on the north, east, and south sides of the excavation. All elevations referenced in this report refer to NAVD88 unless otherwise stated. As part of the excavation, the previously installed PVC liner located over a portion of the bottom of the lagoon will be removed, and the lagoon will be drained to allow sludge removal and filling. A layer of clean soil or sand fill will be installed at the bottom of the excavation and overlain by a Geosynthetic Clay Liner (GCL). Above the GCL, a 60-mil High-Density Polyethylene (HDPE) linear or low-density polyethylene geomembrane liner would be installed and overlain by a drainage rock layer, covered by

a non-woven geotextile fabric separation layer, and then capped with a layer of clean sand prior to filling.

The team is proposing excavating and filling the lagoon in two phases. The initial phase, Design Phase 1, will include excavating and filling the southern portion, approximately 1,700 feet of the lagoon (approximate fill area of 19 acres), with fill to about elevation 35 feet. The west, south, and east sides of Phase 1 would be supported by the existing sidewalls of the lagoon and levee. The north side of the fill area will be supported by a geotube cutoff berm. The cutoff berm would be installed from elevation 10 feet to elevation 35 feet in a generally east-west direction along the entire width of the lagoon and would be constructed with top dimensions of about 25 feet wide and sideslopes of 3H:1V. The berm would be constructed of geotubes, permeable engineered textile bags into which sludge materials from the lagoon would be pumped and allowed to drain, which would require maintaining groundwater levels below the bottom of the geotubes during construction. The concept drawings indicate the geotubes would be installed in an overlapping pyramid structure. The new GCL liner would be constructed below the bottom of the berm, and the HDPE liner would extend up the south face of the berm.

Phase 2 excavation and filling will begin following completion of Phase 1 filling. As part of Phase 2, the northern 30 acres of the lagoon to the north of the cutoff berm will be excavated and backfilled, similar to Phase 1. Following excavation and dewatering, the GCL cap installed for Phase 2 would be tied into the GCL liner installed in Phase 1. The HDPE liner would be installed over the bottom of the Phase 2 excavation and up the north side of the geotube berm. Following filling of the northern 30 acres to elevation 35 feet additional filling will be completed over the entire footprint of the previous lagoon to raise grades in the northern portion of the lagoon to a top elevation of 66 feet and grades in the Phase 1 area to a top elevation 54 feet. Final slopes for the project have not been finalized but will be less than 5H:1V above the existing east and south levee.

As part of Phase 1 and 2 filling, a dewatering system that includes horizontal drainage layers with vertical sumps would be installed to collect and discharge leachate from the fill materials placed as fill. The top of the fills will be capped with a non-woven geotextile-fabric backed GCL and geosynthetic membrane to limit water infiltration. In addition, the top of the fill will be sloped to drain, and a pipe collection system is planned on the west side of the lagoon to collect groundwater from the basalt surface to the west. Control of groundwater has not been evaluated at this time but will be an important consideration for final design of the project.

Following filling to final grades, the facility will be repurposed by the City as a park. Park improvements may include an amphitheater, ball fields, paved access roads and parking lots, and ancillary buildings.

3 SITE DESCRIPTION

3.1 General

The WWTP is bordered by S 6th Street to the north, residential developments and grassy fields to the west, the Cascade Tissue Group mill (formerly Boise Cascade) to the south, and the Multnomah Channel to the east. The majority of the site is occupied by the large WWTP lagoon. The WWTP is located adjacent to the northern edge of the lagoon. Based on review of existing as-built drawings, the bottom of the WWTP lagoon is at about elevation 7 feet (vertical datum unknown). An impoundment levee is located along the eastern edge of the lagoon, with a top-of-levee elevation of about elevation 34 feet. The levee is about 10 feet wide at the top, surfaced with asphalt concrete (AC) pavement, and is used as an access road for vehicular traffic for plant operations. The levee side slopes are surfaced with large, angular basalt fragments with side slopes of about 2H:1V on the eastern (Multnomah Channel) side of the levee. An abandoned rail line is located at the toe of the eastern side of the levee, over about the southern 2,200 feet of the levee. A heavily wooded strip of land separates the rail line from the Multnomah Channel. On the western (lagoon) side of the levee, slopes of the levee range from about 3H:1V above elevation 20 feet to about 5.5H:1V below elevation 20 feet. The bottom of the lagoon is partially lined with a PVC liner. An existing, near-vertical basalt cliff is located on the west side of the lagoon, with elevations above the cliff ranging from about elevation 80 feet towards the northern end of the lagoon to about elevation 35 feet near the southwest end of the lagoon. An existing condition survey of the project site completed by AKS Engineering & Forestry, LLC is provided in Appendix A.

3.2 Geologic Setting

The project site is located on the western bank of the Multnomah Channel near the confluence with the Columbia River, just downstream of the entrance to Scappoose Bay. Warrior Point, the northernmost tip of Sauvie Island, is located beyond the mouth of Multnomah Channel to the east. The Cascadia Subduction Zone (CSZ) and associated Cascadia fold and fault belt are approximately 120 miles to the west. Published geologic mapping indicates the western portion of the project site is underlain by the Sentinel Bluffs member of the Grand Ronde Basalt, which is part of the Columbia River Basalt Group (Evarts, 2004). The Sentinel Bluffs member is in turn underlain by the Winter Water Basalt Group, shown in cross section to underlie the eastern portion of the project site (beyond the extent of mapped Sentinel Bluffs), which is mantled by Quaternary-age alluvium at the surface. A narrow strip of artificial fill is mapped along the eastern boundary of the WWTP lagoon (west of the alluvium), coincident with the location of the retention berm/levee. A

northwest-southeast-trending fault is shown on the geologic map (Evarts, 2004) approximately 1.5 miles northeast of the site; however, this fault is not included in the USGS Quaternary Fold and Fault Database (USGS, 2006). The closest identified Quaternary-age fault is the Portland Hills Fault, located approximately 13.5 kilometers southwest of the site (USGS, 2006). No mapped or historic landslides were identified at the project site or in the immediate vicinity on the Oregon Department of Geology and Mineral Industries (DOGAMI) statewide landslide hazard database (SLIDO). DOGAMI is the state agency responsible for geologic hazard mapping in Oregon. Landslide hazard ratings at the site range from low (landsliding unlikely) to high (landsliding likely), with areas of greater hazard generally corresponding to areas of steeper relief, such as the western portion of the project site (Burns and Watzig, 2014).

3.3 Geologic Reconnaissance

An Oregon-registered geologist from GRI conducted a walking geologic reconnaissance of the project site on September 23, 2019. GRI conducted the reconnaissance to evaluate surface conditions at the site for obvious indications of potential slope instability and other geologic hazards relative to the site. The following text summarizes observations made on site.

An impoundment levee is present along the northern portion of the site and extends approximately 0.5 miles to the southwest, then extends approximately 0.1 mile to the west along the southern end of the site. An inlet approximately 100 feet to 250 feet wide from the Multnomah Channel is located near the northeastern corner of the lagoon, within about 100 feet of the bottom of the levee. The ground surface east of the levee is relatively flat to gently undulating and is about 230 feet to 250 feet wide, with ground surface elevations ranging from about elevation 15 feet to 25 feet to the crest of the Multnomah Channel. Dense vegetation, including grasses, shrubs, and young to mature trees, covers the ground surface. An abandoned rail track runs along the base of the levee in a generally northeast-southwest direction.

A steeply sloping to near-vertical rock cliff is located along the western edge of the lagoon; the western portion of the project site is shown on the geologic map as Sentinel Bluffs basalt. Elevations along the top of the cliff range from about elevation 80 feet near the northern end of the lagoon to about elevation 35 feet near the southern end of the lagoon. The ground surface above the rock cliff is vegetated with grass and mature trees, with visible basalt outcrops. Portions of the near-vertical cliff face in the northern portion of the site exhibited evidence of past rockfall events (accumulated talus material at the base of the cliff and possible source areas visible on the cliff face). A historical topographic map reviewed by GRI identified the project site as a quarry, and past quarrying at the site may have influenced the cliff face slopes. Obvious evidence of large-scale, active, deep-seated

slope instability was not observed at the site. GRI observed areas of ponded water and hummocky topography above the cliffs, possibly a result of near-surface bedrock. A drainage channel enters the lagoon near the southwestern corner of the site, with water levels in the drainage channel apparently controlled by a weir system.

4 SUBSURFACE CONDITIONS

4.1 General

Subsurface materials and conditions at the site were investigated during two separate mobilizations. During the initial mobilization between July 29 and August 2, 2019, two mud-rotary borings, designated B-1 and B-2, and three cone penetration test (CPT) probes, designated CPT-1 through CPT-3, were completed. The borings were advanced to depths ranging from about 156.5 feet to 201.5 feet, and the CPT probes to depths ranging from about 22 feet to 158 feet. During the second mobilization between February 27, 2023, and March 2, 2023, one mud-rotary boring, designated B-3, was completed to a depth of approximately 261.5 feet. Approximate locations of the explorations performed for this investigation are provided on the Site Map, Figure 2. Logs of the borings and CPT probes are provided on Figures 1B through 7B. The field and laboratory programs conducted to evaluate the physical engineering properties of the materials encountered in the explorations are described in Appendix B. The terms and symbols used to describe the soils and rocks encountered in the explorations are defined in Tables 1B through 4B and on the attached legend. A resistivity and seismic refraction survey, completed by Earth Dynamics LLC, is provided in Appendix D. The locations of the geophysical profile lines are shown on Figure 2.

In addition, GRI reviewed available geotechnical data from MFA for their recent work on site for the Phase I Site Characterization and Shannon and Wilson's logs provided in the January 26, 1972, construction plans for the WWTP lagoon. Figure 2 shows the locations of the nearby borings, and logs of the borings are provided in Appendices E and G, respectively. Atterberg Limits testing completed by GRI on samples of soil collected during MFA's recent explorations within the lagoon is provided in Appendix F. The subsurface conditions encountered in the previous borings are in general agreement with the subsurface information obtained during our recent investigation.

GRI also reviewed the U.S. Department of Agriculture (USDA) Web Soil Survey Map covering the project area and the surrounding vicinity, which includes soil survey areas within Clark County, Washington (Version 17, September 16, 2019), Cowlitz County, Washington (Version 20, September 16, 2019), and Columbia County, Oregon (Version 16, September 10, 2019). The USDA map provided in Appendix H indicates the project site east of the lagoon and impoundment berm is mantled by *Sauvie silt loam*, while the area west of the lagoon is described as *Rock outcrop – Xerumbrepts complex, undulating surface*.

The mapped USDA soil units generally agree with GRI's observations and review of surface and subsurface conditions at the project site.

4.2 Soils

For the purpose of discussion, the materials disclosed by the investigation have been grouped into the following major units based on their physical characteristics and engineering properties:

- a. FILL
- b. SAND
- c. SILT
- d. BASALT

The following paragraphs provide a description of the soil units and a discussion of the groundwater conditions at the site.

a. FILL

Boring B-1 was drilled next to existing railroad tracks and encountered about 10 inches of crushed rock at the ground surface. Probes CPT-2 and CPT-3 were drilled through crushed-rock surfacing, and CPT-1 was drilled through an existing AC-surfaced parking lot. The thickness of fill in the CPT probes was not measured.

b. SAND

Sand was encountered at the ground surface in boring B-3 and below the crushed-rock surfacing or pavement in explorations B-1 and CPT-1 through CPT-3 and extends to depths ranging from about 13.8 feet to 25 feet. The sand is gray to brown, fine to medium grained, and contains a variable silt content ranging from trace to some silt. Wood debris was encountered within the sand in boring B-1 below a depth of about 17.5 feet. Based on SPT N-values and CPT tip-resistance values, the relative density of the sand typically ranges from loose to medium dense.

c. SILT

Silt was encountered at the ground surface in boring B-2 and beneath the sand in explorations B-1, B-3, and CPT-1 through CPT-3 and extends to depths ranging from about 21.5 feet to 261.5 feet. Borings B-1 and B-3 were terminated in the silt at a depth of about 201.5 feet and 261.5 feet, respectively. The silt is brown to gray and contains variable percentages of clay and sand, ranging from a trace of clay to clayey and a trace of fine-grained sand to sandy. The silt generally contains wood debris or organics. A 12-foot-thick layer of silty sand was encountered at a depth of about 138 feet in boring B-1; 5-foot to 7-foot-thick layers of silty sand were encountered in boring B-2 at depths of about 70 feet and 145 feet; a 5-foot-thick layer of silty sand was encountered at a depth of 165 feet in

boring B-3; a 1-inch-thick layer of sand was encountered at a depth of about 38 feet in boring B-3; 1-inch thick interbedded layers of sand were encountered between 47 feet and 48.5 feet in boring B-3; and interbedded layers of sand were encountered within the silt below depths of about 65 feet in probe CPT-3. An approximately 5-foot-thick and 2-inch-thick layer of very stiff, fine-grained ash was encountered at a depth of 75 feet and 80.5 feet, respectively, in boring B-3. Based on SPT N-values, Torvane shear-strength values, and CPT tip-resistance values, the relative consistency of the silt ranges from very soft to hard and is generally soft to medium stiff. Below a depth of 115 feet in boring B-3, the relative consistency of the silt typically ranges from very stiff to hard. Atterberg-limits testing completed on samples of silt is summarized on Figures 13B through 19B and indicates the silt has a low to high plasticity.

Consolidation tests were conducted on samples of silt and indicate the soil is normally to slightly overconsolidated and has a moderate to high compressibility in the normally consolidated range of stresses and a low compressibility in the preconsolidated range of stresses; see Figures 20B through 28B. Secondary compression testing completed on samples of silt from borings B-1 and B-3 indicates a low to moderate rate of secondary compression in both the preconsolidated and normally consolidated ranges of stresses. The results of the secondary compression tests are shown on Figures 29B and 30B.

Two multistage, triaxial shear-strength tests indicate this soil unit exhibits an effective angle of internal friction, ϕ' , of about 34° , as indicated on Figures 31B and 32B. In addition, strain-controlled cyclic direct simple shear (DSS) testing was completed on samples of silt from a depth of approximately 39 feet in boring B-1, approximately 64 feet in boring B-2, and approximately 36 feet and 61 feet in boring B-3. The samples were tested at cyclic shear strains varying from 0.5% to 1.6%, and the tabulated results are provided in Appendix B.

d. BASALT

Basalt was encountered beneath the silt in explorations B-2 and CPT-1 through CPT-3. These explorations were terminated in the basalt at depths ranging from about 22 feet to 158 feet. The basalt encountered in boring B-2 is dark gray and predominantly decomposed, with slightly weathered inclusions. The basalt is very soft to soft (R1 to R2). Geophysical testing completed near the toe of the east side of the levee indicates basalt was interpreted at about elevation -50 feet over the southern 600 feet of the lagoon. Further to the north, the depth to basalt increases significantly to elevations on the order of elevation -350 feet between borings B-1 and B-3. The depth to basalt then decreases rapidly to about elevation -100 feet about 50 feet to the north of boring B-1. Additional geophysical testing completed about 150 feet and 250 feet to the east of the railroad tracks interpreted basalt at about elevation -100 feet to elevation -150 feet over the

southern about 1300 feet of the profiles and deeper than elevation -200 feet over the northern about 900 feet of the profiles.

4.3 Groundwater

The borings were completed using mud-rotary drilling techniques, which do not allow an accurate measurement of the groundwater level during drilling. Pore-pressure dissipation testing completed in probes CPT-1 through CPT-3 indicates groundwater at depths ranging from about 1.7 feet to 10.4 feet (elevation 21.4 feet to elevation 12.1 feet) below the ground surface; see Figures 8B through 12B. Based on information provided by MFA, the 100-year flood elevation for the site ranges from about elevation 23.3 feet to elevation 24.7 feet. We anticipate groundwater closely reflects water levels in the nearby Columbia River and Multnomah Channel. However, shallow perched groundwater conditions may develop in the fill during periods of prolonged precipitation. It is our understanding that water levels within the existing, partially PVC-lined wastewater lagoon are generally maintained at about elevation 28 feet.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Based on the explorations and geophysical testing completed for this investigation and review of existing subsurface information, the eastern portion of the lagoon near the existing containment levee is underlain by a variable thickness of sand, underlain by a significant thickness of highly compressible alluvial silt. Interbedded layers of sand were encountered within the silt between depths of about 65 feet and 152 feet. The silt is underlain by basalt. The depth to basalt from the toe of the levee varies significantly across the length of the site and ranges from a depth of about 23 feet and 63 feet near the northern and southern ends of the levee, respectively, to over 350 feet deep about 500 feet south of the northern edge of the lagoon. The western edge of the lagoon consists of a near-vertical basalt cliff. The depth of basalt slopes downward from west to east across the lagoon.

Our preliminary studies indicate the existing, loose to medium-dense, unimproved sand and low-plasticity silt below the groundwater level have the potential to liquefy or strain soften during a design-level earthquake. Liquefaction and soil strain softening of these unimproved soils would result in reduced soil strength and potentially significant settlement. Without the use of ground improvement to improve the existing soil conditions, this reduction in soil strength would also result in seismic instability of the proposed embankment slope during a design-level earthquake. Our studies indicate ground-improvement methods can be used to improve the seismic stability of the proposed fills. In addition, the existing, unimproved alluvial soils are highly compressible, and the placement of new fill is estimated to result in significant total and differential

short-term (primary) and long-term (secondary) settlements. Additional settlement and slope stability of the fill soils will also be a geotechnical design consideration and will be highly dependent on placement and compaction methods for new fills in the lagoon.

The proposed excavation levels (described in the Project Description) relative to the fluctuation of groundwater and Columbia River and Multnomah Channel levels are anticipated to be a significant design and construction consideration for the project. The following sections of this report provide our preliminary conclusions and recommendations for conceptual-level design of the facility.

5.2 Seismic Considerations

5.2.1 Site-Response Analysis

5.2.1.1 General

We understand the seismic design for the project is being completed in accordance with RCRA Subtitle D (258), Seismic Design Guidance for Municipal Solid Waste Landfill Facilities. This document requires the seismic design for landfill facilities to consider an earthquake event that has a 10% probability of being exceeded in 250 years (i.e., an average return period of 2,373 years).

A site-specific site response analysis was completed for the project using nonlinear total stress analysis procedures as part of this investigation. The dynamic site-response modeling primarily consists of three primary components: 1) review of U.S. Geological Survey (USGS) Probabilistic Seismic Hazard Analysis to support selection of target response spectra at the base of the soil column; 2) selection and scaling of ground-motion acceleration time histories to match the target response spectra over the period range of interest; and 3) one-dimensional site-response modeling to evaluate the site-specific influence of subsurface conditions on the resulting ground motions. The results from the site response analysis include peak acceleration, stress, and strain profiles. The peak acceleration provides an indication of the maximum expected ground motion that could occur during a seismic event. The stress and strain profiles offer insights into how the soil would deform under various loading conditions, which is critical for designing structures that can withstand these forces.

5.2.1.2 Development of Target Spectra

The site-response analysis requires developing target spectra at the base of the soil column (hereafter referred to as “target bedrock spectra”) prior to selecting and scaling the input earthquake-acceleration time histories. As previously discussed, the RCRA Subtitle D standard requires seismic evaluation to be considered for an earthquake event with 2,373 years of return period, which corresponds to the ground motion with a 10% probability of exceedance in 250 years. This ground motion is comparable to the ASCE 7

probabilistic earthquake with a 2% probability of exceedance over 50 years (equivalent to a return period of 2,475 years). Therefore, the target spectrum was derived for a 2,475-year return period based on 2014 USGS Unified Hazard Tool (UHT) for Site Class B/C boundary conditions was used for this study. Table 5-1 summarizes the site-specific uniform hazard spectral values at the project site utilized as target bedrock spectra.

Table 5-1: SITE-SPECIFIC 2,475-YEAR SPECTRAL VALUES FOR B/C BOUNDARY CONDITION

Period, sec	Spectral Acceleration, g 2,475-yr
PGA	0.41
0.1	0.87
0.2	0.90
0.3	0.75
0.5	0.55
0.75	0.43
1	0.34
2	0.19
3	0.13
4	0.09
5	0.07

5.2.1.3 Ground-Motion Selection and Scaling

For the site-response analysis, a suite of seven recorded horizontal ground-motion acceleration time histories were selected from earthquakes having magnitudes, frequency contents, and spectral shapes consistent with those that control the target spectrum. The 2014 USGS deaggregation of probabilistic ground motions at the site indicates the CSZ interface and crustal sources are the primary contributors to the potential seismicity of the site. Therefore, crustal and subduction-zone earthquake records were selected and scaled to the target spectrum for use in the site-response modeling. The selected time histories used for the site-response modeling are summarized in Table 5-2.

Table 5-2: SUMMARY OF GROUND-MOTION RECORDS SELECTED FOR SITE-RESPONSE ANALYSES

No.	Earthquake and Year	Mag. Mw	Station Name	Record ID	Record Source	Seed Record PGA, g	Sampling Frequency, Hz	Record Length, sec	Scaling Factor
1	Tohoku 2011	9.0	Iwaki	FKS011EW	KNET	0.33	100	300	1.1
2	Tohoku 2011	9.0	Sawara	CHB004NS	KNET	0.29	100	300	1.4
3	Maule 2010	8.8	Santiago La Florida	SlaFloridaNS	RENADIC	0.25	200	208	2.2
4	Maule 2010	8.8	Santiago Centro	SCentroEW	RENADIC	0.22	200	205	1.9
5	Michoacan 1985	8.1	CaletaDeCampos	CaletaDeCamposNS	UNR	0.14	200	51	3.1
6	Iwate 2008	6.9	IWT010	IWT010NS	PEER	0.28	100	238	1.5
7	Chuetsu-oki 2007	6.8	Joetsu Ogataku	65011EW	PEER	0.20	100	60	1.8

Following selection of the time histories, the input bedrock motions were linearly modified using amplitude scaling so that the mean response spectra of the recordings reasonably matched the target bedrock spectrum. The amplitude scaling process involves selecting a single scaling factor for each time history and multiplying the entire acceleration time history by this factor so its response spectrum approximates the input target spectra.

5.2.1.4 Modeling Method

The site-response modeling was performed using a 1D, non-linear, site-response analysis in the DEEPSOIL program (Hashash et al., 2016) developed by the University of Illinois. The program employs a time-domain site-response analysis capable of incorporating the non-linear hysteretic soil behavior that is observed during cyclic loading and unloading. The program computes the dynamic response of a layered soil profile to vertically propagating shear waves using a built-in total stress or effective stress analysis option. The program uses the pressure-dependent modified hyperbolic constitutive model initially developed by Kondner and Zelasko (1963; Modified Kondner and Zelasko [MKZ] model) and the General Quadratic/Hyperbolic (GQ/H) strength-controlled constitutive model recently introduced by Groholski et al. (2015). The GQ/H model allows the shear strength at failure to be defined while still providing the flexibility to represent small-strain soil behavior. Therefore, the GQ/H material model was used since it provides a better approximation of

modulus reduction and damping and higher levels of shear strain approaching the ultimate shear strength while still maintaining small-strain nonlinearity.

The GQ/H parameters are generally obtained by fitting the hyperbolic model to published empirical modulus reduction and damping curves such as Vucetic and Dobry (1991), EPRI (1993), and Darendeli (2001). The conventional approach for defining unloading-reloading criteria and behavior under general cyclic-loading conditions (hysteretic damping) is based on the Masing criteria (Masing, 1926) and extended Masing criteria (Pyke, 1979; and Vucetic, 1990). An exact match of the target modulus reduction and damping curves is not concurrently possible using the Masing or extended Masing rules (i.e., one must match the target modulus reduction curve as accurately as possible and accept the misfit of damping or optimize the fit of both simultaneously). Phillips and Hashash (2009) developed an alternative non-Masing model by introducing a reduction factor that effectively alters the Masing rules and allows for both modulus reduction and damping curves to be fitted simultaneously. This model is implemented in DEEPSOIL as the Modulus Reduction and Damping Factor (MRDF) Pressure-Dependent Hyperbolic model (Phillips and Hashash, 2009).

In general, DEEPSOIL allows the user to create a discretized soil profile and input a variety of soil-modeling parameters derived from subsurface and laboratory testing and established correlations in geotechnical literature. The selected suite of scaled earthquake records is then input into the program and propagated up through the soil column to the ground surface.

5.2.1.5 Input Simplified Soil Profile and Dynamic Properties

Two simplified subsurface profiles were developed at the project site for the existing site conditions based on the subsurface exploration and laboratory testing programs completed for the project, supplemented with available subsurface information for the project area. Profile 1 was developed at cross section B-B' (Figure 2) based on boring MW-4 and CPT-3, while profile 2 was developed at cross-section C-C' (Figure 2) based on boring MW-3 and CPT-2. The shear wave velocity measurements were conducted for CPT-2 probe, and the shear wave velocity for the CPT-3 probe was derived based on correlation with tip resistances measured during testing. The elastic half-space boundary condition at the base of the model was assumed for profiles 1 and 2 at depths of about 160 feet and 60 feet, respectively. The half-space boundary condition at the base of the model was represented by a visco-elastic boundary with a unit weight of 130 pounds per cubic foot (pcf) and a shear-wave velocity of 2,500 feet/second.

The dynamic properties of each soil layer were estimated using published relationships on similar materials and local experience. The total stress analyses were completed using

modified EPRI (1993) and Vucetic and Dobry (1991) modulus and damping curves. The sand layers encountered throughout the soil profile were assigned the depth-dependent EPRI (1993) deep cohesionless soil modulus and damping curves that account for the effects of confining pressure. The silty and clayey layers were assigned the plasticity index-dependent Vucetic and Dobry (1991) modulus and damping curves.

5.2.1.6 Results of the Site Response Analysis

The site-response analyses for the two profiles were completed using a suite of scaled ground-motion records listed in the preceding tables and the generalized soil profiles developed for the site. The results of the analyses are presented on Results of the Dynamic Response Analysis for V_s Profile 1, Figure 3 and Results of the Dynamic Response Analysis for V_s Profile 2, Figure 4. The figures show the profiles of the maximum acceleration, maximum normalized shear stress, and maximum shear strain with depth for individual earthquake motions (shown in gray) and their mean values (shown in black). The maximum acceleration and normalized shear stress profiles are mostly observed to vary with depth between 0.2 and 0.4. The maximum shear strain values are generally observed to be less than 1.2%.

5.2.2 Liquefaction, Cyclic Softening and Liquefaction-induced Settlements

Liquefaction is a process through which saturated non-plastic to low-plasticity silts and granular materials, such as sand, temporarily lose strength during and immediately after a seismic event. Liquefaction occurs as seismic shear stresses propagate through saturated soil and distort the soil structure, causing loosely packed groups of particles to contract or collapse. If drainage is impeded and cannot occur quickly, the collapsing soil structure increases the porewater pressure between the soil grains. If the porewater pressure increases to a level approaching the weight of the overlying soil, the soil temporarily behaves as a viscous liquid rather than a solid.

Cyclic softening is a term that describes a relatively gradual and progressive increase in shear strain with load cycles. Excess pore pressures may increase due to cyclic loading but will generally not approach the total overburden stress. Shear strains accumulate with additional loading cycles, but an abrupt or sudden decrease in shear stiffness is not typically expected. Settlement due to post-seismic consolidation can occur, particularly in lower-plasticity silts. Large shear strains can develop, and strength loss related to soil sensitivity may be a concern.

The potential for liquefaction and/or cyclic softening is typically evaluated by comparing the cyclic shear stresses induced within a soil profile during an earthquake to the ability of the soils to resist these stresses. In this procedure, earthquake-induced shear stress is characterized by the cyclic stress ratio (CSR), and soil resistance is characterized by the cyclic resistance ratio (CRR). The CSR can be estimated based on empirical correlations or

the results of site-response modeling. The CRR of soils is dependent on several factors, including the number of loading cycles, relative density, confining stress, plasticity, natural water content, stress history, age, depositional environment (fabric), and composition. The CRR of soils is evaluated using in situ testing in conjunction with laboratory index testing, which may also include monotonic and cyclic laboratory strength tests. The CRR for sandy soils is typically estimated based on soil shear strength as characterized by SPT N-values or CPT probe tip resistances, with various corrections to account for fines contents and other factors. For clay-like soils, the cyclic resistance is typically evaluated using estimates of the undrained shear strength, overconsolidation ratio (OCR), and sensitivity, or directly from cyclic laboratory tests.

The factor of safety against liquefaction and/or cyclic softening is calculated as the ratio of the CRR to CSR on a layer-by-layer basis within the soil profile. As the factor of safety decreases to 1.0, there is an increased risk of liquefaction or soil-strength loss. For the purpose of these evaluations, we assumed a groundwater elevation of about 9 feet, which corresponds to a depth of about 25 feet at borings MW-3 and MW-4 locations. For this project, the CSR profiles were developed based on the results of the site-response analyses performed using the DEEPSOIL program. The DEEPSOIL analyses normally yield the maximum computed shear stress normalized by the initial vertical effective stress (τ_{\max}/σ'_v). The DEEPSOIL normalized shear stress was multiplied by 0.65 to convert to an equivalent uniform value (i.e., representative value) of CSR.

Our liquefaction analyses indicate the sandy soils below the groundwater surface are generally susceptible to liquefaction. The maximum depth of liquefaction and risks to a project can be a topic of debate since the case histories used to develop the simplified procedure are limited to a depth of about 60 feet. The risks of liquefaction and the resulting consequences at these greater depths are not well understood. For the purposes of this study, we have assumed that the potential for additional vertical settlements due to liquefaction of the silty sand underlying the alluvium below 90 feet is unlikely.

In addition, as part of our seismic studies, GRI conducted static and cyclic DSS testing to evaluate the static and seismic behaviors of the silt soils that underlie the project site. The cyclic DSS tests were conducted in our laboratory to evaluate the cyclic resistance, degradation potential, and post-cyclic behavior of the silt. The laboratory testing program focused on a series of static and cyclic DSS tests with supporting standard indexes and consolidation tests. Based on the laboratory test results, the silt encountered at depths of about 35 feet and 60.5 feet in boring B-3, and our interpretation of the OCR profile for the silt at 39 feet in boring B-1 and 64 feet in boring B-2, is slightly overconsolidated with an estimated OCR of 1.5. Strain-controlled cyclic DSS testing at shear strains ranging from 0.5% to 1.6% was completed on samples of the silt. The cyclic DSS testing identified a

potential reduction in shear strength (softening) of the silt soils below the groundwater level during a design-level seismic event at shear strains that we anticipate could occur during a design-level seismic event (less than 1.6% strain). The post-cyclic shear strengths used in our analysis were based on 3% strain to reduce deformation. The testing completed to date indicates the measured reduction in shear strength is significantly less than would be anticipated for low-plasticity silts based on conventional methods for predicting strength loss where the silts would be considered sand like. However, we recommend additional cyclic DSS testing be completed as the project progresses. The results of the cyclic DSS testing are provided in Appendix B.

The potential of liquefaction-induced settlement of sand-like soils was estimated using an empirical approach method described by Yoshimine et al. (2006), which is based on case histories of areas that have experienced liquefaction. Using this procedure, we estimate up to 10 inches of free-field liquefaction settlement at the site. This seismically induced settlement excludes additional vertical settlements that may occur due to the lateral spreading hazard or cyclic softening of the fine-grained soils that should be further evaluated as part of the Phase II geotechnical investigation.

5.2.3 Newmark Slope Deformation Analyses

The Newmark rigid-block analysis (Newmark, 1965) provides an estimation of the anticipated horizontal slope movements based on a double integration of the duration that the acceleration time history of the slide mass exceeds a specific yield acceleration (k_y). In general, this decoupled analysis involves: (1) a dynamic response analysis to compute the "average" accelerations experienced by the slide mass, followed by (2) a displacement analysis using the Newmark (1965) double-integration procedure with the average acceleration time history as the input motion. The average acceleration computed in the first step is commonly referred to as the horizontal equivalent acceleration (HEA) time history and represents a spatial average of the accelerations acting on the slide mass (i.e., horizontal shear-stress time history normalized by the total vertical overburden stress).

The potential seismic displacement was developed for cross-sections B-B' and C-C' (Figure 2). The critical pseudo-static surfaces for each cross-sections B-B' and C-C' were initially determined based on conventional limit equilibrium analysis. Subsequently, HEA time histories were computed along the critical failure surface using site-response analysis, and the HEA time history was directly input into a Newmark seismic-displacement analysis to calculate the permanent seismic displacement as a function of the seismic yield acceleration. Permanent Seismic Displacement Curves, Figure 5 shows the resulting displacement curves versus yield acceleration (K_y) for cross-sections B-B' and C-C'. As described in Section 5.4.2, an allowable slope deformation of 24 inches was assumed for

this initial phase I geotechnical analysis. As shown on the figure, the yield acceleration corresponding to the 24-inch allowable deformation is approximately 0.07g.

5.3 Embankment Stability Under Seismic Loading

5.3.1 General

GRI evaluated embankment stability under seismic loading conditions for three cross sections, identified as cross sections A-A', B-B', and C-C' on Figure 2. As an initial check of post-earthquake stability, the models were run with a pseudo-static acceleration, k_h , of zero. The models were run assuming a drained soil strength parameter, ϕ' of 28° for the dredged fill placed within the lagoon. In addition, the models assumed a liquified soil strength, $S_u/\sigma_v = 0.1$ for the submerged sand soils below the groundwater surface base on the simplified procedure by Idriss and Boulanger (2008) and undrained soil strengths, S_u/σ_v varying between 0.17 and 0.20 for the submerged silt. The S_u/σ_v of 0.17 is based on the average post-cyclic DSS testing completed for the project, and the S_u/σ_v of 0.20 is based on a 20% reduction in the full undrained shear strength to account for cyclic softening assuming the silts exhibit a *clay-like* behavior (Idriss and Boulanger 2008) based on 3% strain to limit deformations. Factors of safety of less than 1.0 were obtained, indicating a high risk of flow failure and that methods to improve the shear strength of the soil, such as ground improvement, will be required to improve the seismic slope stability.

5.3.2 Seismic Slope Stability Modeling with Ground Improvement

Ground improvement will be required on the channel side of the existing east side levee to improve seismic slope stability and reduce the risk of large slope movements or flow failures. For our Phase I geotechnical investigation, it is our understanding that about 24 inches of seismic slope movement is acceptable for the embankments. This allowable slope movement will need to be further analyzed during our Phase II geotechnical investigation. As discussed in the Newmark Slope Deformation section, a Newmark Analysis was completed to evaluate a yield acceleration (k_y) equivalent to 24 inches of slope movement. Our analysis indicates a mean yield acceleration of 0.07 g, which corresponds to approximately 24 inches of seismically induced lateral deformation in the embankment.

Due to the high fines content of the soils in the depths of interest, deep cement-soil-mixed columns (DSM) were considered for preliminary ground improvement design. The composite shear strength of the ground improvement buttress can be estimated by combining the shear strengths of the treated and untreated soils. The treated soil strength can be estimated as the product of the ground-improvement area replacement ratio and the 365-day shear strength of the ground-improvement columns. The untreated soils

(between the ground improvement grids) were assigned a conservative shear strength of 500 pounds per square foot (psf).

For our preliminary seismic analysis, we assumed a 28-day compressive strength of the DSM columns of 200 pounds per square inch (psi) and an area replacement ratio of about 35%. In accordance with the guidelines established by the Federal Highway Administration (FHWA) design manual (Bruce et al., 2013), we estimate a composite shear strength of the DSM improved block of at least 5,725 psf.

GRI re-evaluated embankment stability under seismic loading conditions for the three cross sections, identified as cross sections A-A', B-B', and C-C' on Figure 2 previously discussed above. The models were run assuming a drained soil strength parameter, ϕ' of 28° for the dredged fill, a liquified soil strength, $S_u/\sigma_v = 0.1$ for the submerged sand soils below the groundwater surface, and a composite shear strength of 5,725 psf for the DSM improved block. Each model was run assuming two soil conditions for the submerged silt. The two conditions analyzed included 1) an undrained soil shear strength, $S_u/\sigma_v = 0.20$ for the saturated silts below the groundwater level based on a 20% reduction from the full undrained soil shear strength and 2) an average cyclic-softened undrained soil strength, $S_u/\sigma_v = 0.17$ for the silts encountered below the groundwater level based on cyclic DSS testing at shear strains between 0.5% and 1.6%. The intention of the two conditions analyzed was to develop a profile based on the average results of the cyclic DSS testing as well as a potential "best case" profile if the majority of the silt encountered at the site is shown to have higher plasticity and therefore a reduced risk of cyclic softening based on additional testing as part of the Phase II geotechnical investigation. We anticipate modeling completed as part of the Phase II geotechnical investigation could also include several undrained soil strength, S_u/σ_v values within each model if more refined soil profiles are developed following completion of additional subsurface explorations and laboratory testing.

The soil parameters used in the global slope-stability modeling are presented with the seismic stability models provided on Slope Stability Model, Figures 6 through 11. For the models, a factor of safety against instability for seismic loading conditions was computed for potential failure surfaces that could extend beyond the toe of the existing levee along the east side of the lagoon. The computed factor of safety against instability is defined as the ratio of the forces (or moments) tending to resist failure to the forces (or moments) tending to cause failure. A ground improvement buttress located on the channel side of the east levee was modeled and then widened towards the channel and deepened until a minimum factor of safety of 1.0 was obtained for failures occurring upslope of the existing toe of the levee on the east side of the lagoon. As previously discussed, this approach assumes deformations through the lagoon of up to 24 inches are acceptable during the

design-level seismic event. It should be noted that greater movements will occur on the channel side of the levee.

The ground improvement block dimensions required to limit slope movement of the proposed embankment to about 24 inches in the models are provided on Figures 6 through 11 and are summarized in Table 5-3, below.

Table 5-3: MODELED DSM COLUMNS IMPROVEMENT BLOCK DIMENSIONS

Cross Section	Average Silt Shear Strength, S_u/s_v	DSM Block Width, ft	DSM Block Depth, ft
A-A'	0.20	155	280
A-A'	0.17	255 ^(a)	295
B-B'	0.20	65	165
B-B'	0.17	100	165
C-C'	0.20	15	55
C-C'	0.17	25	65

Note:

- a. Ground Improvement extends at least 5 feet below the existing levee along the east side of lagoon.

It should be noted that the softened silt profile at cross section A-A' required installation of ground improvements beneath the existing levee. DSM columns are typically installed on level ground, and this configuration would likely require the removal of a portion of the existing levee to allow installation of ground improvements.

The modeling approach used for this phase of work does not inherently address overturning. For this reason, we recommend assuming the block width is at least one-half of the block height. Initial models were also completed with no restrictions on the potential slope failure depths. As part of the Phase II geotechnical investigation, we recommend completing more robust modeling, such as finite difference or finite element numerical modeling, to better model the ground improvement in a deep, relatively soft soil profile. Based on past experience, we anticipate that this additional modeling could result in a significant reduction in ground improvement. It should also be noted that ground improvement depths greater than about 150 feet will limit ground improvement types and costs will increase significantly. Table 5-4 presents assumed ground improvement widths and depths for this phase of the project. These dimensions should be re-evaluated as part of the Phase II geotechnical investigation.

Table 5-4: CONCEPT-LEVEL DSM COLUMNS IMPROVEMENT BLOCK DIMENSIONS

Cross Section	DSM Block Width, ft	DSM Block Depth, ft
A-A'	150	150
B-B'	100	150
C-C'	35	65

As part of the Phase II geotechnical investigation, additional explorations, including borings and CPT probes, should be completed within the lagoon and east and south of the existing lagoon berm to evaluate the depth to basalt, soil properties, and layering of soils above the basalt. The work should include additional cyclic DSS testing to further evaluate potential softening of the submerged silt. In addition, Atterberg Limits testing completed on samples obtained from MFA’s borings completed within the lagoon indicates the soils beneath the lagoon may have higher plasticity than the soils encountered on the channel side of the berm and should be further evaluated as part of the Phase II geotechnical investigation. Additional discussion regarding the proposed Phase II investigation is provided in Section 5.9.

5.4 Embankment Stability Under Static Loading

It is anticipated that the dredged spoils used to fill the lagoon will be saturated and highly variable. Depending on pretreatment prior to placement, compacting these dredged soils as structural fill will likely be impractical. As previously discussed, our seismic slope stability models were completed assuming a long-term drained soil strength parameter, ϕ' of 28° for the dredged fill assuming the subsurface drainage program planned for this project will be drained to reduce the risk of excess pore pressure generation and reduction of strength during a design-level earthquake. A geotube cutoff berm is proposed between the Phase 1 and Phase 2 site filling. The proposed location and dimensions of the cutoff berm are discussed in the Project Description section of this report. The engineering properties of the geotubes will require further evaluation prior to slope stability evaluation. As part of the Phase II geotechnical investigation, the process for fill placement, excess water removal, compaction, geotube properties, and geotube performance requirements will need to be further evaluated prior to completion of static slope stability modeling of the geotube berm and existing levee during and after site filling.

5.5 Settlements

The proposed construction sequence assumes up to 56 feet of fill will be required to achieve a final site grade of about elevation 66 feet. The majority of new fill will consist of sediment, soil, and the City’s wastewater treatment sludge. As part of the Phase II geotechnical investigation, the processes for fill placement, compaction, and settlement monitoring will need to be further evaluated. As described previously, it is anticipated that

the dredged spoils used to fill the lagoon will be saturated and highly variable, and that initially compacting these dredged soils as structural fill will likely be impractical. For this Phase I geotechnical investigation, we have assumed the fill will be placed with limited compactive effort and will have an average unit weight of 100 pcf following placement.

Settle3D software by Rocscience, Inc., was utilized to model the proposed fill heights. The models were constructed for three separate loading conditions. The three conditions analyzed included 1) areal settlements following Phase 1 filling to elevation 35 feet for the southern 19 acres of the lagoon; 2) areal settlements following Phase 2 filling to elevation 66 feet with maximum sideslopes of 10H:1V, 12H:1V, 12H:1V and 3H:1V on the east, south, west, and north sides of the fill, respectively; and 3) following final grading to level the fill area at about the maximum fill levels placed as part of the Phase 2 filling but with sideslopes of 5H:1V or flatter along the east side of the filled area.

The models estimate up to about 1.5 feet, 7.5 feet, and 9 feet of total settlement following Phase 1 filling, Phase 2 filling, and final site grading, respectively. Based on the limited number of explorations that extend below a depth of about 120 feet, zones of sandier and/or stiffer silt soils may be present below this depth. If these sandier or stiffer soils are consistently located below 120 feet across the deeper portions of the site, our models indicate the settlement estimates provided above would be reduced by about 2 feet for the Phase 2 filling and final site grading, respectively.

As previously mentioned, the depth to basalt increases from west to east across the lagoon. For the northern portion of the lagoon, basalt was encountered at elevations ranging from about elevation 3.5 feet to elevation 11 feet for the western approximately two-thirds of the lagoon. East of the east levee, towards the north end of the lagoon, geophysical testing indicates basalt may be encountered at elevations on the order of elevation -350 feet. This significant elevation change was observed over a horizontal distance of about 500 feet. Explorations completed between these areas were drilled to elevations of about -104 feet to -109.5 feet and did not encounter basalt. For preliminary design, we recommend assuming the basalt depth may drop nearly vertical within the northeast portion of the existing lagoon. Since negligible settlements are estimated in portions of the lagoon where fill is placed directly on basalt, we estimate differential settlements may approach the total settlement estimates discussed above for all three models.

For the Phase II geotechnical investigation, additional borings and CPTs should be completed in the eastern portion of the lagoon, with particular emphasis on the northeastern portion of the lagoon to evaluate the depth to basalt and identify potential sandier layers that would allow additional drainage paths to increase the time rate of

consolidation of the soils. Time rates of settlement estimates and a settlement monitoring program will be evaluated as part of the Phase II geotechnical investigation following completion of additional explorations within the lagoon.

A Geosynthetic Clay Liner (GCL) and a 60-mil HDPE, or linear low-density polyethylene geomembrane liner, are planned along the bottom of the lagoon at about elevation 10 feet. In addition, a geotube cutoff berm is proposed in an east-west direction across the bottom of the lagoon, separating the northern and southern portions of the lagoon. The total settlements and differential settlements discussed above are applicable to these planned improvements. As part of the Phase II geotechnical investigation, differential and total settlement tolerances for these improvements will require further evaluation. However, we anticipate these settlement estimates will be excessive for these improvements, and additional measures such as a surcharge program or ground improvement within the lagoon could be required to reduce these settlements. A surcharge program and ground improvement design will be evaluated as part of the Phase II geotechnical investigation to reduce these differential settlements.

5.6 Groundwater Management

A Geosynthetic Clay Liner (GCL) and a 60-mil HDPE, or linear low-density polyethylene geomembrane liner, are planned along the bottom of the lagoon at about elevation 10 feet. The ordinary high water (OHW) for the project site was not available at the time of this report. Based on information provided by MFA, the 100-year flood elevation for the site ranges from about elevation 23.3 feet to elevation 24.7 feet. We anticipate groundwater closely reflects water levels in the nearby Columbia River and Multnomah Channel. We anticipate filling the lagoon with sediment above the 100-year flood elevation will take several years to complete. Based on the depth of excavation, the installation of an HDPE liner, and water levels in the nearby Multnomah channel, we anticipate significant risks of floating the HDPE liner when river levels exceed fill levels within the lagoon. Considerations for potentially flooding the lagoon to maintain equivalent groundwater levels on both sides of the lagoon or raising the bottom elevation of the HDPE liner may be required to reduce the risk of floating the liner and should be further analyzed during the Phase II geotechnical investigation. In addition, groundwater levels during geotube construction and dewatering of the soils within the tube will need to be kept below the level of the tubes to allow geotube dewatering.

5.7 Foundation Support

As previously discussed, the site is underlain by a significant thickness of compressible silt soils. In addition, up to 56 feet of potentially uncontrolled fill is planned to be placed on the site. Our experience indicates foundations supported on uncontrolled fill can experience excessive total and differential settlement that can lead to structural distress to

the buildings. Additional geotechnical explorations should be completed to assist in evaluating settlement implications for new buildings that may be part of a future site condition. For preliminary design, we anticipate new buildings will be supported on a deep-foundation system such as steel-pipe piles driven to the basalt or ground improvement consisting of deep soil mixing.

5.8 Workplan for Phase II Geotechnical Investigation

5.8.1 General

We recommend completion of an additional geotechnical field exploration program and engineering analyses to support advancement of the Phase II geotechnical investigation and to inform the appropriate level of seismic mitigation needed for design of the wastewater lagoon repurposing facility. Supplemental subsurface explorations consisting of CPTs and borings are recommended to further characterize the soil properties and subsurface profile. Specifically, we recommend CPT explorations be completed to further delineate the thickness and engineering properties of the silt soils and depth to basalt. In addition to CPT explorations, borings should be completed to obtain relatively undisturbed samples of silt for additional laboratory analysis. A limited suite of cyclic testing of the silty soils was completed for this phase of work. Additional cyclic testing will be an important consideration in estimating the seismic performance of the site. For our Phase II Geotechnical Investigation, we recommend the following field exploration and laboratory testing programs.

5.8.2 Recommended Phase II Subsurface Explorations

We recommend subsurface materials and conditions for the Phase II geotechnical site investigation be evaluated with eight mud-rotary borings and 11 CPT probes. We recommend three of the borings and five of the CPT probes be completed in the eastern portion of the lagoon to evaluate the depth to basalt and engineering properties of the soils above the basalt. These explorations will require the use of a barge for completion. We recommend three of the borings and three of the CPT probes be completed near the toe of the eastern side of the levee and one boring be completed on the south side of the levee on the south side of the lagoon. Finally, we recommend the completion of three CPT probes and one boring about halfway between the existing railroad tracks and Multnomah Channel. Shear-wave velocity testing should be completed in one of the CPT probes where basalt is anticipated to be encountered at significant depth. The borings and CPT probes should extend to the top of basalt. In the mud-rotary borings, samples should be collected using a standard split-spoon sampler and/or undisturbed Shelby tube sampler at 5-foot intervals of depth up to 100 feet and 10-foot intervals of depth below 100 feet. The borings and CPT probes should be well spaced to provide information on the depth to basalt and subsurface conditions above the basalt.

5.8.3 Recommended Phase II Laboratory Testing

Laboratory tests will be conducted to provide data on the important physical characteristics of the subsoils, which are essential for engineering studies and analyses. The laboratory tests will include standard classification tests, such as natural water content and unit weight determinations, as well as strength and consolidation testing. The latter will provide the qualitative data necessary for the various foundation design studies, such as foundation types and estimated settlements. In addition, we recommend cyclic direct simple shear tests be performed on six additional soil samples to further evaluate static and seismic shear strengths.

5.8.4 Additional Phase II Field Investigation Activities

The bathymetry of the small channel near the northeastern edge of the lagoon should be gathered to facilitate slope stability modeling.

6 LIMITATIONS

This report presents the results of a preliminary Phase I geotechnical investigation of the proposed St. Helens Wastewater Lagoon Repurposing. The information presented herein is preliminary and provides our general conclusions regarding the feasibility of the project with respect to the observed site conditions. This information is intended for planning and preliminary estimation purposes. A more detailed geotechnical investigation, including subsurface explorations, laboratory testing, and engineering analyses, should be completed as part of the Phase II geotechnical investigation in order to further evaluate the appropriate level of seismic mitigation needed to accommodate the lagoon repurposing design.

We have included the Geoprofessional Business Association (GBA) guidance document "Important Information about This Geotechnical-Engineering Report/Geoenvironmental Report" to assist you and others in understanding the use and limitations of this report, included as Appendix I. We recommend you read this document.

Please contact the undersigned if you have any questions about our preliminary design recommendations.

Submitted for GRI,



Scott M. Schlechter, PE, GE
Principal



Renews 02/2024

George A. Freitag, CEG
Principal



Renews 12/2023

Brian J. Bayne, PE
Associate

This document has been submitted electronically.

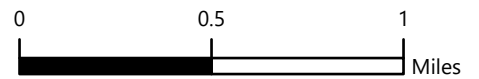
7 REFERENCES

- Burns, W. J., and Watzig, R. J., 2014, Statewide landslide information database for Oregon, release 3.4 (SLIDO-3.4): Oregon Department of Geology and Mineral Industries.
- Bruce, M.C., Berg, R.R., Collin, J. G., Filz, G. M., Terashi, M., and Yang, D.S, October 2013, Federal Highway Administration Design Manual: Deep Mixing for Embankment and Foundation Support, Federal Highway Administration, FHWA-HRT-13-046.
- Darendeli, M., 2001, Development of a New Family of Normalized Modulus Reduction and Material Damping Curves, University of Texas at Austin, PhD dissertation.
- Electric Power Research Institute (EPRI), 1993, Guidelines for site-specific ground motions, Palo Alto, California, TR-102293.
- Evarts, R. C., 2004, Geologic Map of the St Helens Quadrangle, Columbia County, Oregon and Cowlitz and Clark Counties, Washington. USGS Scientific Investigations Map 2834, scale: 1:24,000.
- Groholski, D. R., Hashash, Y. M. A., Musgrove, M., Harmon, J., and Kim, B., 2015, Evaluation of 1-D non-linear site response analysis using a general quadratic/hyperbolic strength-controlled constitutive model, 6ICEGE: 6th International Conf. on Earthquake Geotechnical Engineering, Christchurch, New Zealand.
- Hashash, Y. M. A., Musgrove, M.I., Harmon, J.A., Groholski, D.R., Phillips, C.A., and Park, D., 2016, DEEPSOIL 6.1, User Manual, p. 125.
- Idriss, I.M., and Boulanger, R.W., 2008, Soil liquefaction during earthquakes: Earthquake Engineering Research Institute (EERI), MNO-12 p. 226
- Kondner, R. L., and Zelasko, J. S., 1963, Hyperbolic stress-strain formulation of sands, Second pan American Conference on Soil Mechanics and Foundation Engineering, Sao Paulo, Brazil, pp. 289-324.
- Masing, G., 1926, Eigenspannungen and verfertigung beim messing, Proc., 2nd Int. Congress on Applied Mech., Zurich, Switzerland.
- Newmark, N.M., 1965, Effects of earthquakes on dams and embankments, in Geotechnique 15, 139-159.
- Phillips, C., and Hashash, Y. M. A., 2009, Damping formulation for non-linear 1D site response analyses: Soil Dynamics and Earthquake Engineering 29(7), pp. 1,143-1,158.

- Pyke, R., 1979, Nonlinear soil model for irregular cyclic loadings: J. Geotech. Eng. Div. 105, pp. 715-726.
- U.S. Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed 9/30/2019, from USGS web site: <http://earthquake.usgs.gov/hazards/qfaults/>.
- Vucetic, M., 1990, Normalized behavior of clay under irregular cyclic loading: Canadian Geotech. J. 27, pp. 29-46.
- Vucetic, M., and Dobry, R., 1991, Effect of soil plasticity on cyclic response: Journal of Geotechnical Engineering, ASCE, vol. 117, no. 1, pp. 89-107.
- Yoshimine, M., Nishizaki, H., Amano, K., and Hosono, Y., 2006, Flow deformation of liquefied sand under constant shear load and its application to analysis of flow slide of infinite slope: Soil Dynamics and Earthquake Engineering, v. 26, no. 2-4, pp. 253-264.

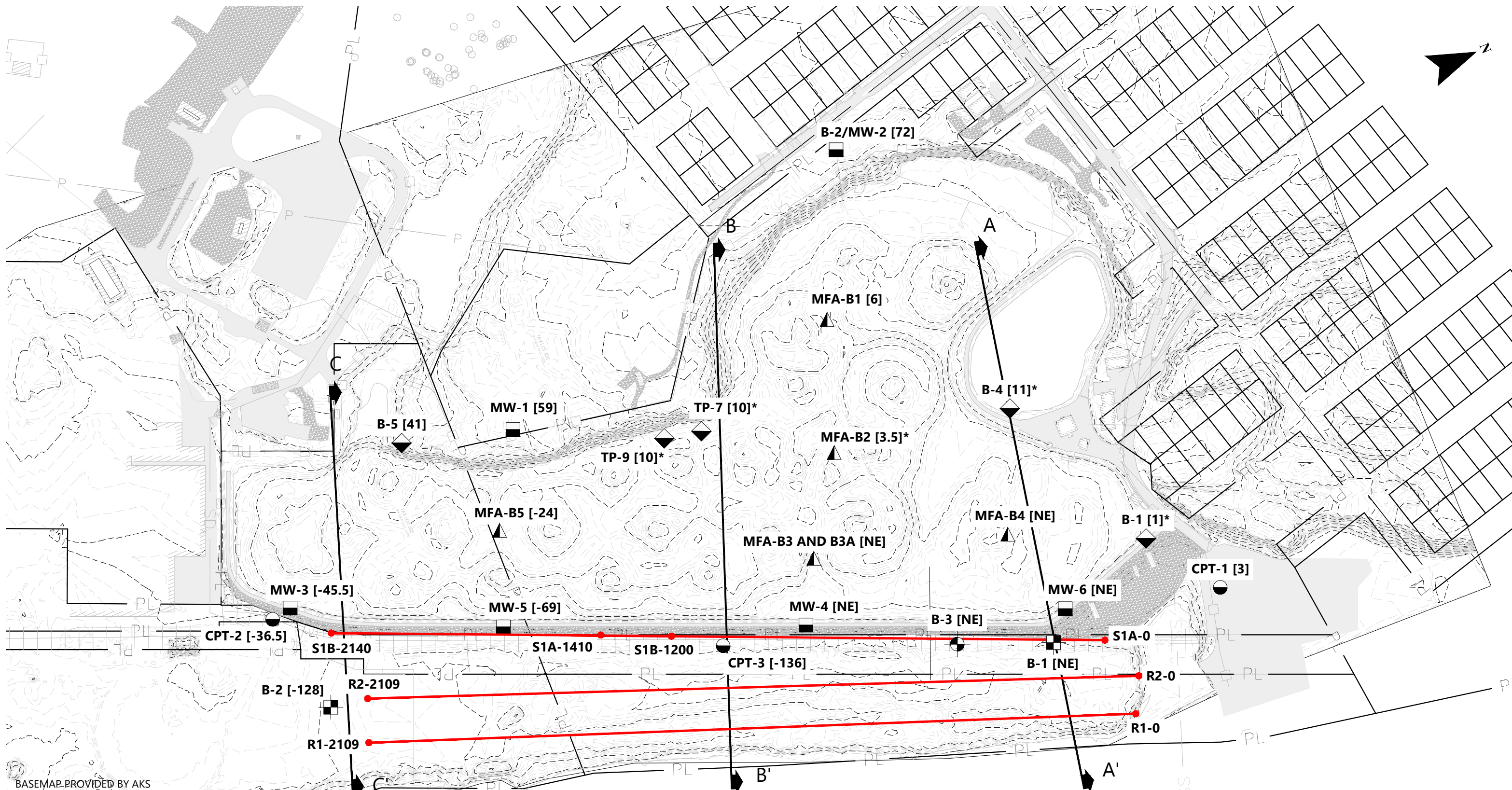


BASEMAP PROVIDED BY ESRI, 2023



GRI MAUL, FOSTER, AND ALONGI
WASTEWATER LAGOON REPURPOSING

VICINITY MAP



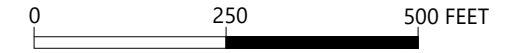
BASEMAP PROVIDED BY AKS

LEGEND:

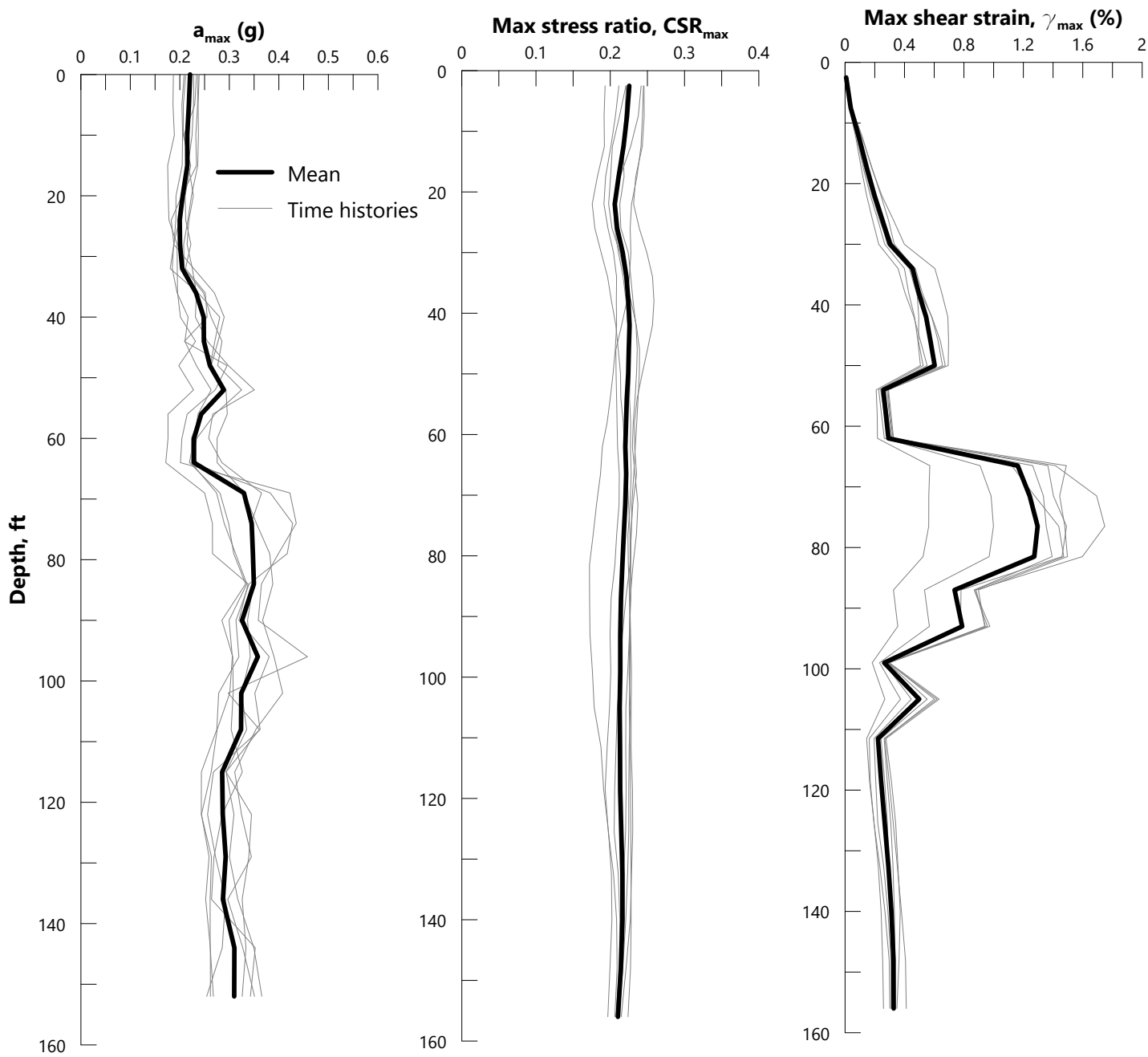
- | | | | | | |
|--|--|--|--|-------------|--|
| | BORING COMPLETED BY GRI
(FEBRUARY 27 - MARCH 2, 2023) | | BORING COMPLETED BY MAUL FOSTER ALONGI
(2023) | | CROSS SECTIONS |
| | BORING COMPLETED BY GRI
(JULY 29 - AUGUST 2, 2019) | | BORING COMPLETED BY MAUL FOSTER ALONGI
(2019) | | GEOPHYSICAL PROFILE ALIGNMENTS
(MARCH 6, AND MAY 2 AND 3, 2023) |
| | CONE PENETRATION TEST COMPLETED BY GRI
(JULY 30-31, 2019) | | EXPLORATION COMPLETED BY SHANNON & WILSON
(1968-1969) | [B] | BASALT ELEVATION |
| | | | | [NE] | NOT ENCOUNTERED |

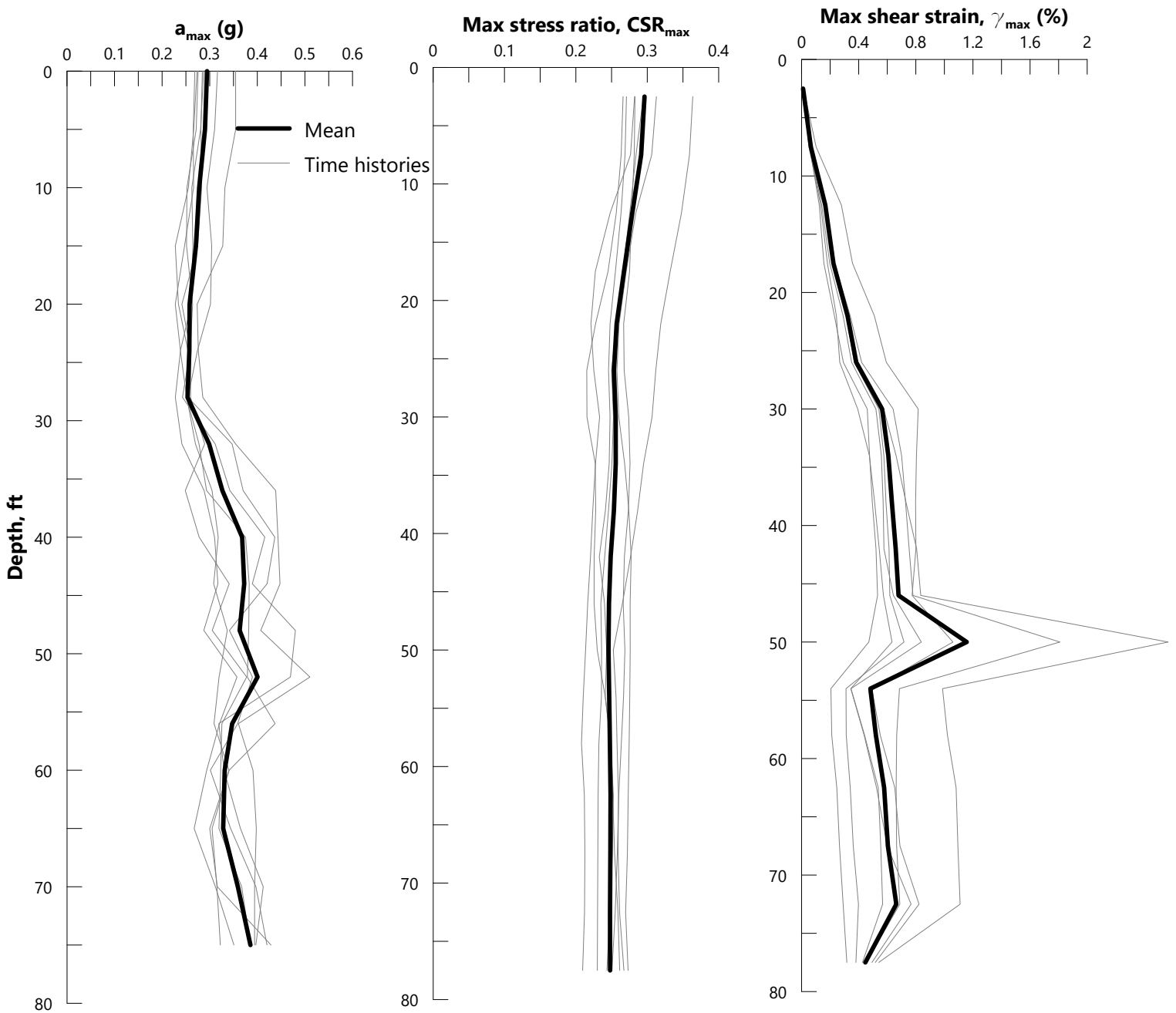
NOTES:

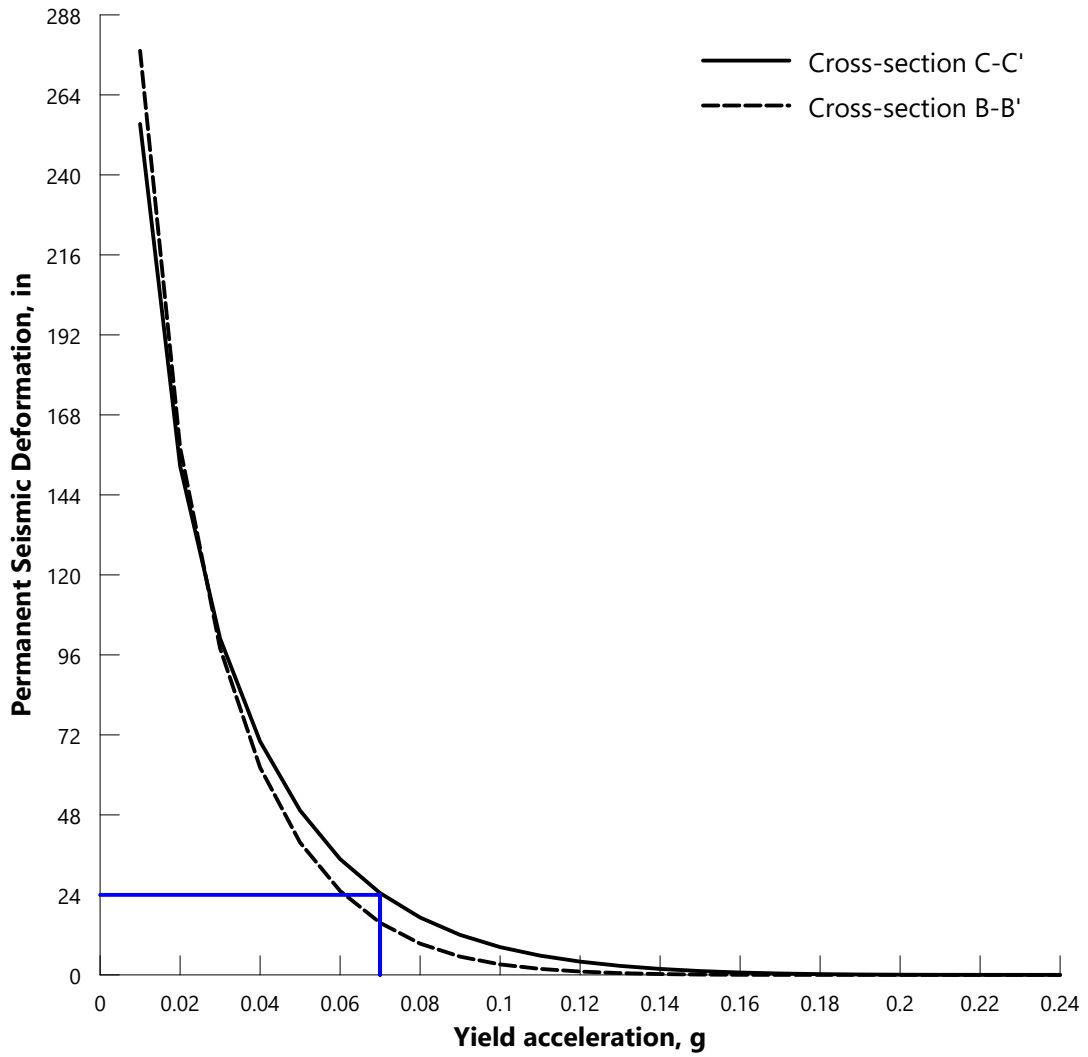
1. VERTICAL DATUM (NAVD 88) WITH EXCEPTION OF [#]* WHICH USES VERTICAL DATUM MEAN SEA LEVEL.



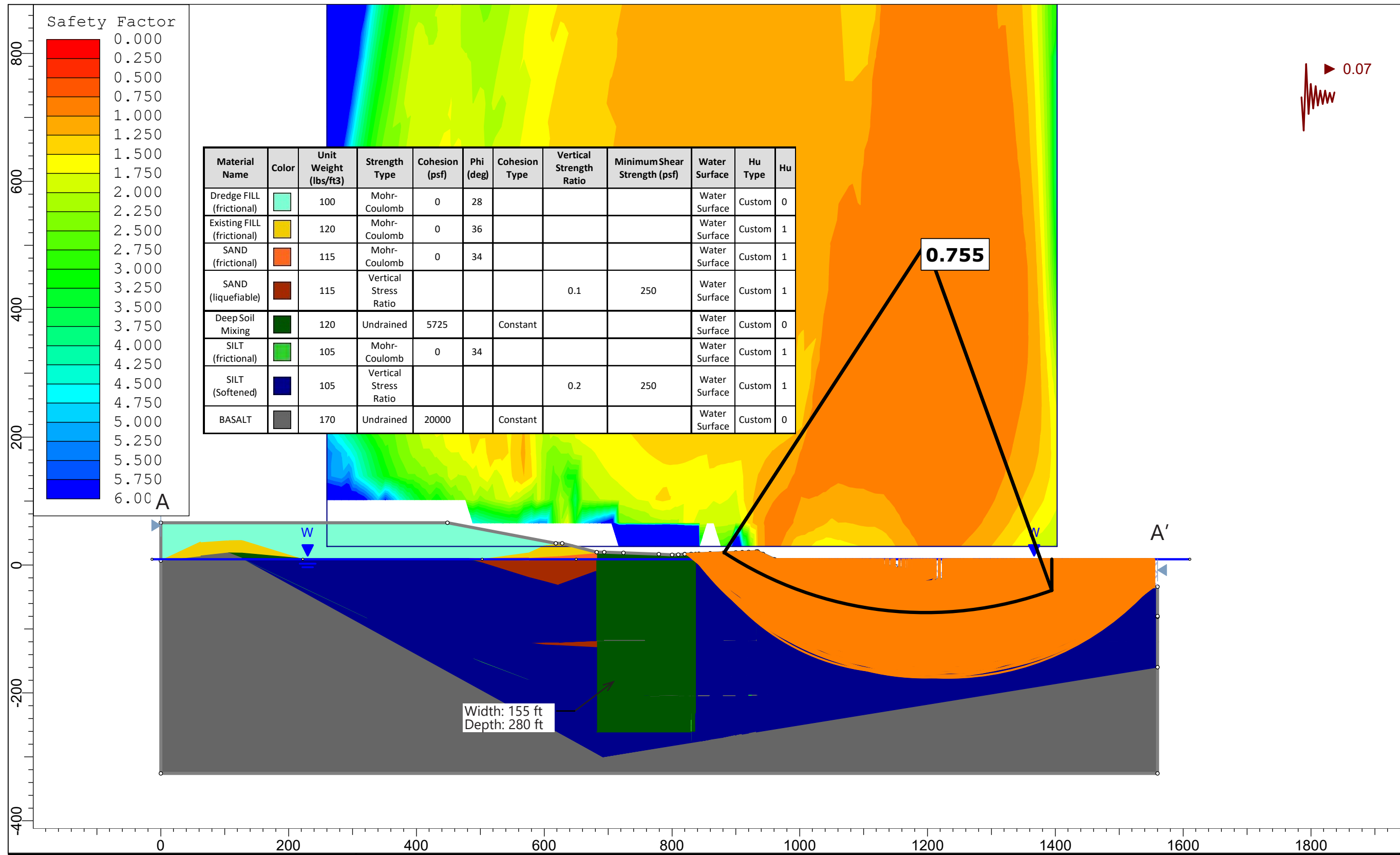
SITE MAP

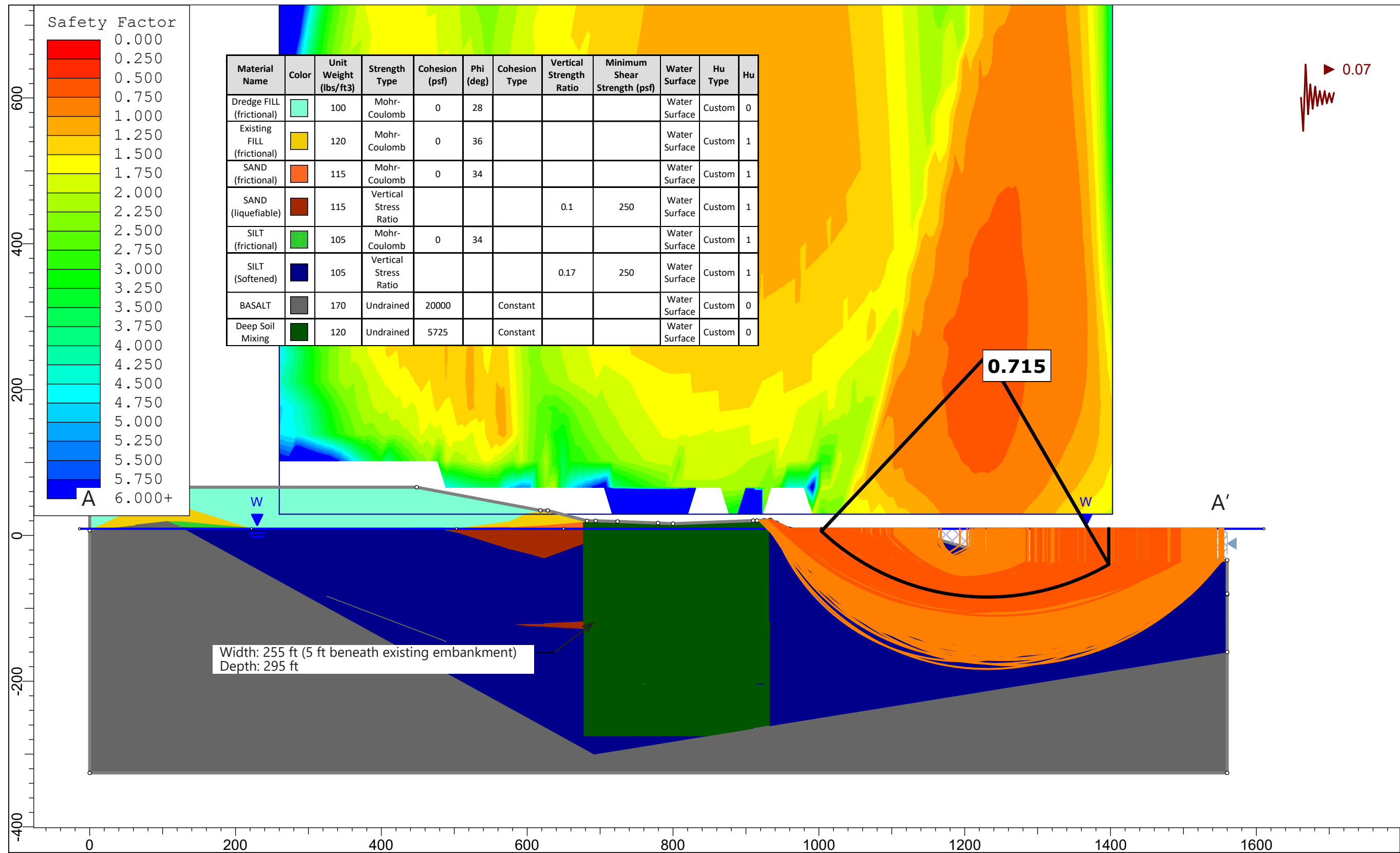






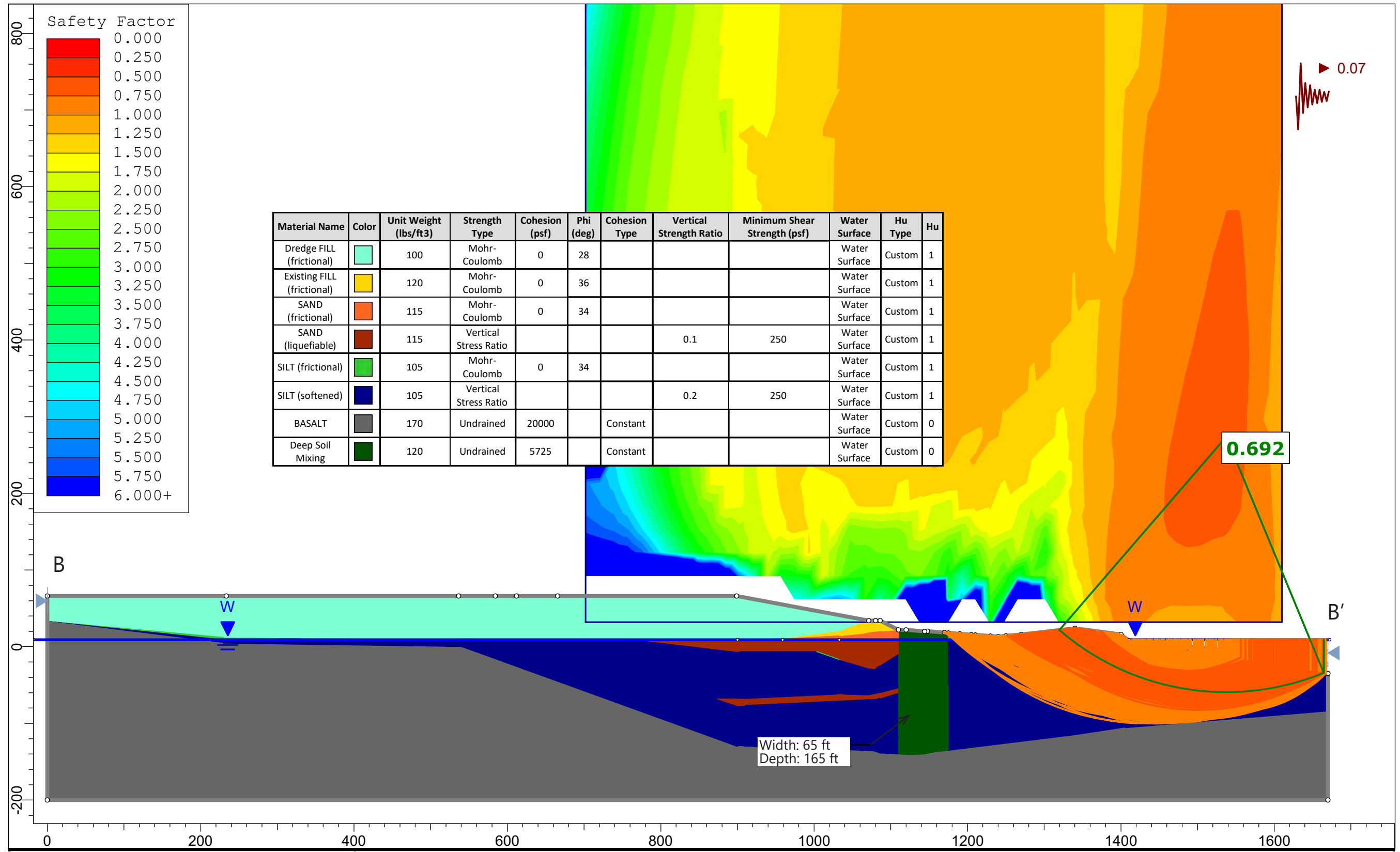
PERMANENT SEISMIC DISPLACEMENT CURVES

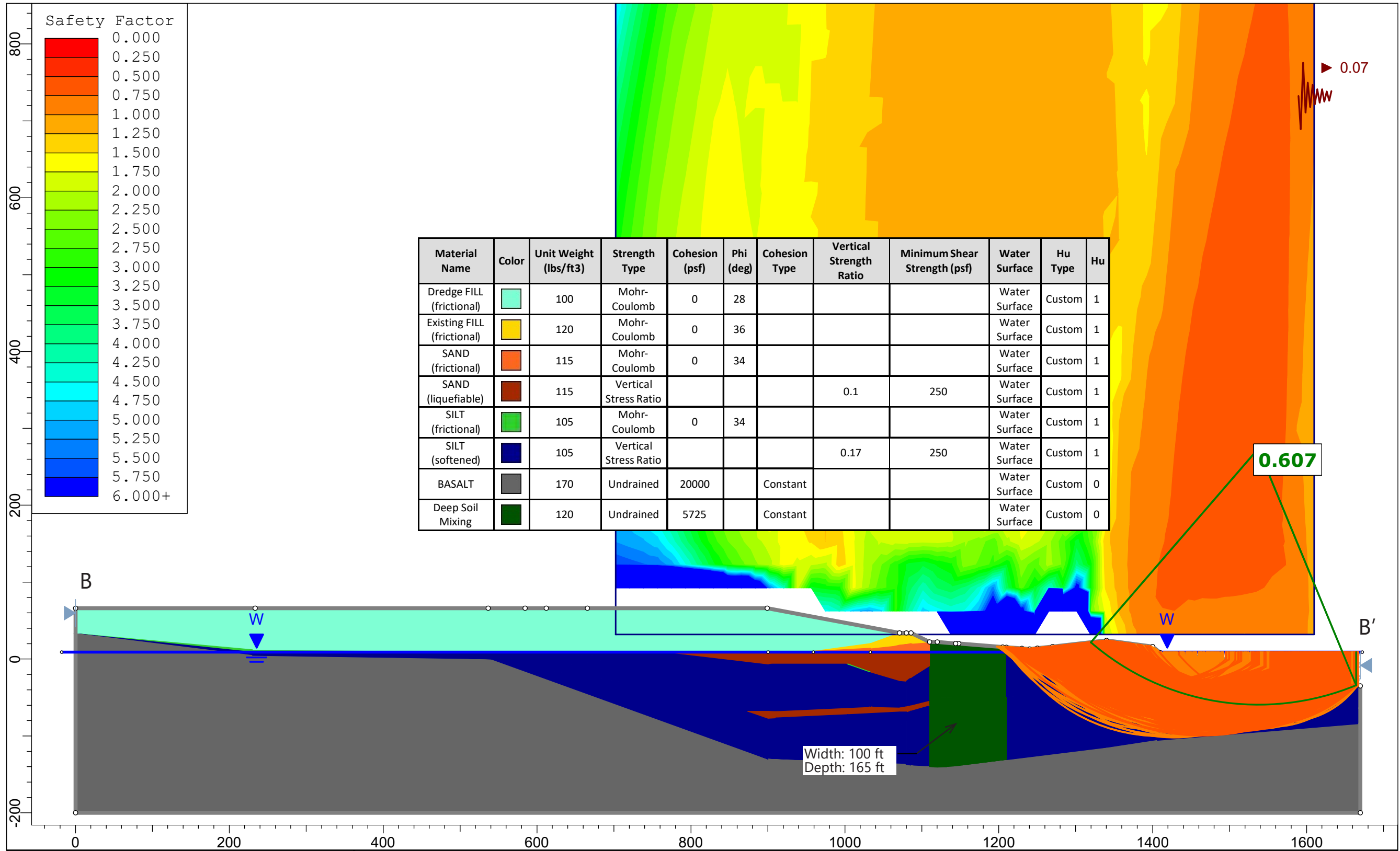




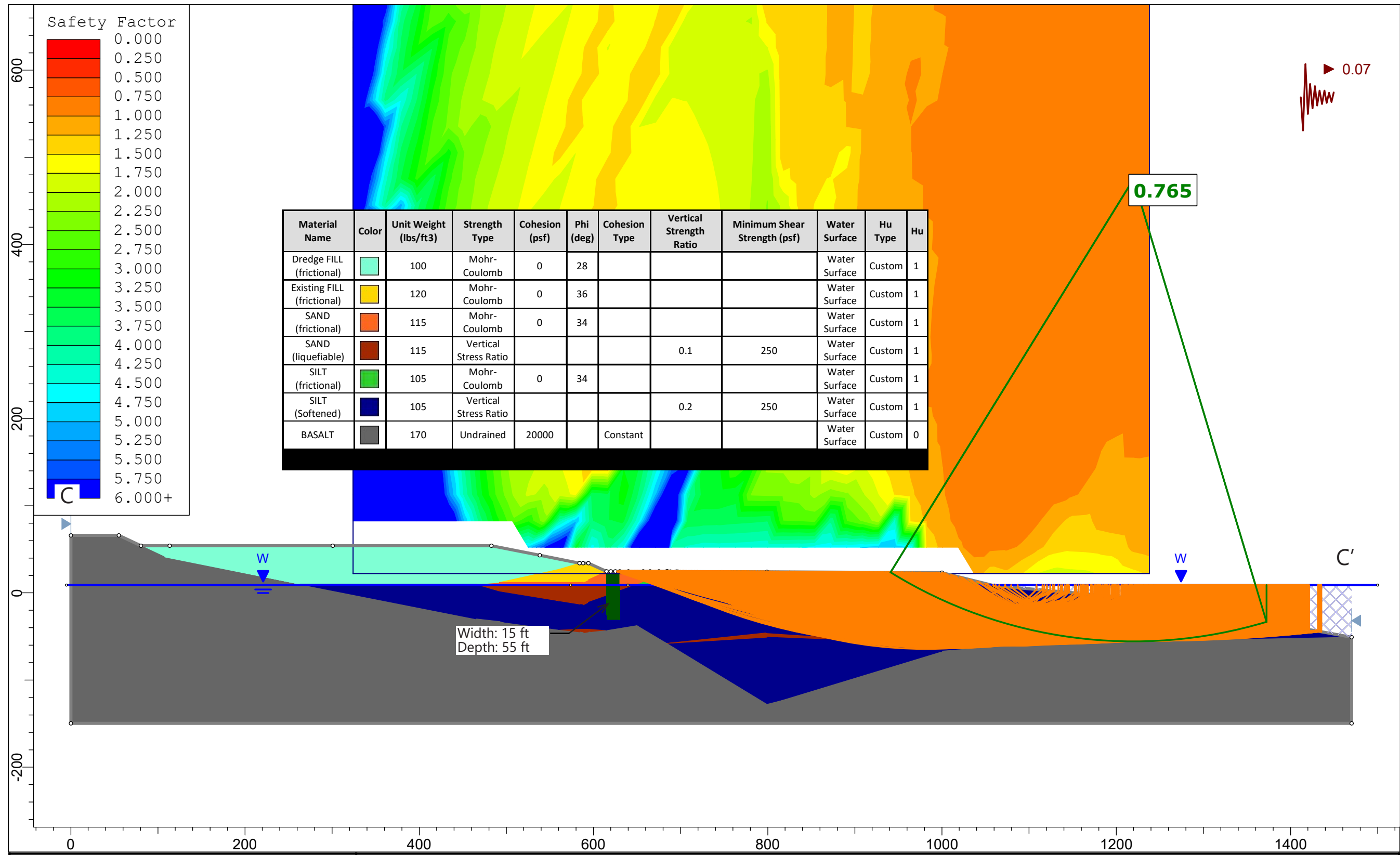
Width: 255 ft (5 ft beneath existing embankment)
Depth: 295 ft

GRI MAUL, FOSTER, AND ALONGI
WASTEWATER LAGOON REPURPOSING
CROSS SECTION A-A'
(SEISMIC, SOFTENED UNDRAINED
SHEAR STRENGTH)

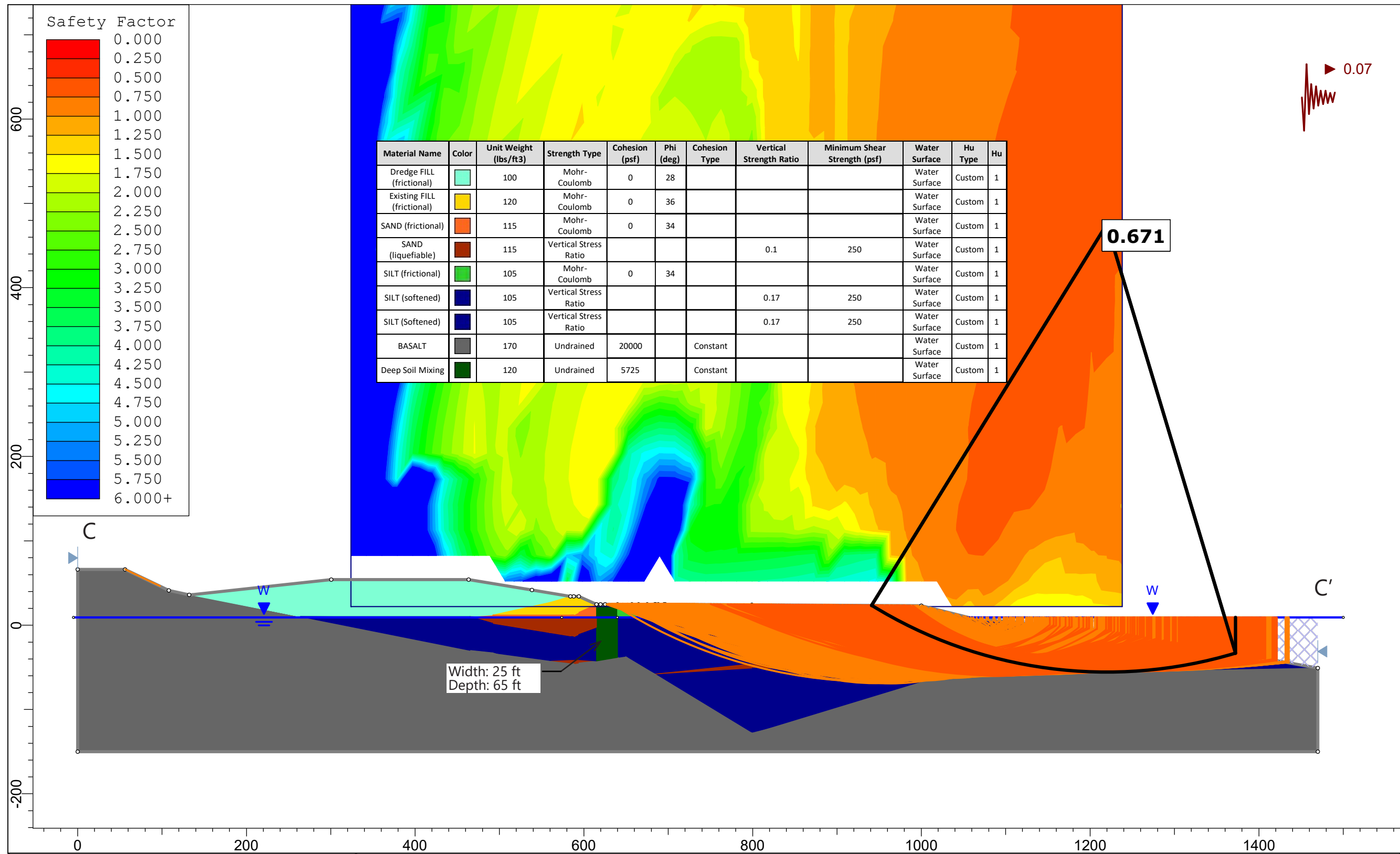




GRI MAUL, FOSTER, AND ALONGI
WASTEWATER LAGOON REPURPOSING
CROSS SECTION B-B'
(SEISMIC, SOFTENED UNDRAINED
SHEAR STRENGTH)



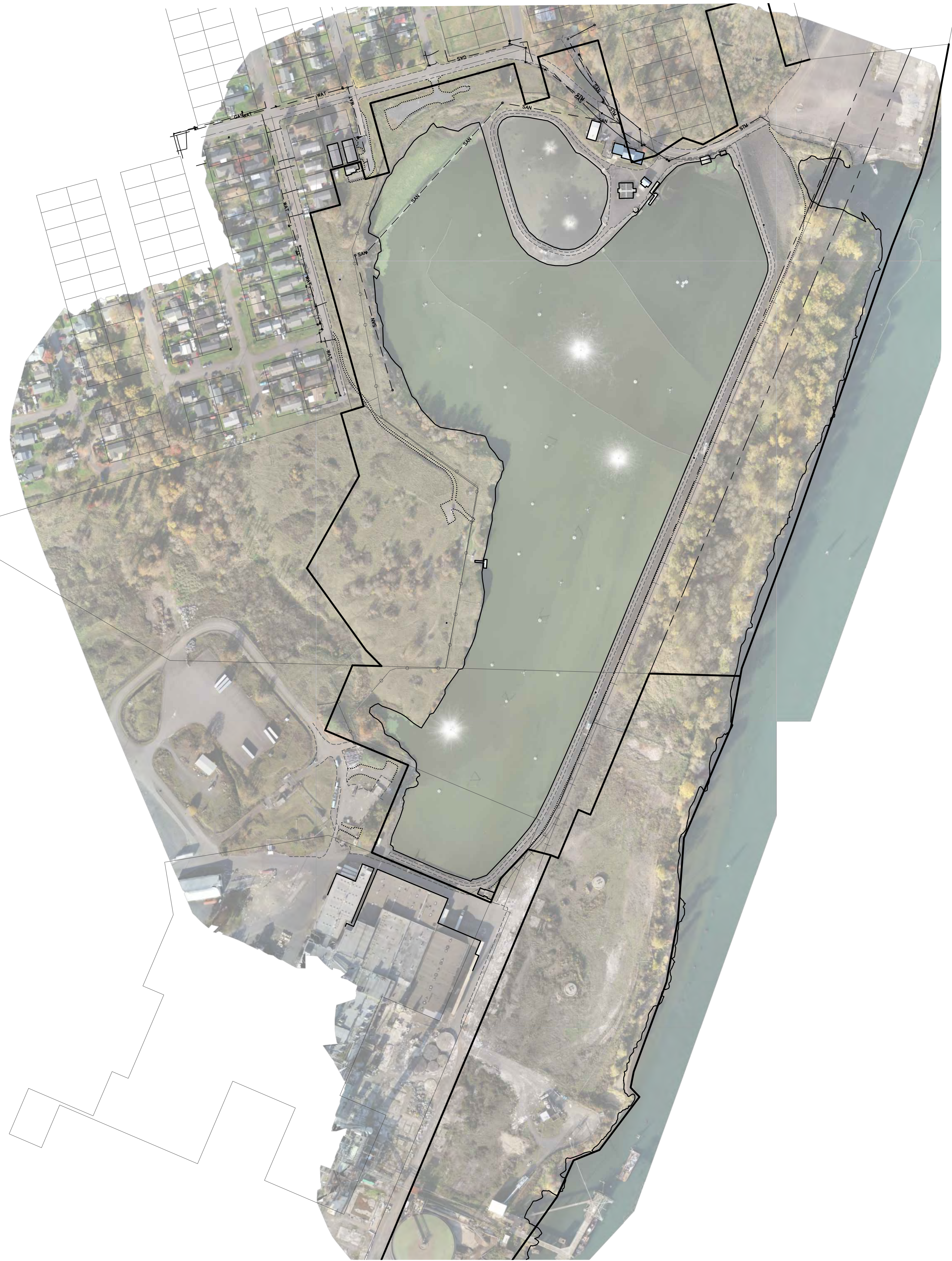
GRI MAUL, FOSTER, AND ALONGI
 WASTEWATER LAGOON REPURPOSING
CROSS SECTION C-C'
 (SEISMIC, PARTIALLY SOFTENED
 UNDRAINED SHEAR STRENGTH)



GRI MAUL, FOSTER, AND ALONGI
WASTEWATER LAGOON REPURPOSING
CROSS SECTION C-C'
(SEISMIC, SOFTENED UNDRAINED
SHEAR STRENGTH)

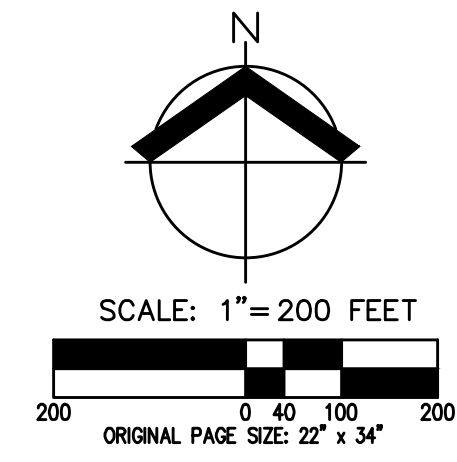
APPENDIX A

Existing Conditions Survey (AKS Engineering and Forestry, 2019)



NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBER 19311213. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
2. FIELD WORK WAS CONDUCTED NOVEMBER 2019.
3. VERTICAL DATUM: ELEVATIONS ARE BASED ON NGS BENCHMARK NO. RD4218, LOCATED AT THE NW CORNER OF THE LAGOON. ELEVATION = 78.3 FEET (NAVD 88).
4. THIS IS NOT A BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY. BOUNDARIES ARE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION. THE BOUNDARY SHOWN HEREON IS PARTIALLY BASED ON GIS DATA FROM THE CITY OF ST. HELENS WEBSITE AND SHOULD BE USED FOR VISUAL PURPOSES ONLY.
5. CONTOUR INTERVAL IS 1 FOOT.
6. BATHYMETRIC INFORMATION WAS PROVIDED BY MAUL FOSTER & ALONG, INC. AND COMBINED WITH LIDAR DATA FROM THE STATE OF OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES WEBSITE.
4. HORIZONTAL DATUM: A LOCAL DATUM PLANE DERIVED FROM STATE PLANE OREGON NORTH 3601 NAD83(2011)EPOCH:2010.0000 BY MULTIPLYING BY A PROJECT MEAN GROUND COMBINED SCALE FACTOR OF 1.0000328962 AT A CENTRAL PROJECT POINT WITH INTERNATIONAL FOOT STATE PLANE GRID COORDINATES NB05128.443, E7614876.336 AND A MERIDIAN CONVERGENCE ANGLE OF -1'38"04". STATE PLANE COORDINATES WERE DERIVED FROM GPS OBSERVATIONS USING THE ORGN NETWORK. DISTANCES SHOWN ARE INTERNATIONAL FOOT GROUND VALUES.

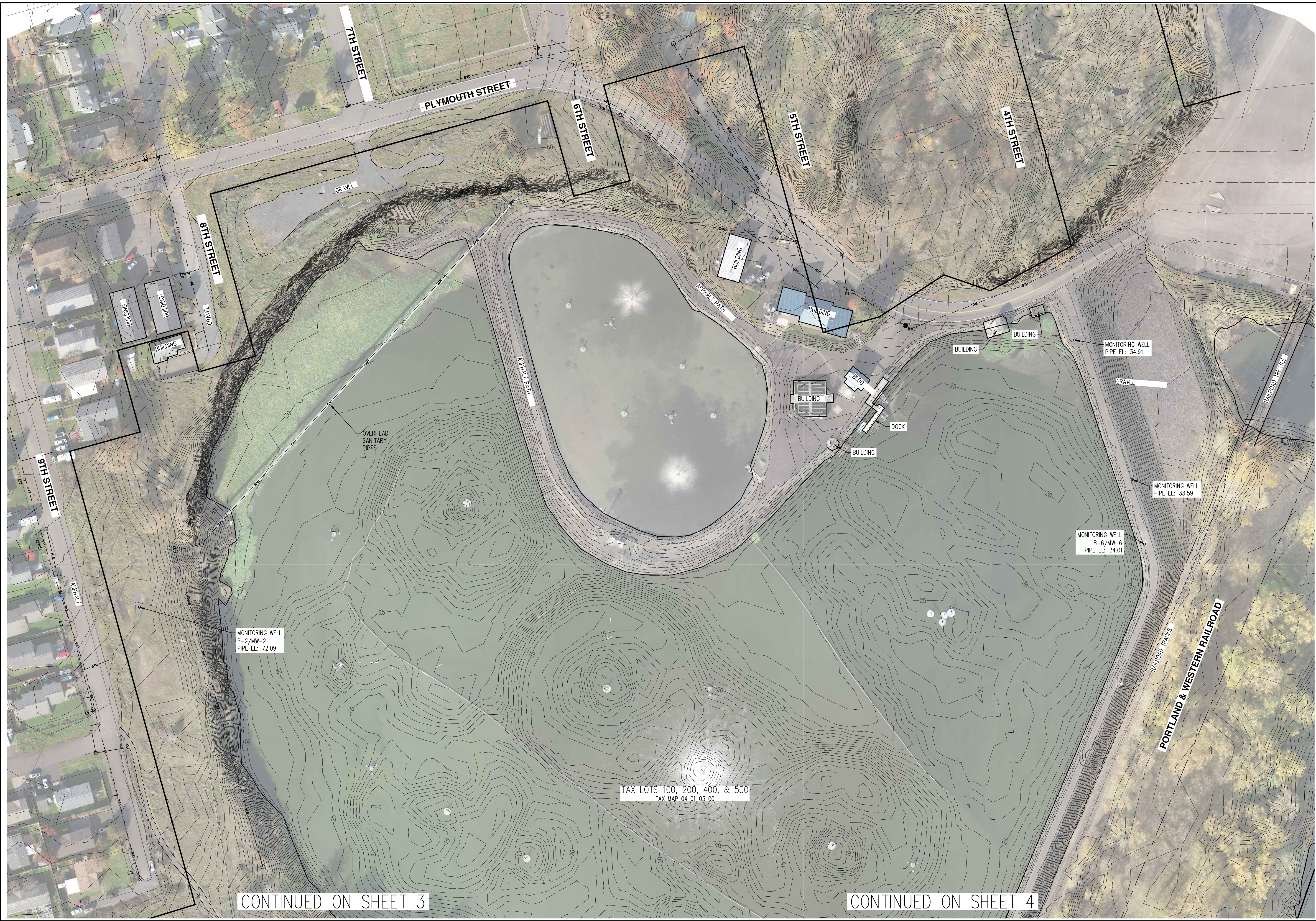


DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED
 PROFESSIONAL
 LAND SURVEYOR

 OREGON
 JANUARY 9, 2007
 NICK WHITE
 7065215
 RENEWS: 6/30/20

REVISIONS
 JOB NUMBER
7835
 SHEET
1 OF 11

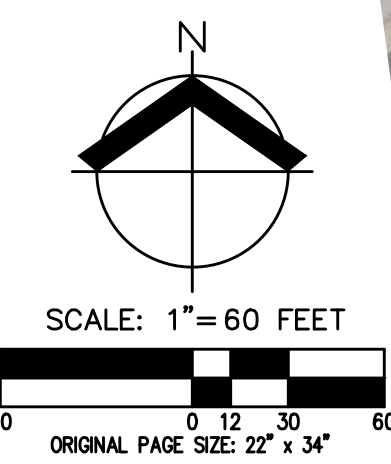


CONTINUED ON SHEET 3

CONTINUED ON SHEET 4

TAX LOTS 100, 200, 400, & 500
TAX MAP 04 01 03 00

AKS DRAWING FILE: 78355ACONDING | LAYOUT | SHEET 3



CONTINUED ON SHEET 2

CONTINUED ON SHEET 4



CONTINUED ON SHEET 5

AKS
 AKS ENGINEERING & FORESTRY, LLC
 1385 SW HELEN ST., SUITE 100
 TULSA, OK 74106
 505.563.6151
 WWW.AKS-ENG.COM

ENGINEERING - SURVEYING - NATURAL RESOURCES
 FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

ST HELENS LAGOON
 CITY OF ST HELENS OREGON
 TAX MAP 4N1W300
 TAX LOT 200

**EXISTING CONDITIONS
 AERIAL PLAN**

DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED
 PROFESSIONAL
 LAND SURVEYOR
Nick White
 OREGON
 JANUARY 9, 2007
 NICK WHITE
 7065215
 RENEWS: 6/30/20

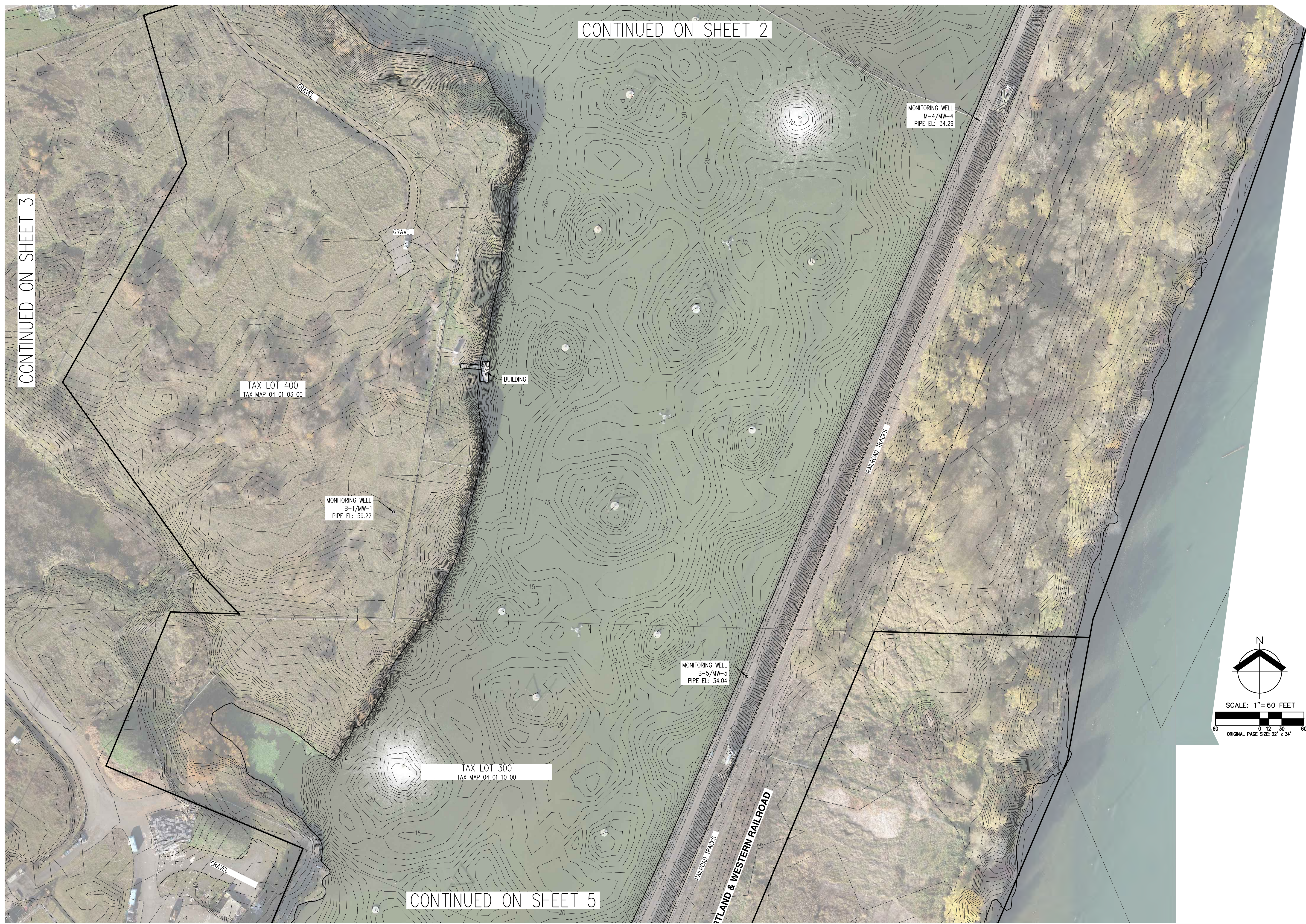
REVISIONS

JOB NUMBER
 7835

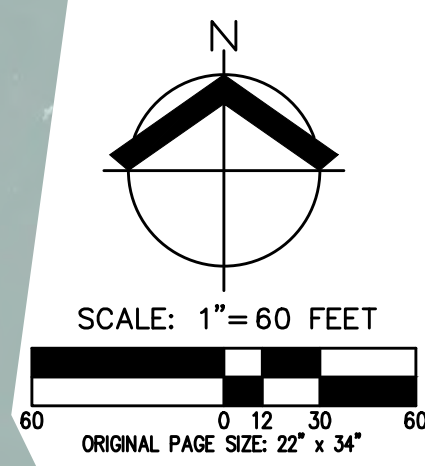
SHEET
3 OF 11

CONTINUED ON SHEET 3

CONTINUED ON SHEET 2



CONTINUED ON SHEET 5



**EXISTING CONDITIONS
 AERIAL PLAN**

DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED
 PROFESSIONAL
 LAND SURVEYOR
Nick White
 OREGON
 JANUARY 9, 2007
 NICK WHITE
 7065219
 RENEWS: 6/30/20

REVISIONS

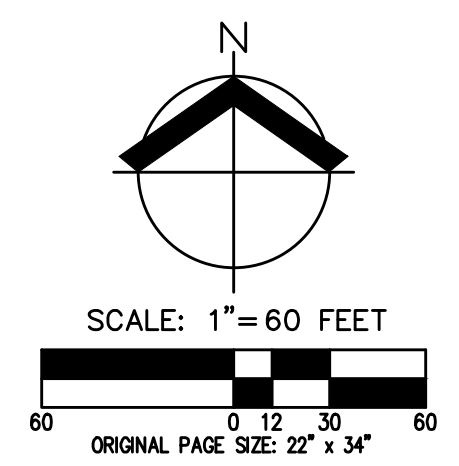
JOB NUMBER
7835

SHEET
4 OF 11



CONTINUED ON SHEET 4

CONTINUED ON SHEET 6



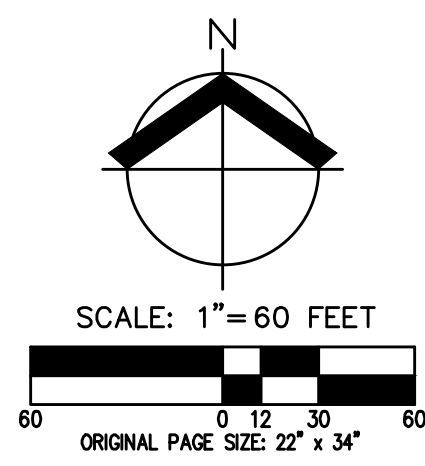
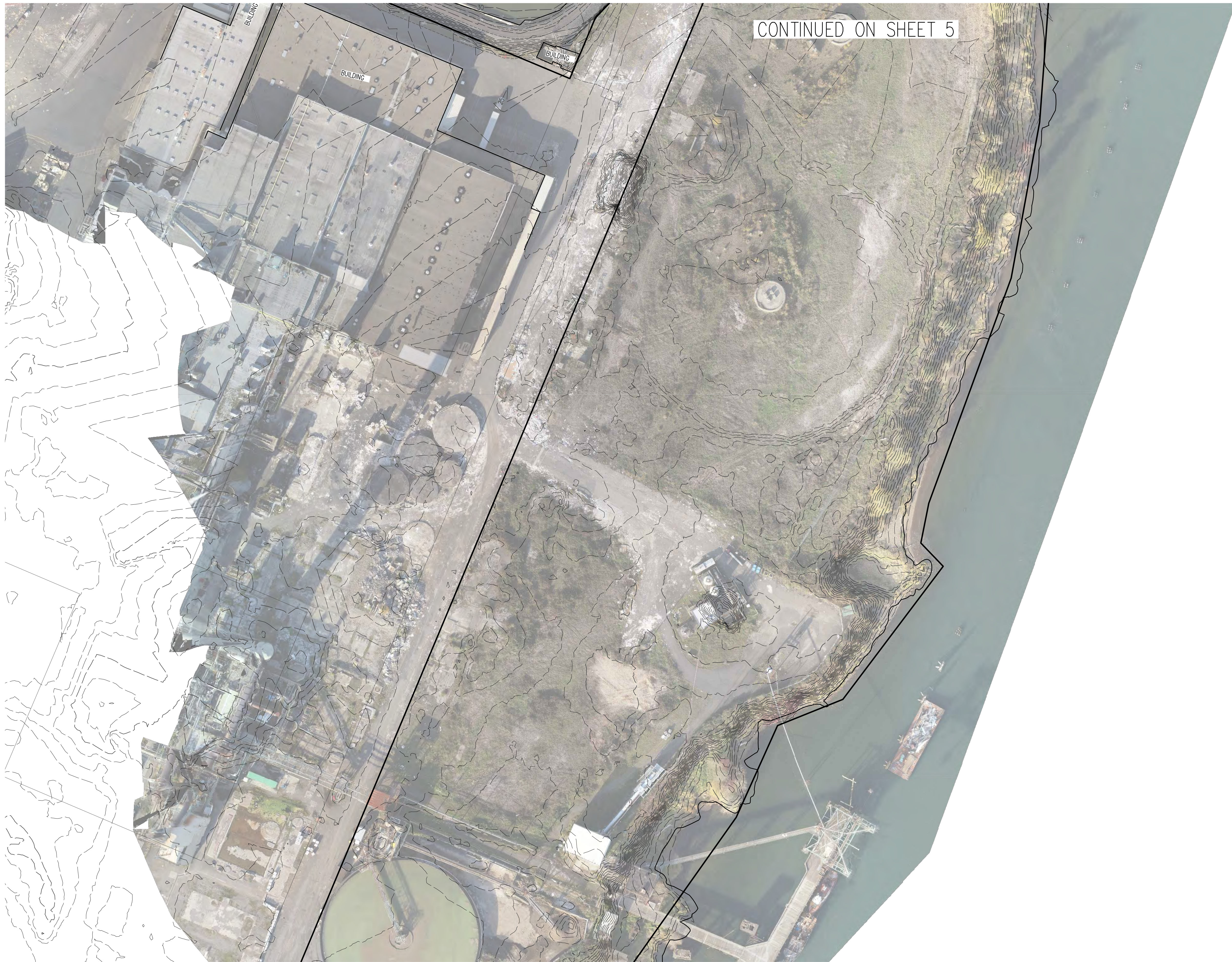
**EXISTING CONDITIONS
 AERIAL PLAN**

DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED
 PROFESSIONAL
 LAND SURVEYOR

Nick White
 OREGON
 JANUARY 9, 2007
 NICK WHITE
 7065219
 RENEWS: 6/30/20

CONTINUED ON SHEET 5



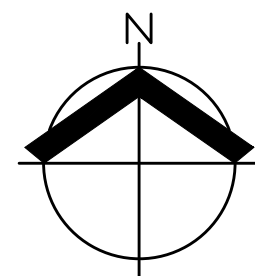
DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED PROFESSIONAL LAND SURVEYOR
Nick White
 OREGON
 JANUARY 9, 2007
 NICK WHITE
 70652LS
 RENEWS: 6/30/20

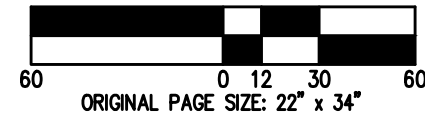
REVISIONS

JOB NUMBER
7835

SHEET
6 OF 11



SCALE: 1"=60 FEET



ORIGINAL PAGE SIZE: 22" x 34"



CONTINUED ON SHEET 8

CONTINUED ON SHEET 9

TAX LOTS 100, 200, 400, & 500
TAX MAP 04 01 03 00

AKS
AKS ENGINEERING & FORESTRY, LLC
1985 SW 10th Ave, Ste 100
Tualatin, OR 97062
503.663.6191
WWW.AKS-ENG.COM

ST HELENS LAGOON
CITY OF ST HELENS OREGON
TAX MAP 4N1W00
TAX LOT 200

**EXISTING CONDITIONS
PLAN**

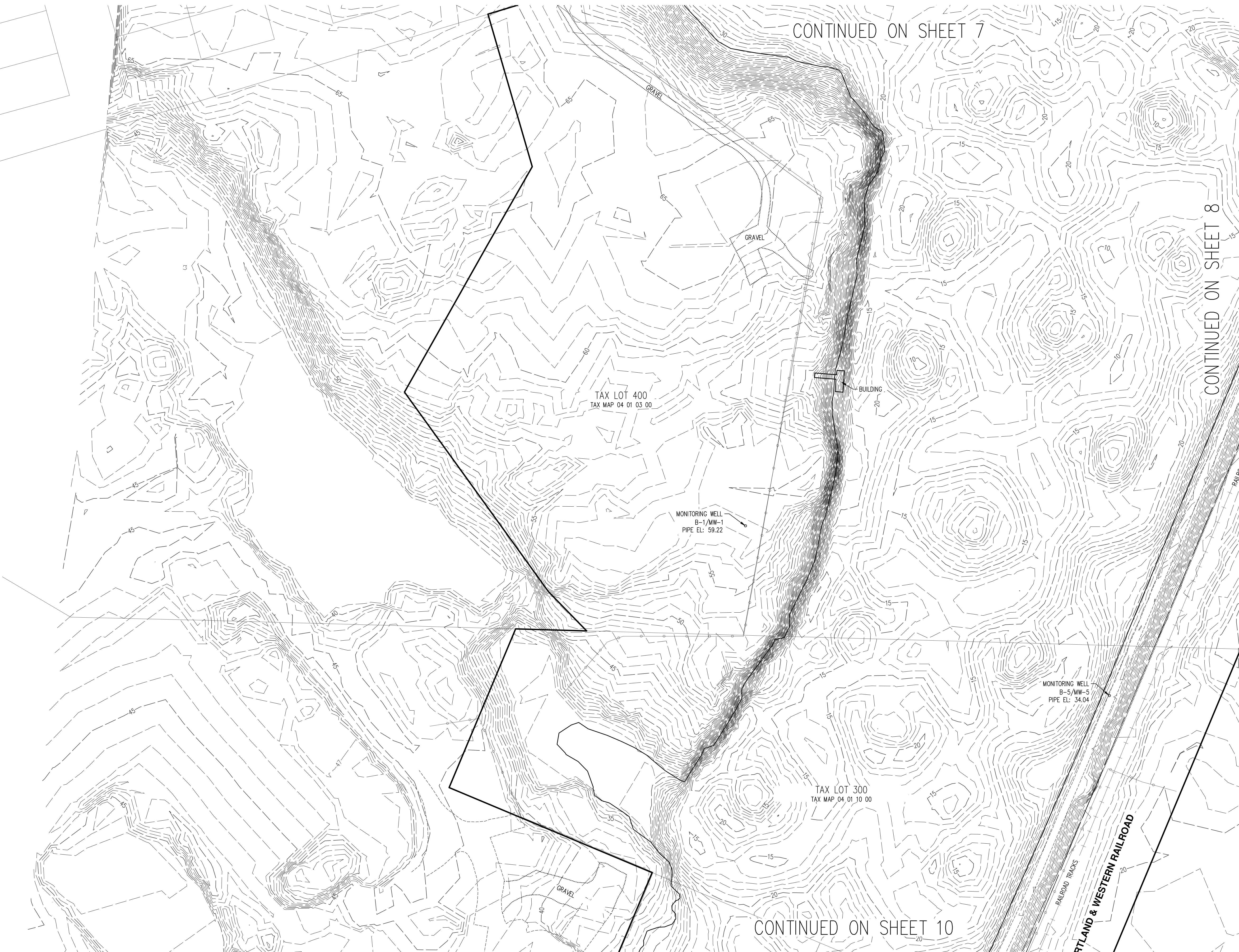
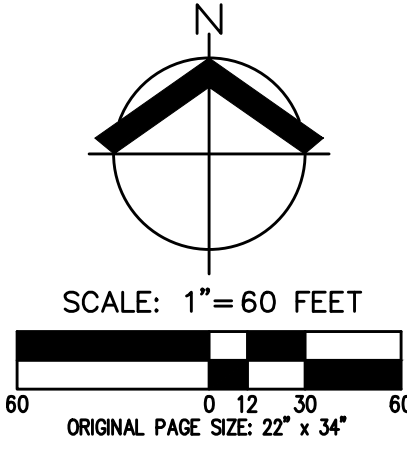
DESIGNED BY:
DRAWN BY: HDS
MANAGED BY: NSW
CHECKED BY: TJA

DATE: 12/09/2019
REGISTERED PROFESSIONAL LAND SURVEYOR
Nick White
OREGON
JANUARY 9, 2007
NICK WHITE
70652LS
RENEWS: 6/30/20

REVISIONS:
JOB NUMBER
7835
SHEET
7 OF 11

AKS DRAWING FILE: 7835EXCONDING | LAYOUT: SHEET 7

AKS DRAWING FILE: 7835EXCONDING | LAYOUT: SHEET 8



CONTINUED ON SHEET 7

CONTINUED ON SHEET 8

CONTINUED ON SHEET 10

AKS
 AKS ENGINEERING & FORESTRY, LLC
 1385 NW HELENS LAGOON RD, STE 100
 TILLAMOOK, OR 97162
 503.563.6151
 WWW.AKS-ENG.COM

ST HELENS LAGOON
CITY OF ST HELENS OREGON
 TAX MAP 4N1W30
 TAX LOT 200

EXISTING CONDITIONS PLAN

DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED PROFESSIONAL LAND SURVEYOR

 OREGON
 JANUARY 9, 2007
 NICK WHITE
 70652LS
 RENEWS: 6/30/20

REVISIONS

JOB NUMBER
7835

SHEET
8 OF 11

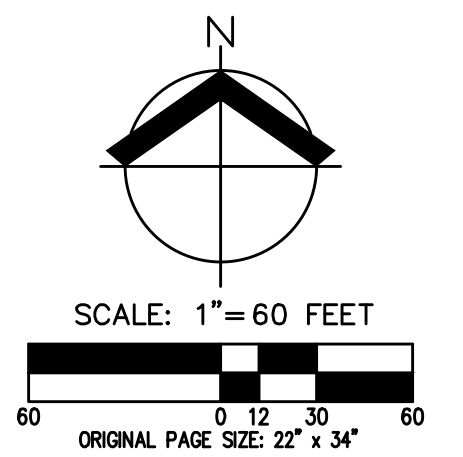
CONTINUED ON SHEET 8

CONTINUED ON SHEET 7



CONTINUED ON SHEET 10

EXISTING CONDITIONS PLAN



DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED PROFESSIONAL LAND SURVEYOR
Nick White
 OREGON
 JANUARY 9, 2007
 NICK WHITE
 70652LS
 RENEWS: 6/30/20

REVISIONS

JOB NUMBER 7835

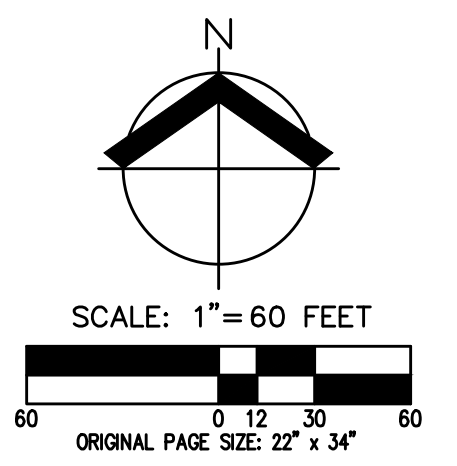
SHEET 9 OF 11

AKS DRAWING FILE: 78355COND.DWG | LAYOUT: SHEET 10



CONTINUED ON SHEET 9


CONTINUED ON SHEET 11



AKS
 AKS ENGINEERING & FORESTRY, LLC
 13952 NW HELENS LAGOON RD, STE 100
 TILLAMOOK, OR 97162
 503.563.6151
 WWW.AKS-ENG.COM

ST HELENS LAGOON
CITY OF ST HELENS OREGON
 TAX LOT 200

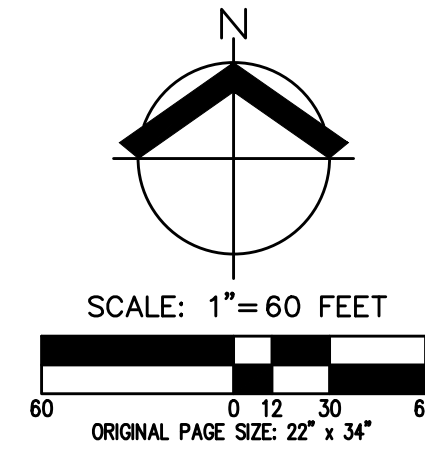
**EXISTING CONDITIONS
 PLAN**

DESIGNED BY:	
DRAWN BY:	HDS
MANAGED BY:	NSW
CHECKED BY:	TJA
DATE:	12/09/2019
REGISTERED PROFESSIONAL LAND SURVEYOR  OREGON JANUARY 9, 2007 NICK WHITE 70652LS RENEWS: 6/30/20	
REVISIONS	
JOB NUMBER	7835
SHEET	10 OF 11

AKS DRAWING FILE: 7835EXCOND.DWG | LAYOUT: SHEET 11



CONTINUED ON SHEET 10



AKS
 AKS ENGINEERING & FORESTRY, LLC
 1395 SW HELENS LAGOON RD, STE 100
 TULASTON, OR 97062
 503.563.6151
 WWW.AKS-ENG.COM

ENGINEERING - SURVEYING - NATURAL RESOURCES
 FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

ST HELENS LAGOON
CITY OF ST HELENS OREGON
 TAX LOT 200

**EXISTING CONDITIONS
 PLAN**

DESIGNED BY:
 DRAWN BY: HDS
 MANAGED BY: NSW
 CHECKED BY: TJA
 DATE: 12/09/2019

REGISTERED
 PROFESSIONAL
 LAND SURVEYOR

Nick White
 OREGON
 JANUARY 9, 2007
 NICK WHITE
 7065219
 RENEWS: 6/30/20

REVISIONS

JOB NUMBER
7835

SHEET
11 OF 11

APPENDIX B

Field Explorations and Laboratory Testing

APPENDIX B

FIELD EXPLORATIONS AND LABORATORY TESTING

B.1 FIELD EXPLORATIONS

B.1.1 General

Subsurface materials and conditions at the site were investigated by GRI during two separate mobilizations. During the initial mobilization between July 29 and August 2, 2019, two mud-rotary borings, designated B-1 and B-2, and three cone penetration test (CPT) probes, designated CPT-1 through CPT-3, were completed. During the second mobilization between February 27 and March 2, 2023, one mud-rotary boring, designated B-3, was completed. The locations of the borings and probes are shown on Figure 2. The above fieldwork is discussed in more detail below.

B.1.2 Mud-Rotary Borings

Borings B-1 through B-3 were advanced to depths ranging from about 156.5 feet to 261.5 feet using mud-rotary drilling techniques using a CME 55 HT or CME 850 track-mounted drill rig provided and operated by Western States Soil Conservation, Inc., of Hubbard, Oregon. Disturbed samples were obtained from the borings at about 2.5-foot intervals of depth to a depth of about 15 feet, 5-foot intervals from 15 feet to 80 feet of depth, and 5-foot to 10-foot intervals below 80 feet of depth. Boring B-3 was blind-drilled from a depth of 221.5 feet to 260 feet. Disturbed samples were obtained using a 2-inch outside-diameter (O.D.) standard split-spoon sampler. Standard Penetration Tests (SPT) were conducted by driving the sampler into the soil a distance of 18 inches using a 140-pound hammer dropped 30 inches. The number of blows required to drive the standard split-spoon sampler the last 12 inches is known as the Standard Penetration Resistance, or SPT N-value. The SPT N-values provide a measure of the relative density of granular soils and the relative consistency of cohesive soils. Samples obtained from the borings were placed in airtight jars and returned to our laboratory for further classification and testing. In addition, relatively undisturbed samples were collected by pushing a 3-inch-O.D. Shelby tube into the undisturbed soil a maximum distance of 24 inches using the hydraulic ram of the drill rig. The soil exposed in the ends of the Shelby tubes was examined and classified in the field. After classification, the tubes were sealed with rubber caps and returned to our laboratory for further examination and testing. All samples were returned to our laboratory for further examination and testing.

Logs of the mud-rotary borings are provided on Figures 1B through 3B. Each log presents a descriptive summary of the various types of materials encountered in the boring and notes the depth at which the materials and/or characteristics of the materials change. To the right of the descriptive summary, the numbers and types of samples taken during the

drilling operation are indicated. Farther to the right, SPT N-values are shown graphically along with the natural moisture contents, Torvane shear-strength values, fines contents, Atterberg-limits determinations, and dry densities of soil samples. The terms and symbols used to describe the soil and rock encountered in the borings are defined in Tables 1B and 2B and the attached legend.

B.1.3 Cone Penetrometer Test Probes

Probes CPT-1 through CPT-3 were advanced to depths of about 21.2 feet to 158 feet, where refusal installation conditions were encountered, using a truck-mounted electrical cone provided and operated by Oregon Geotechnical Explorations, Inc., of Keizer, Oregon. During a CPT, a steel cone is forced vertically into the soil at a constant rate of penetration. The force required to cause penetration at a constant rate can be related to the bearing capacity of the soil immediately surrounding the point of the penetrometer cone. This force is measured and recorded every 4 inches. In addition to the cone measurements, measurements are obtained of the magnitude of force required to force a friction sleeve attached above the cone through the soil. The force required to move the friction sleeve can be related to the undrained shear strength of fine-grained soils. The dimensionless ratio of sleeve friction to point-bearing capacity indicates the type of soil penetrated. The cone penetration resistance can be used to evaluate the relative consistency or density of cohesionless and cohesive soils, respectively. In addition, a piezometer fitted between the cone and the sleeve measures changes in water pressure as the probe is advanced and can also be used to measure the depth of the top of the groundwater surface. CPT-1 included shear-wave velocity testing. For this test, an accelerometer is placed in the cone equipment, which allows measurement of the arrival times of shear waves at the cone base from impulses generated at the ground surface that can then be used to calculate shear-wave velocities in the soil profile. The logs of CPTs are provided on Figures 4B through 7B. The shear-wave velocity measurements for CPT-2 are provided on Figure 6B. Graphical data from pore-pressure dissipation tests are provided on Figures 8B through 12B. Interpretations of the soil types encountered by the probe are shown graphically on the logs. Guidelines for the classification of soils in the CPT probe are provided in Table 3B.

B.2 LABORATORY TESTING

B.2.1 General

All samples obtained from the field were returned to our laboratory, where the physical characteristics of the samples were noted and the field classifications modified where necessary. At the time of classification, the natural moisture content of each soil sample was determined. Additional testing included Torvane shear strength, dry unit weight, washed-sieve analysis (percent passing the U.S. No. 200 sieve), Atterberg limits, one-dimensional consolidation, unconfined compression strength, triaxial compression testing,

and cyclic direct simple shear (DSS) testing. The following paragraphs describe the testing program in more detail.

B.2.2 Natural Moisture Content

Natural moisture content determinations were made in conformance with ASTM International (ASTM) D2216. The results are shown on Figures 1B through 3B and summarized in Table 4B.

B.2.3 Torvane Shear Strength

The approximate undrained shear strengths of relatively undisturbed, fine-grained soil samples were determined using a Torvane shear device. The Torvane is a hand-held apparatus with vanes that are inserted into the soil. The torque required to fail the soil in shear around the vanes is measured using a calibrated spring. The results of the Torvane shear-strength test are summarized on Figures 1B through 3B.

B.2.4 Dry Unit Weight

The dry unit weight of undisturbed soil samples was determined in the laboratory in accordance with ASTM D2937 by cutting a cylindrical specimen of soil from a Shelby tube sample. The dimensions of the specimen were carefully measured, the volume calculated, and the specimen weighed. After oven-drying, the specimen was reweighed and the water content was calculated. The dry unit weight was then computed. The dry unit weight is shown on Figures 1B through 3B and summarized in Table 4B.

B.2.5 Washed-Sieve Analysis

Washed-sieve analyses were performed on selected samples of the soil to assist in their classification. The test is performed by taking a sample of known dry weight and washing it over a No. 200 sieve. The material retained on the sieve is oven-dried and weighed. The percentage of material passing that passes the No. 200 sieve is then calculated. The results are summarized on Figures 1B through 3B and in Table 4B.

B.2.6 Atterberg Limits

Atterberg limits tests were performed on 28 samples of the fine-grained soil in substantial conformance with ASTM D4318. The test data are shown on Figures 1B through 3B and summarized in Table 4B. The results are also shown graphically on Figures 13B through 19B.

B.2.7 One-Dimensional Consolidation

One-dimensional consolidation testing was performed in accordance with ASTM D2435 to obtain data on the compressibility characteristics of nine relatively undisturbed samples of fine-grained soil. Test results are summarized on Figures 20B through 28B in the form

of a curve showing effective stress versus percent strain. The initial moisture content and unit weight of the sample are also provided on the figure.

B.2.8 Unconfined Compression

An unconfined compression test was performed on a selected sample of silt. The test was conducted in accordance with ASTM D2166. The test results are summarized below.

Boring	Sample	Depth, ft	Unconfined Compressive Strength, psf	Undrained Shear Strength, psf
B-1	S-10	28.3	1,270	635

B.2.9 Triaxial Compression Test

Two isotropically consolidated, undrained (CIU) triaxial compression tests with pore-pressure measurements were performed on selected samples of soil from borings B-1 and B-2. Samples for these tests were collected with a relatively undisturbed 2.85-inch inside-diameter (I.D.) Shelby tube. The specimens were extruded from the tubes, the ends of the sample were trimmed square, and the samples were encapsulated in a protective rubber membrane and mounted into a triaxial cell. Vertical filter paper drains were placed on the sides of each sample to enhance drainage and reduce the equalization time of strain-induced pore pressures.

Upon completion of sample preparation, the samples were saturated under an effective confining pressure of approximately 1 psi to 2 psi, with a back pressure of at least 40 psi to achieve timely saturation. Subsequently, the effective confining stress was increased, and the sample was allowed to consolidate with the drainage line open. Following consolidation, the drainage line was closed, and the sample was sheared undrained at a constant rate of strain while measurements were made of axial load, axial strain, and shear-induced pore pressure. The peak deviator stress ($\sigma_1 - \sigma_3$) was selected as the point of failure for each stage on the Mohr-Coulomb envelope.

The test results are summarized on Figures 31B and 32B. A graphical summary of deviator stress, effective stress ratio, and change in pore pressure versus axial strain is shown on the left side of the figure. Farther to the right, on the top half of the figure, is the modified Mohr-Coulomb envelope based on maximum effective shear stress and the corresponding effective normal stress at failure. A summary of the test data, including sample identification and initial and final moisture content of the samples, is tabulated below the modified Mohr-Coulomb plot.

B.2.10 Cyclic Direct Simple Shear

Strain-controlled, cyclic DSS tests were performed in conformance with standard of practice and ASTM D6528 on relatively undisturbed soil samples extruded from a Shelby

tube. The test provides data on the cyclic resistance, degradation potential, and post-cyclic behavior of the underlying fine-grained soils, which is necessary for seismic and slope-stability studies. The cyclic tests were completed at a frequency of 0.1 Hz, and the post-cyclic shear-strength tests were completed at a shear-strain rate of 5%/hour. The results of the cyclic DSS tests are tabulated below.

Boring	Depth, ft	Confining Pressure ⁽¹⁾ , psf	Overconsolidation Ratio (OCR)	Shear Strain, %	Ru at 60 Cycles	Max Ru at 200 Cycles	Static Shear Strength, psf	Post Cyclic Shear Strength, psf	Post-cyclic/Static Su/ sv At 3% Strain
B-1	39.0	2,500	1.5 ^(2,3)	Static	N/A	N/A	930	N/A	0.25
B-1	39.2	2,500	1.5 ^(2,3)	0.5	0.35	0.42	N/A	1,040	0.25
B-1	39.8	2,500	1.5 ^(2,3)	0.8	0.59	0.64	N/A	1,000	0.23
B-1	39.6	2,500	1.5 ^(2,3)	1.6	0.84	0.88	N/A	965	0.19
B-1	39.4	7,500	1.0 ⁽⁴⁾	0.8	0.32	0.39	N/A	2,023	0.21
B-2	64.3	3,500	1.5 ^(2,3)	Static	N/A	N/A	1,240	N/A	0.25
B-2	64.0	3,500	1.5 ^(2,3)	0.8	0.42	0.45	N/A	1,200	0.25
B-2	63.8	3,500	1.5 ^(2,3)	1.6	0.78	0.85	N/A	1,110	0.21
B-2	63.6	3,500	3.1 ⁽⁵⁾	1.6	0.26	0.39	N/A	2,330	0.47
B-3	36.7	2,350	1.5 ^(2,3)	Static	N/A	N/A	928	N/A	0.22
B-3	35.5	2,350	1.5 ^(2,3)	0.8	0.56	0.63	N/A	940	0.19
B-3	36.4	2,350	1.5 ^(2,3)	1.2	0.78	0.84	N/A	1,027	0.13
B-3	36.25	2,350	1.5 ^(2,3)	1.6	0.83	0.89	N/A	921	0.15
B-3	60.9	3,500	1.5 ^(2,3)	Static	N/A	N/A	1,174	N/A	0.19
B-3	61.2	3,500	1.5 ^(2,3)	0.6	0.35	0.40	N/A	1,200	0.18
B-3	60.4	3,500	1.5 ^(2,3)	0.8	0.40	0.45	N/A	1,017	0.13
B-3	61.2	3,500	1.5 ^(2,3)	1.2	0.57	0.67	N/A	1,267	0.16
B-3	60.2	3,500	1.5 ^(2,3)	1.6	0.72	0.79	N/A	932	0.16

Notes:

- 1) Confinement pressure was equivalent to existing overburden pressure with the exception of B-1 at 39.4 ft, which was consolidated to a confinement pressure of approximately 3 times the overburden pressure.
- 2) OCR interpolated from consolidation testing.
- 3) Specimen consolidated to existing overburden pressure and then tested.
- 4) Specimen consolidated to confining pressure and then tested at confining pressure.
- 5) Specimen consolidated to 11,000 psf and then tested at confining pressure.

Table 1B

GUIDELINES FOR CLASSIFICATION OF SOIL

Description of Relative Density for Granular (Coarse-Grained) Soil

Relative Density	Standard Penetration Resistance (N-values) blows/foot	3-Inch Sampler (140-lb Hammer) (N-values) blows/foot	3-Inch Sampler (300-lb Hammer) (N-values) blows/foot
Very Loose	0 - 4	0 - 11	0 - 4
Loose	4 - 10	11 - 26	4 - 10
Medium Dense	10 - 30	26 - 74	10 - 30
Dense	30 - 50	74 - 120	30 - 47
Very Dense	over 50	over 120	over 47

Description of Relative Consistency for Cohesive (Fine-Grained) Soils

Consistency	Standard Penetration Resistance (N-values) blows per ft	3-Inch Sampler (140-lb Hammer) (N-values) blows/foot	3-Inch Sampler (300-lb Hammer) (N-values) blows/foot	Torvane or Undrained Shear Strength, tsf
Very Soft	0 - 2	0 - 3	0 - 2	less than 0.125
Soft	2 - 4	3 - 6	2 - 5	0.125 - 0.25
Medium Stiff	4 - 8	6 - 12	5 - 9	0.25 - 0.50
Stiff	8 - 15	12 - 25	9 - 19	0.50 - 1.0
Very Stiff	15 - 30	25 - 65	19 - 31	1.0 - 2.0
Hard	over 30	over 65	over 31	over 2.0

Grain-Size Classification	Modifier for Subclassification		
	Adjective	Primary Constituent SAND or GRAVEL	Primary Constituent SILT or CLAY
<i>Boulders:</i> > 12 inches			
<i>Cobbles:</i> 3 inches - 12 inches			
<i>Gravel:</i> ¼ inch - ¾ inch (fine) ¾ inch- 3 inches (coarse)	trace: some: sandy, gravelly:	<5 (silt, clay) 5 - 15 (sand, gravel) 15 - 30 (sand, gravel) 30 - 50 (sand, gravel)	5 - 15 (sand, gravel) 15 - 30 (sand, gravel) 30 - 50 (sand, gravel)
<i>Sand:</i> No. 200 - No. 40 sieve (fine) No. 40 - No. 10 sieve (medium) No. 10 - No. 4 sieve (coarse)	trace: some: silty, clayey:	<5 (silt, clay) 5 - 12 (silt, clay) 12 - 50 (silt, clay)	<i>Relationship of clay and silt determined by plasticity index test</i>
<i>Silt/Clay:</i> Pass No. 200 sieve			

Table 2B

GUIDELINES FOR CLASSIFICATION OF ROCK

Relative Rock Weathering Scale

Term	Field Identification
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 1 in. into rock.
Moderately Weathered	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Predominantly Decomposed	Rock mass is more than 50% decomposed. Rock can be excavated with geologist’s pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock “fabric” may be evident. May be reduced to soil with hand pressure.

Relative Rock Hardness Scale

Term	Hardness Designation	Field Identification	Approximate Unconfined Compressive Strength
Extremely Soft	R0	Can be indented with difficulty by thumbnail. May be moldable or friable with finger pressure.	< 100 psi
Very Soft	R1	Crumbles under firm blows with point of a geology pick. Can be peeled by a pocketknife and scratched with fingernail.	100 - 1,000 psi
Soft	R2	Can be peeled by a pocketknife with difficulty. Cannot be scratched with fingernail. Shallow indentation made by firm blow of geology pick.	1,000 - 4,000 psi
Medium Hard	R3	Can be scratched by knife or pick. Specimen can be fractured with a single firm blow of hammer/geology pick.	4,000 - 8,000 psi
Hard	R4	Can be scratched with knife or pick only with difficulty. Several hard hammer blows required to fracture specimen.	8,000 - 16,000 psi
Very Hard	R5	Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.	> 16,000 psi

RQD and Rock Quality

Relation of RQD and Rock Quality		Terminology for Planar Surface		
RQD (Rock Quality Designation), %	Description of Rock Quality	Bedding	Joints and Fractures	Spacing
0 - 25	Very Poor	Laminated	Very Close	< 2 in.
25 - 50	Poor	Thin	Close	2 in. – 12 in.
50 - 75	Fair	Medium	Moderately Close	12 in. – 36 in.
75 - 90	Good	Thick	Wide	36 in. – 10 ft
90 - 100	Excellent	Massive	Very Wide	> 10 ft

Table 3B

CONE PENETRATION TEST (CPT) CORRELATIONS

Cohesive Soils

Cone Tip Resistance, tsf	Consistency
<5	Very Soft
5 to 15	Soft to Medium Stiff
15 to 30	Stiff
30 to 60	Very Stiff
>60	Hard

Cohesionless Soils

Cone Tip Resistance, tsf	Relative Density
<20	Very Loose
20 to 40	Loose
40 to 120	Medium
120 to 200	Dense
>200	Very Dense

Reference

Kulhawy, F. H., and Mayne, P. W., 1990, Manual on Estimating Soil Properties for Foundation Design, Electric Power Research Institute, EL-6800.

Table 4B
SUMMARY OF LABORATORY RESULTS

Sample Information				Atterberg Limits					Soil Type
Location	Sample	Depth, ft	Elevation, ft	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Fines Content, %	
B-1	S-2	5.0	15.0	22	--	--	--	--	SAND
	S-3	7.5	12.5	19	--	--	--	6	SAND
	S-4	10.0	10.0	27	--	--	--	--	SAND
	S-5	12.5	7.5	30	--	--	--	4	SAND
	S-6	15.0	5.0	29	--	--	--	--	SAND
	S-7	17.5	2.5	28	--	--	--	7	SAND
	S-8	20.0	0.0	29	--	--	--	7	SAND
	S-9	25.0	-5.0	57	--	--	--	--	SILT
	S-10	28.3	-8.3	55	68	--	--	--	SILT
	S-10	29.5	-9.5	52	--	--	--	96	SILT
	S-11	30.0	-10.0	52	--	56	16	94	SILT
	S-12	35.0	-15.0	50	--	--	--	--	SILT
	S-13	38.5	-18.5	46	75	--	--	--	SILT
	S-13	39.5	-19.5	46	--	46	3	81	SILT
	S-14	40.0	-20.0	51	--	51	9	--	SILT
	S-15	45.0	-25.0	50	--	--	--	82	SILT
	S-16	49.5	-29.5	49	--	--	--	81	SILT
	S-17	50.0	-30.0	47	--	51	9	--	SILT
	S-18	55.0	-35.0	51	--	--	--	--	SILT
	S-19	60.0	-40.0	49	--	44	11	72	SILT
	S-20	65.0	-45.0	51	--	--	--	--	SILT
	S-21	70.0	-50.0	42	--	--	--	--	SILT
	S-22	75.0	-55.0	54	--	44	11	62	Sandy SILT
	S-23	80.0	-60.0	37	--	48	7	--	SILT
	S-24	90.0	-70.0	45	--	--	--	--	SILT
	S-25	100.0	-80.0	52	--	53	20	96	SILT
	S-27	120.0	-100.0	48	--	--	--	--	SILT
	S-28	130.0	-110.0	68	--	68	15	97	SILT
	S-29	140.0	-120.0	33	--	--	--	27	Silty SAND
	S-30	150.0	-130.0	39	--	--	--	--	SILT
	S-31	160.0	-140.0	38	--	35	1	82	SILT
	S-33	180.0	-160.0	42	--	41	5	96	SILT
	S-35	200.0	-180.0	42	--	--	--	--	SILT
B-2	S-1	3.5	20.5	76	--	--	--	--	Clayey SILT
	S-3	7.0	17.0	48	--	--	--	92	Clayey SILT
	S-4	10.0	14.0	44	--	47	18	--	Clayey SILT
	S-5	14.5	9.5	50	--	--	--	--	Clayey SILT
	S-6	15.0	9.0	50	--	--	--	--	Clayey SILT
	S-7	20.0	4.0	52	--	--	--	86	Clayey SILT
	S-8	24.3	-0.3	53	70	--	--	97	Clayey SILT



Table 4B
SUMMARY OF LABORATORY RESULTS

Sample Information				Atterberg Limits					Soil Type
Location	Sample	Depth, ft	Elevation, ft	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Fines Content, %	
B-2	S-9	25.0	-1.0	55	--	57	18	--	Clayey SILT
	S-10	30.0	-6.0	53	--	--	--	--	Clayey SILT
	S-12	35.0	-11.0	48	--	--	--	--	SILT
	S-13	40.0	-16.0	50	--	--	--	--	SILT
	S-15	45.0	-21.0	68	--	--	--	--	SILT
	S-16	50.0	-26.0	68	--	87	47	97	SILT
	S-18	55.0	-31.0	82	--	--	--	--	SILT
	S-19	60.0	-36.0	52	--	--	--	--	SILT
	S-20	63.4	-39.4	47	78	--	--	84	SILT
	S-20	64.0	-40.0	48	--	50	16	78	SILT
	S-21	65.0	-41.0	46	--	55	11	--	SILT
	S-22	70.0	-46.0	37	--	--	--	29	Silty SAND
	S-23	75.0	-51.0	41	--	43	4	--	SILT
	S-24	80.0	-56.0	41	--	--	--	--	SILT
	S-25	85.0	-61.0	46	--	--	--	61	SILT
	S-26	90.0	-66.0	48	--	54	7	--	SILT
	S-27	95.0	-71.0	45	--	--	--	--	SILT
	S-28	100.0	-76.0	56	--	56	9	--	SILT
	S-29	105.0	-81.0	51	--	--	--	--	SILT
	S-30	115.0	-91.0	40	--	42	5	--	SILT
	S-31	125.0	-101.0	37	--	--	--	64	SILT
	S-32	135.0	-111.0	37	--	--	--	--	SILT
	S-33	145.0	-121.0	37	--	--	--	--	Silty SAND

Table 4B
SUMMARY OF LABORATORY RESULTS

Sample Information				Atterberg Limits					Soil Type
Location	Sample	Depth, ft	Elevation, ft	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Fines Content, %	
B-3	S-1	5.0	14.0	23	--	--	--	--	SAND
	S-2	10.0	9.0	25	--	--	--	5	SAND
	S-3	15.0	4.0	28	--	--	--	--	SAND
	S-4	20.0	-1.0	29	--	--	--	--	Clayey SILT
	S-6	27.0	-8.0	55	--	59	27	83	Clayey SILT
	S-7	30.0	-11.0	54	--	--	--	--	Clayey SILT
	S-8	35.0	-16.0	47	75	--	--	--	Clayey SILT
	S-8	35.5	-16.5	48	--	--	--	82	Clayey SILT
	S-9	37.0	-18.0	51	--	41	9	88	Clayey SILT
	S-10	40.0	-21.0	51	--	--	--	--	SILT
	S-12	47.0	-28.0	50	--	46	13	80	SILT
	S-13	55.0	-36.0	45	--	--	--	--	SILT
	S-14	60.0	-41.0	53	69	--	--	--	SILT
	S-15	65.0	-46.0	63	--	51	15	93	SILT
	S-16	70.0	-51.0	49	--	--	--	--	SILT
	S-17	75.0	-56.0	43	--	--	--	--	PEAT
	S-17b	75.5	-56.5	62	--	--	--	--	PEAT
	S-18	80.0	-61.0	58	--	--	--	--	SILT
	S-19	85.0	-66.0	45	--	41	5	90	SILT
	S-21	90.0	-71.0	46	--	--	--	--	SILT
	S-22	95.0	-76.0	43	--	--	--	--	SILT
	S-23	100.0	-81.0	41	--	--	--	--	SILT
	S-24	105.0	-86.0	48	--	--	--	--	SILT
	S-25	110.0	-91.0	42	--	36	8	89	SILT
	S-26	115.0	-96.0	38	--	--	--	--	SILT
	S-27	120.0	-101.0	48	--	--	--	--	SILT
	S-28	125.0	-106.0	40	--	--	--	--	SILT
	S-29	130.0	-111.0	55	--	--	--	--	SILT
	S-30	135.0	-116.0	34	--	--	--	61	Sandy SILT
	S-31	140.0	-121.0	47	--	--	--	--	SILT
	S-32	145.0	-126.0	45	--	41	12	89	SILT
	S-34	150.0	-131.0	39	--	--	--	--	SILT
	S-35	155.0	-136.0	35	--	--	--	68	Sandy SILT
	S-36	160.0	-141.0	30	--	--	--	--	Sandy SILT
	S-37	165.0	-146.0	32	--	--	--	--	Silty SAND
	S-38	170.0	-151.0	35	--	--	--	--	SILT
	S-39	175.0	-156.0	46	--	43	11	96	SILT
	S-40	180.0	-161.0	46	--	--	--	--	SILT
	S-41	185.0	-166.0	31	--	--	--	--	SILT
	S-42	190.0	-171.0	41	--	--	--	--	SILT



Table 4B
SUMMARY OF LABORATORY RESULTS

Sample Information				Atterberg Limits				Fines Content, %	Soil Type
Location	Sample	Depth, ft	Elevation, ft	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %		
B-3	S-44	210.0	-191.0	36	--	--	--	--	SILT
	S-44b	211.0	-192.0	32	--	--	--	--	SILT
	S-45	220.0	-201.0	39	--	--	--	--	SILT
	S-46	260.0	-241.0	37	--	--	--	--	SILT

BORING AND TEST PIT LOG LEGEND

SOIL SYMBOLS

Symbol	Typical Description
	LANDSCAPE MATERIALS
	FILL
	GRAVEL; clean to some silt, clay, and sand
	Sandy GRAVEL; clean to some silt and clay
	Silty GRAVEL; up to some clay and sand
	Clayey GRAVEL; up to some silt and sand
	SAND; clean to some silt, clay, and gravel
	Gravelly SAND; clean to some silt and clay
	Silty SAND; up to some clay and gravel
	Clayey SAND; up to some silt and gravel
	SILT; up to some clay, sand, and gravel
	Gravelly SILT; up to some clay and sand
	Sandy SILT; up to some clay and gravel
	Clayey SILT; up to some sand and gravel
	CLAY; up to some silt, sand, and gravel
	Gravelly CLAY; up to some silt and sand
	Sandy CLAY; up to some silt and gravel
	Silty CLAY; up to some sand and gravel
	PEAT

SAMPLER SYMBOLS

Symbol	Sampler Description
	2.0 in. O.D. split-spoon sampler and Standard Penetration Test with recovery (ASTM D1586)
	Shelby tube sampler with recovery (ASTM D1587)
	3.0 in. O.D. split-spoon sampler with recovery (ASTM D3550)
	Grab Sample
	Rock core sample interval
	Sonic core sample interval
	Push probe sample interval

INSTALLATION SYMBOLS

Symbol	Symbol Description
	Flush-mount monument set in concrete
	Concrete, well casing shown where applicable
	Bentonite seal, well casing shown if applicable
	Filter pack, machine-slotted well casing shown where applicable
	Grout, vibrating-wire transducer cable shown where applicable
	Vibrating-wire pressure transducer
	1-in.-diameter solid PVC
	1-in.-diameter hand-slotted PVC
	Grout, inclinometer casing shown where applicable

FIELD MEASUREMENTS

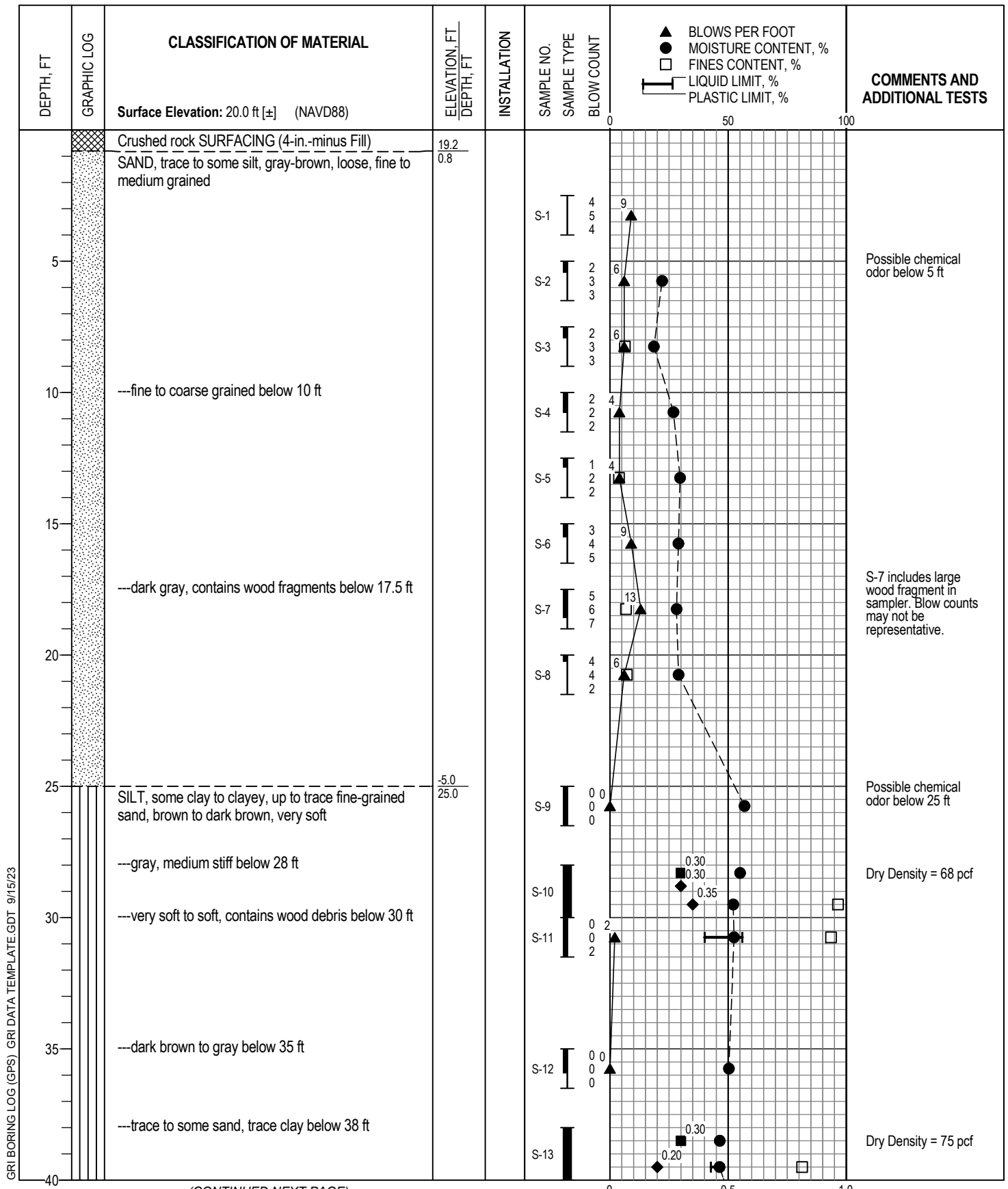
Symbol	Typical Description
	Groundwater level during drilling and date measured
	Groundwater level after drilling and date measured
	Rock/sonic core or push probe recovery (%)
	Rock quality designation (RQD, %)

BEDROCK SYMBOLS

Symbol	Typical Description
	BASALT
	MUDSTONE
	SILTSTONE
	SANDSTONE

SURFACE MATERIAL SYMBOLS

Symbol	Typical Description
	Asphalt concrete PAVEMENT
	Portland cement concrete PAVEMENT
	Crushed rock BASE COURSE



(CONTINUED NEXT PAGE)

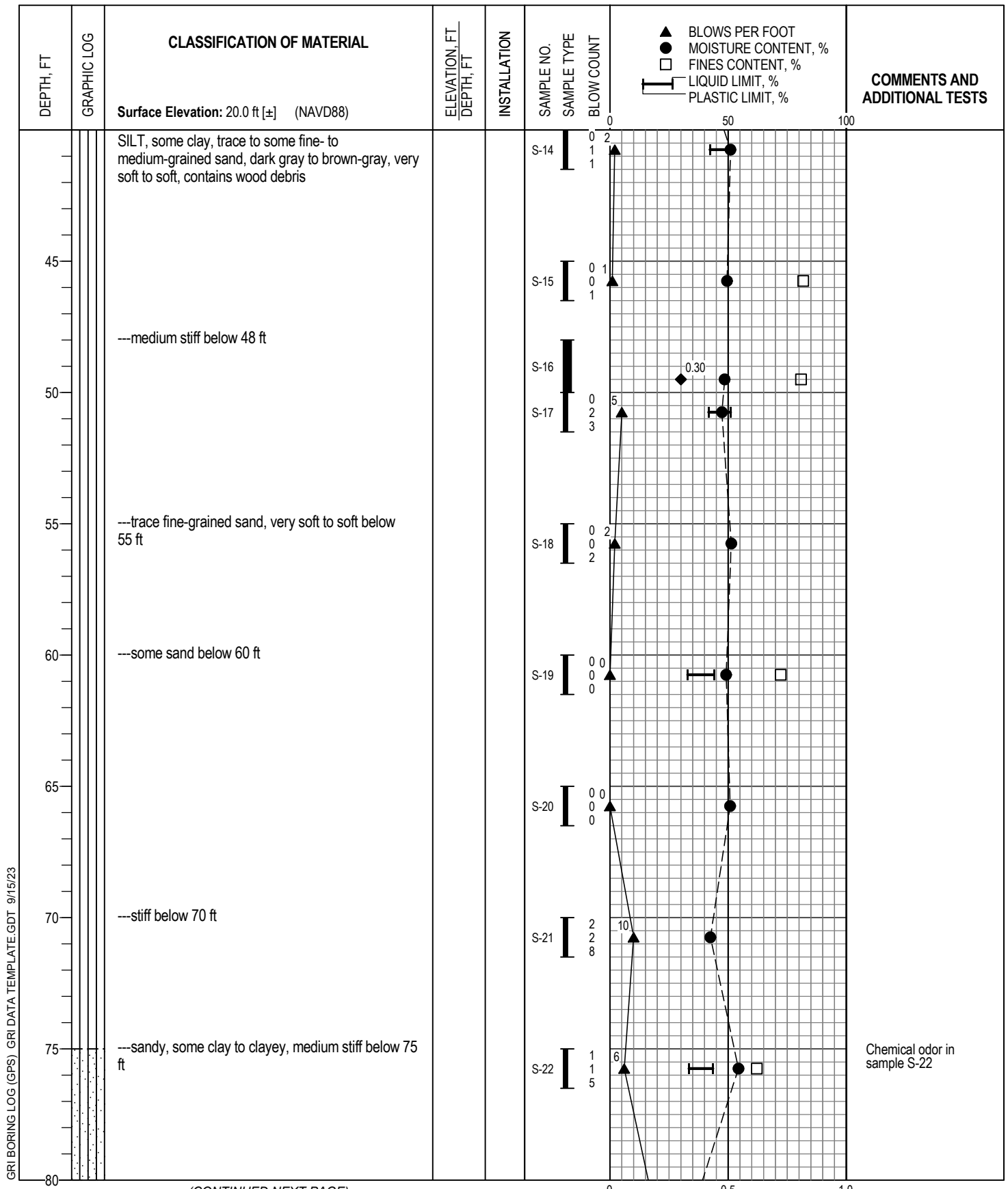
GRI BORING LOG (GPS) GRI DATA TEMPLATE.GDT 9/15/23

Logged By: G. Martin	Drilled by: Western States Soil Conservation, Inc.
Date Started: 7/31/19	GPS Coordinates: 45.8552° N -122.7976° W (WGS 84)
Drilling Method: Mud Rotary	Hammer Type: Auto Hammer
Equipment: CME 55 HT Track-Mounted Drill Rig	Weight: 140 lb
Hole Diameter: 5 in.	Drop: 30 in.
Note: See Legend for Explanation of Symbols	Energy Ratio: 76%

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-1

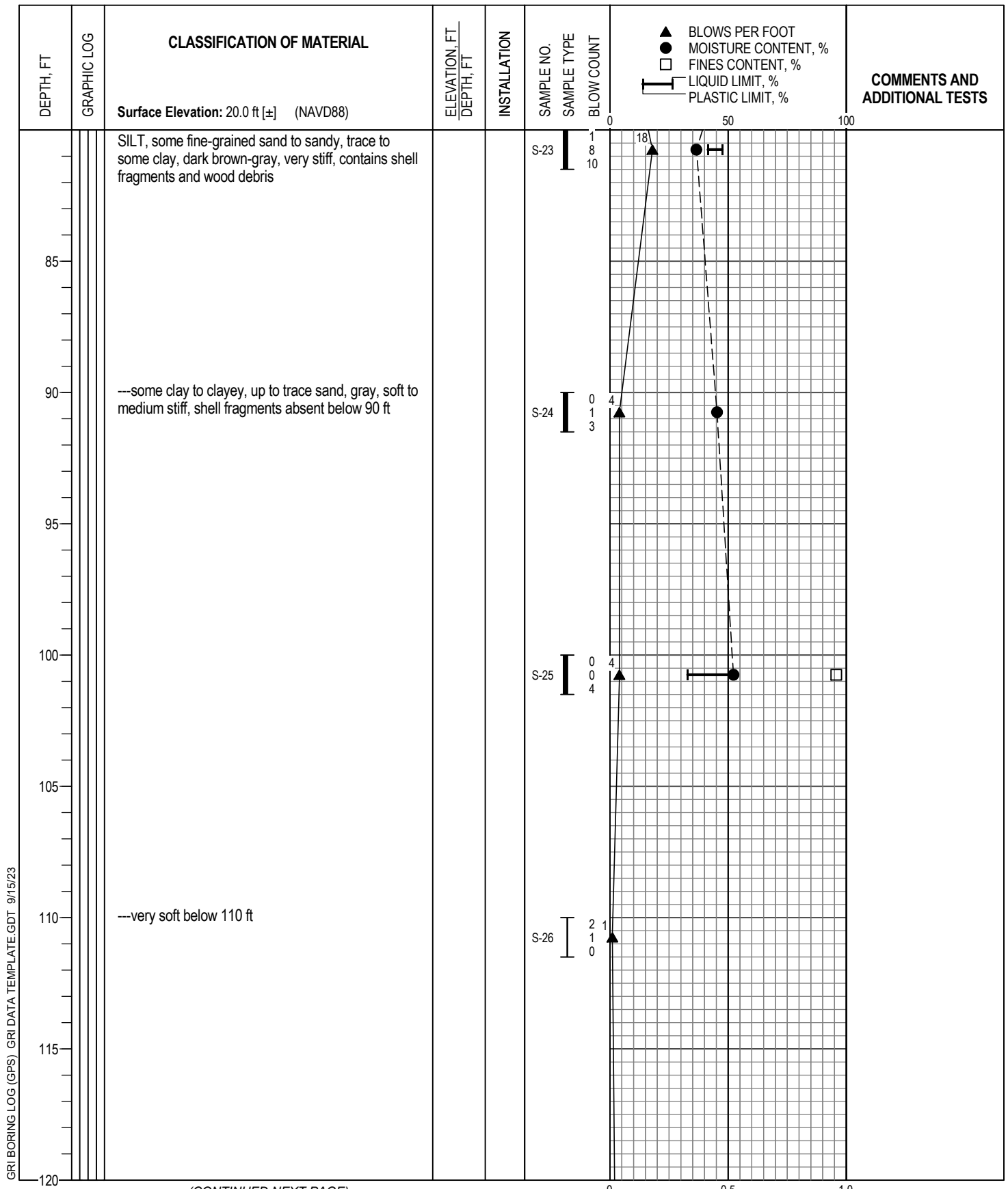


(CONTINUED NEXT PAGE)

GRI BORING LOG (GPS) GRI DATA TEMPLATE.GDT 9/15/23



BORING B-1

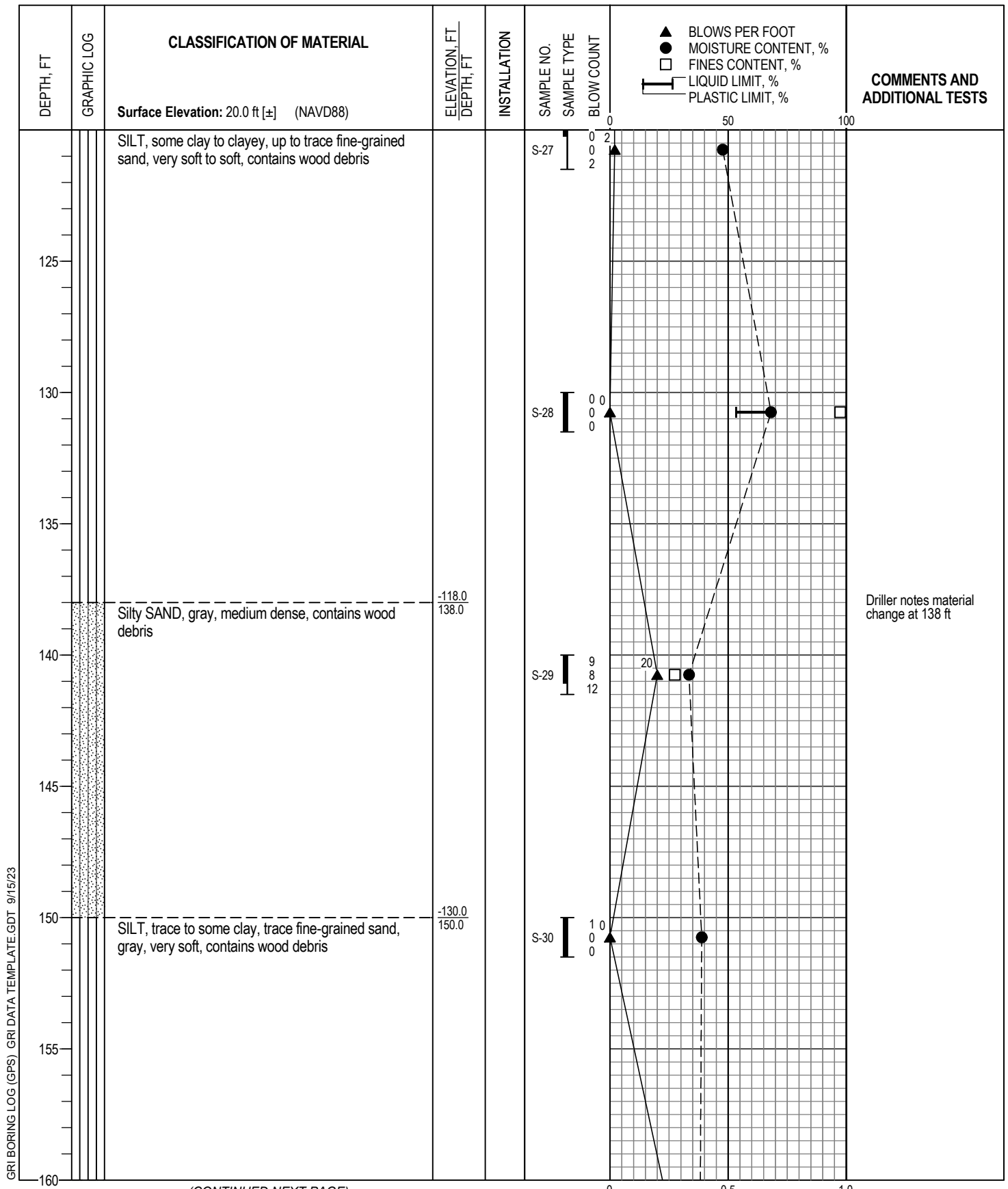


(CONTINUED NEXT PAGE)

GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23



BORING B-1



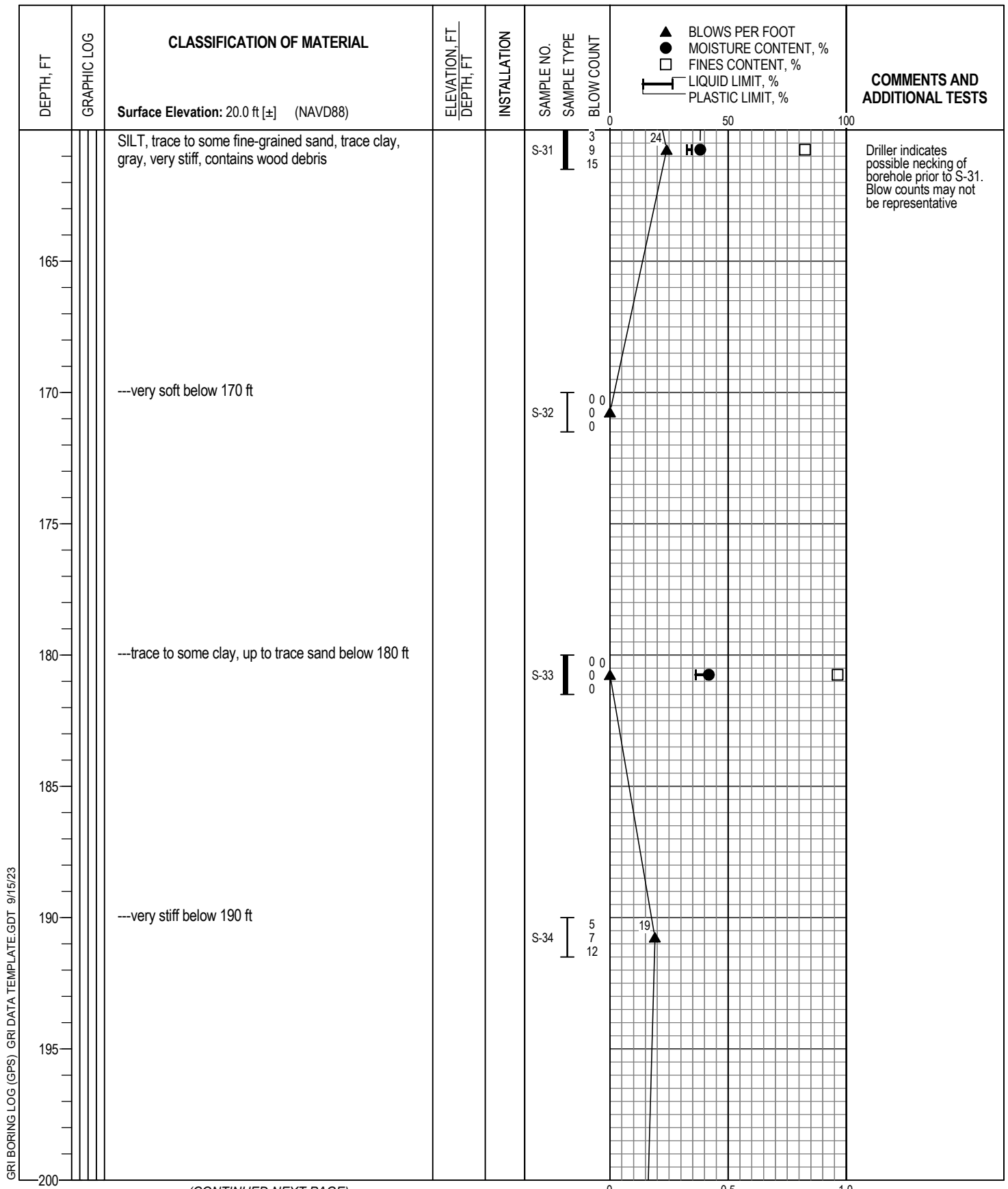
(CONTINUED NEXT PAGE)

GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-1



(CONTINUED NEXT PAGE)

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-1

GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23

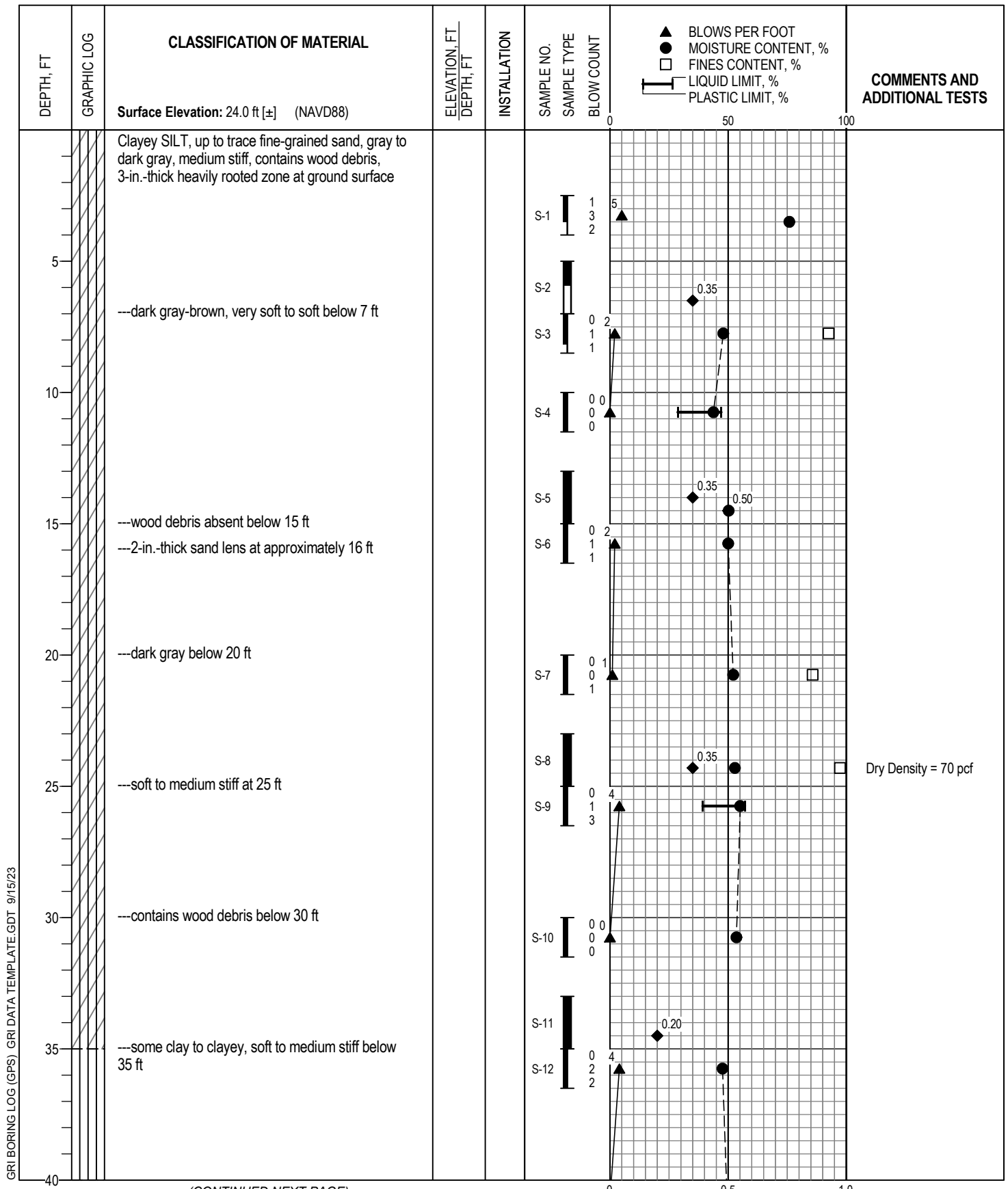
DEPTH, FT	GRAPHIC LOG	CLASSIFICATION OF MATERIAL	ELEVATION, FT DEPTH, FT	INSTALLATION	SAMPLE NO. SAMPLE TYPE BLOW COUNT	<ul style="list-style-type: none"> ▲ BLOWS PER FOOT ● MOISTURE CONTENT, % □ FINES CONTENT, % — LIQUID LIMIT, % — PLASTIC LIMIT, % 	COMMENTS AND ADDITIONAL TESTS
		Surface Elevation: 20.0 ft [±] (NAVD88)					
		SILT, trace to some clay, trace fine-grained sand, gray, stiff, contains scattered organics (8/2/2019)	-181.5 201.5		S-35 0 6 10		
205							
210							
215							
220							
225							
230							
235							
240							

GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-1



GRI BORING LOG (GPS) GRI DATA TEMPLATE.GDT 9/15/23

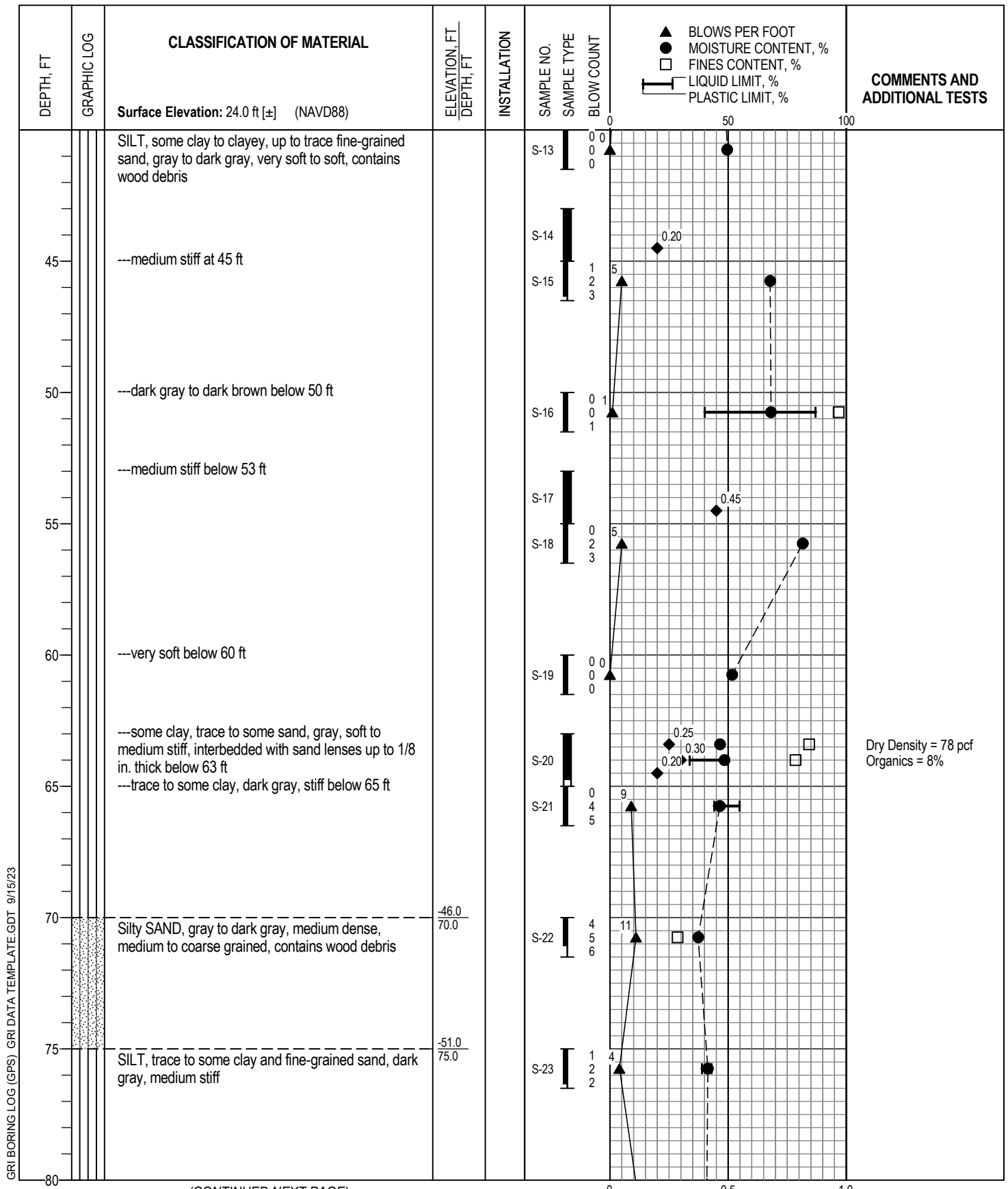
(CONTINUED NEXT PAGE)

Logged By: G. Martin	Drilled by: Western States Soil Conservation, Inc.
Date Started: 7/29/19	GPS Coordinates: 45.8504° N -122.7997° W (WGS 84)
Drilling Method: Mud Rotary	Hammer Type: Auto Hammer
Equipment: CME 55 HT Track-Mounted Drill Rig	Weight: 140 lb
Hole Diameter: 5 in.	Drop: 30 in.
Note: See Legend for Explanation of Symbols	Energy Ratio: 76%

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-2

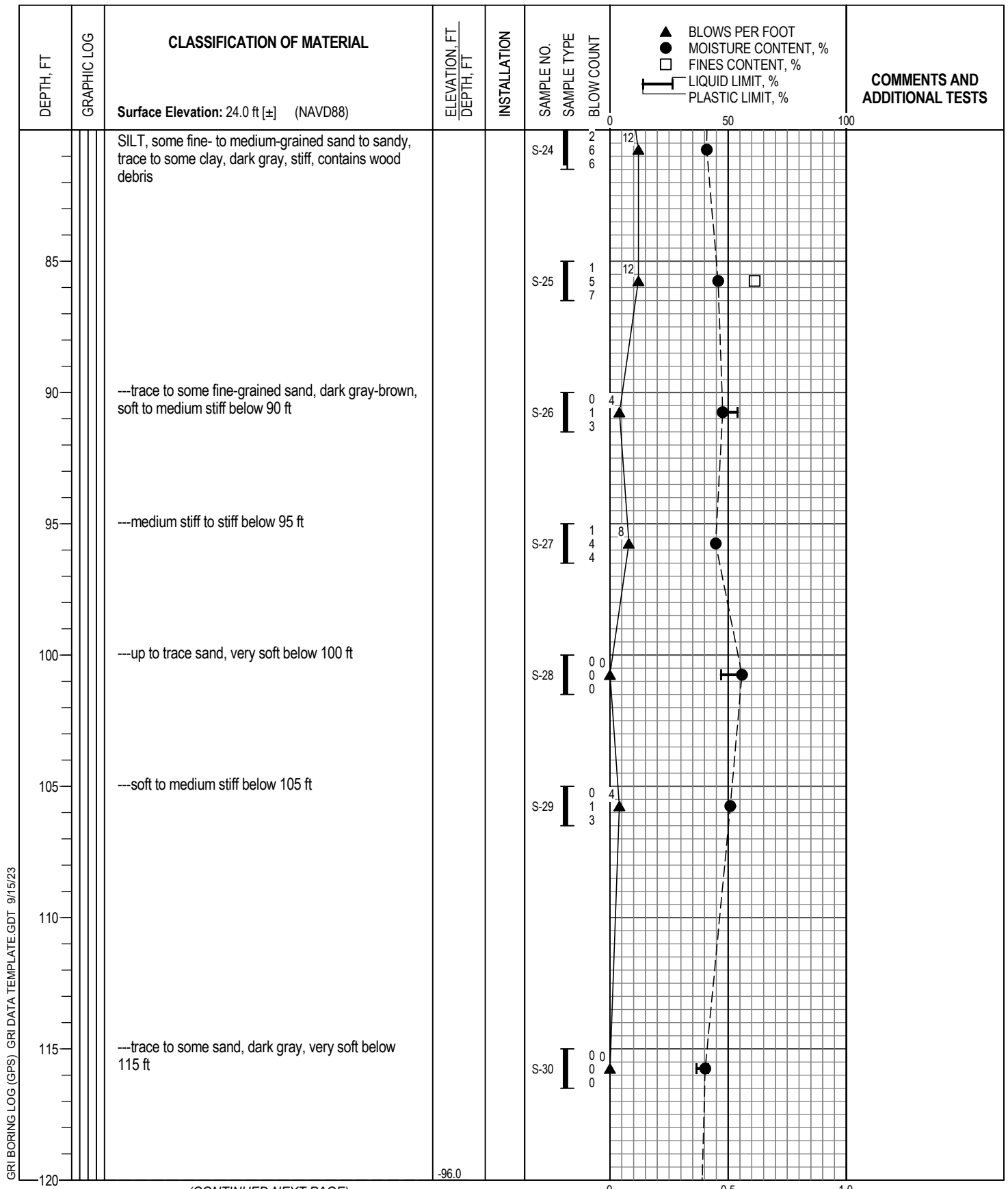


(CONTINUED NEXT PAGE)

GRI BORING LOG (GFS) GRI DATA TEMPLATE.GDT 9/15/23



BORING B-2

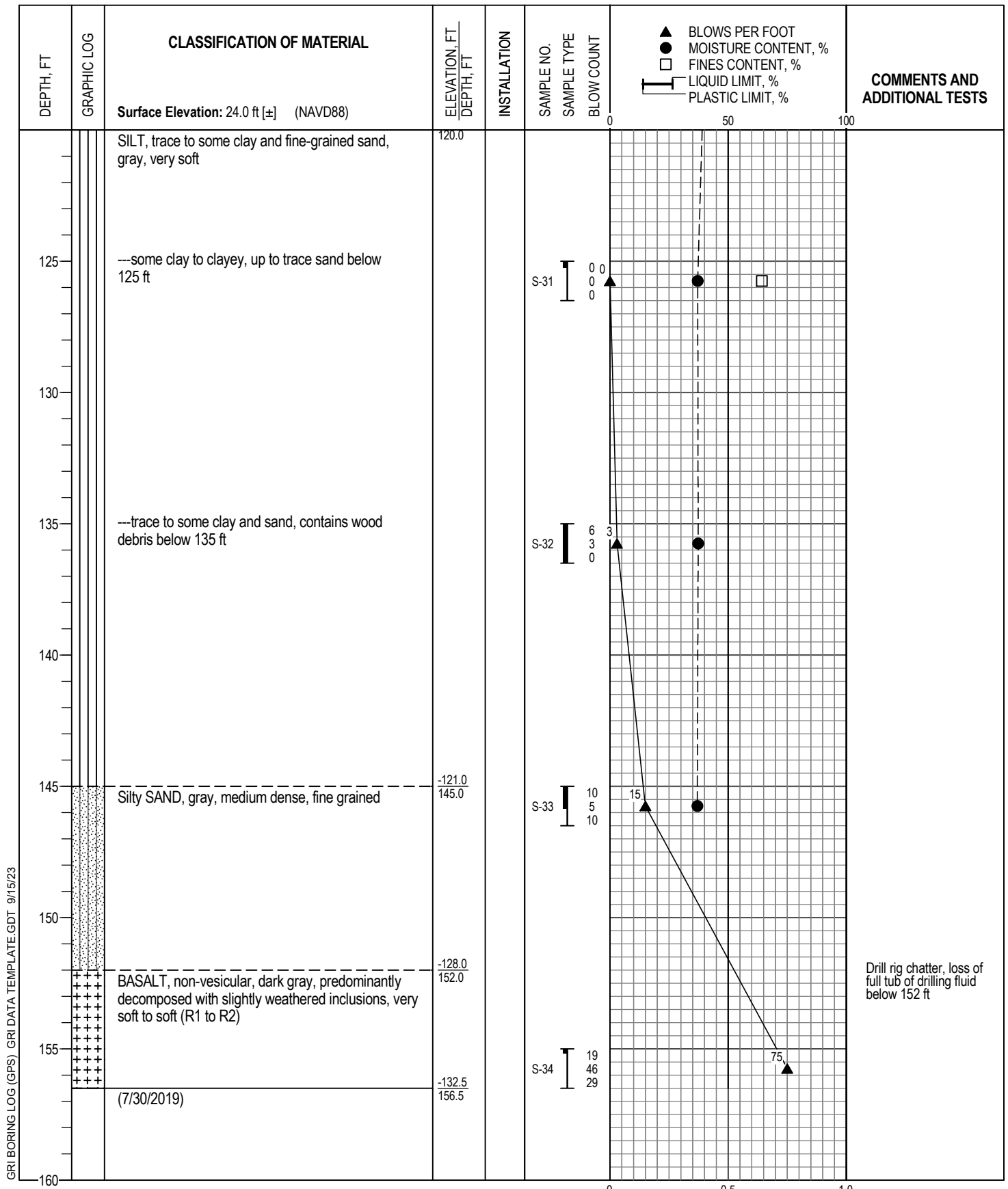


GRI BORING LOG (GFS) GRI DATA TEMPLATE.GDT 9/15/23

(CONTINUED NEXT PAGE)



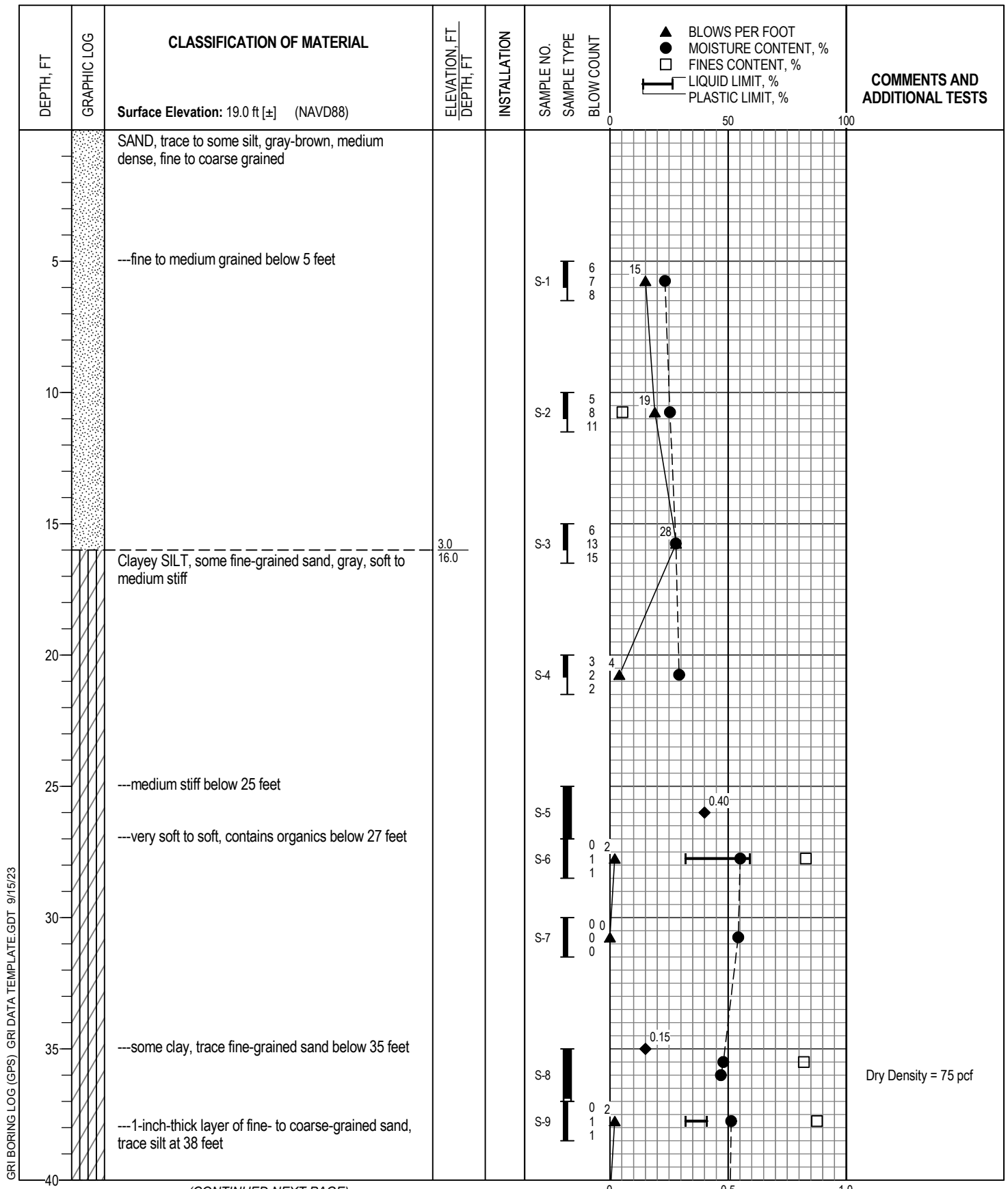
BORING B-2



GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23



BORING B-2



GRI BORING LOG (GPS) GRI DATA TEMPLATE.GDT 9/15/23

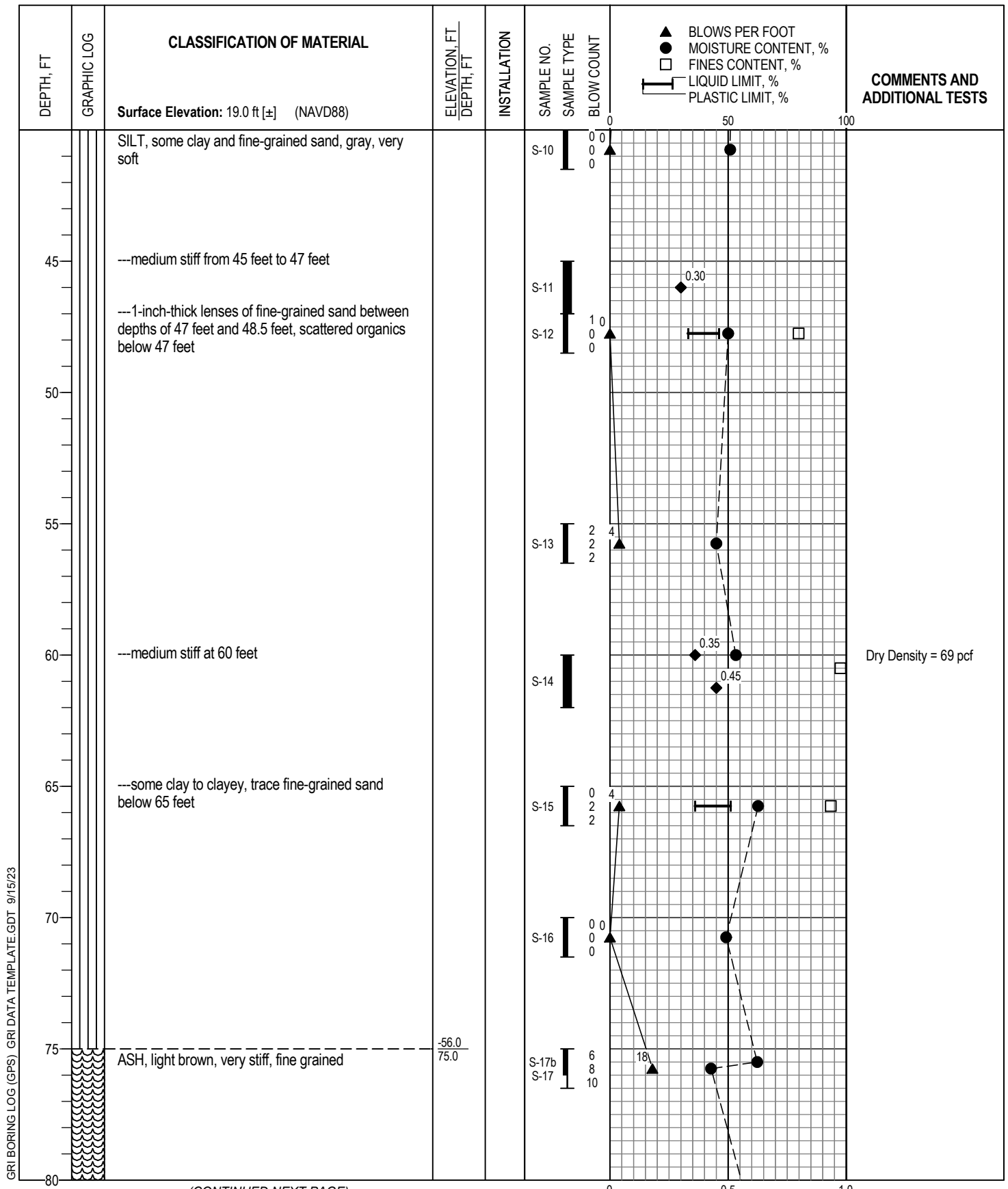
(CONTINUED NEXT PAGE)

Logged By: M. Miller		Drilled by: Western States Soil Conservation, Inc.	
Date Started: 2/27/23		GPS Coordinates: 45.85474° N -122.7981° W (WGS84)	
Drilling Method: Mud Rotary		Hammer Type: Auto Hammer	
Equipment: CME 850 Track-Mounted Drill Rig		Weight: 140 lb	
Hole Diameter: 5 in.		Drop: 30 in.	
Note: See Legend for Explanation of Symbols		Energy Ratio:	

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-3

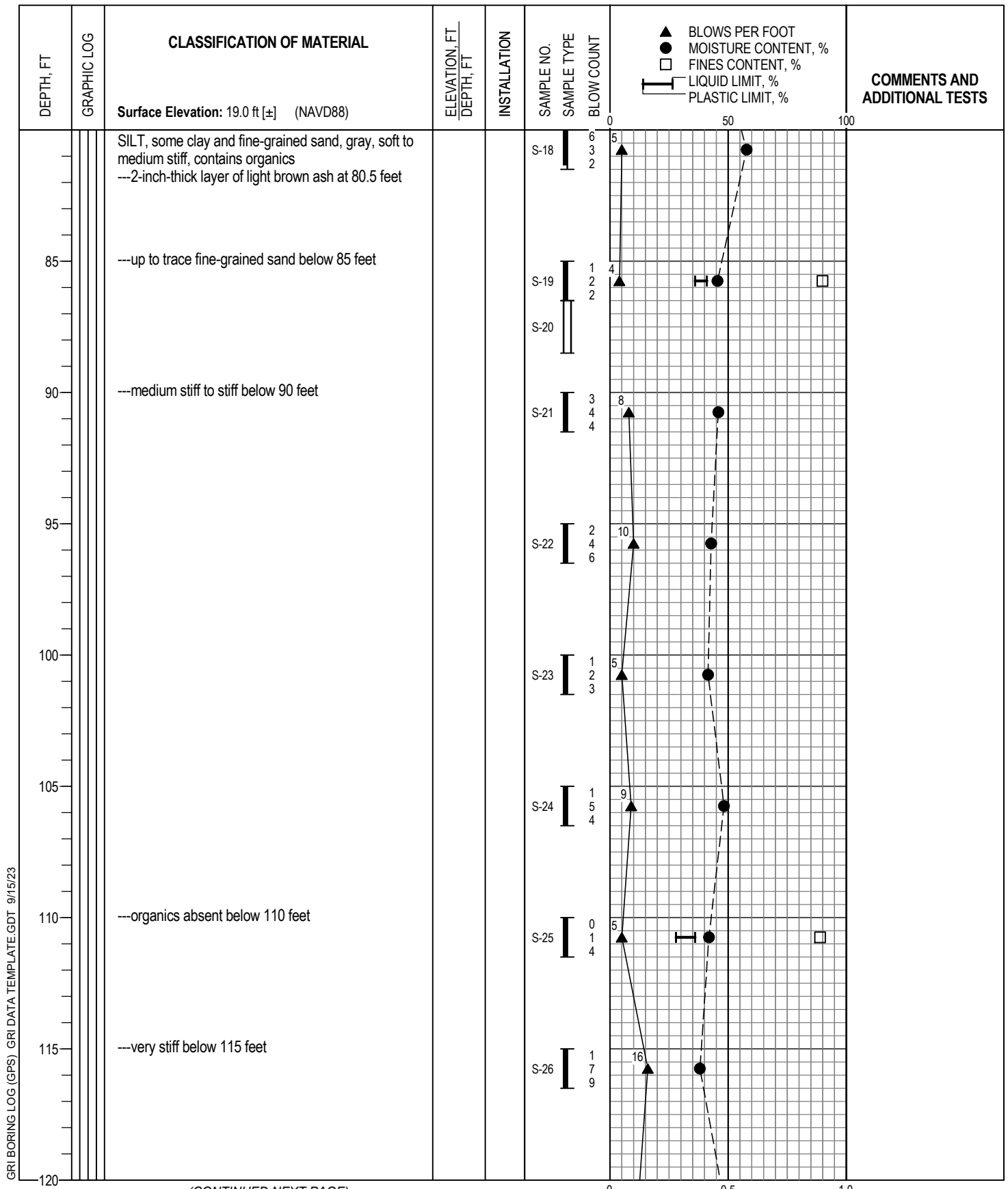


(CONTINUED NEXT PAGE)

GRI BORING LOG (GPS) GRI DATA TEMPLATE.GDT 9/15/23



BORING B-3



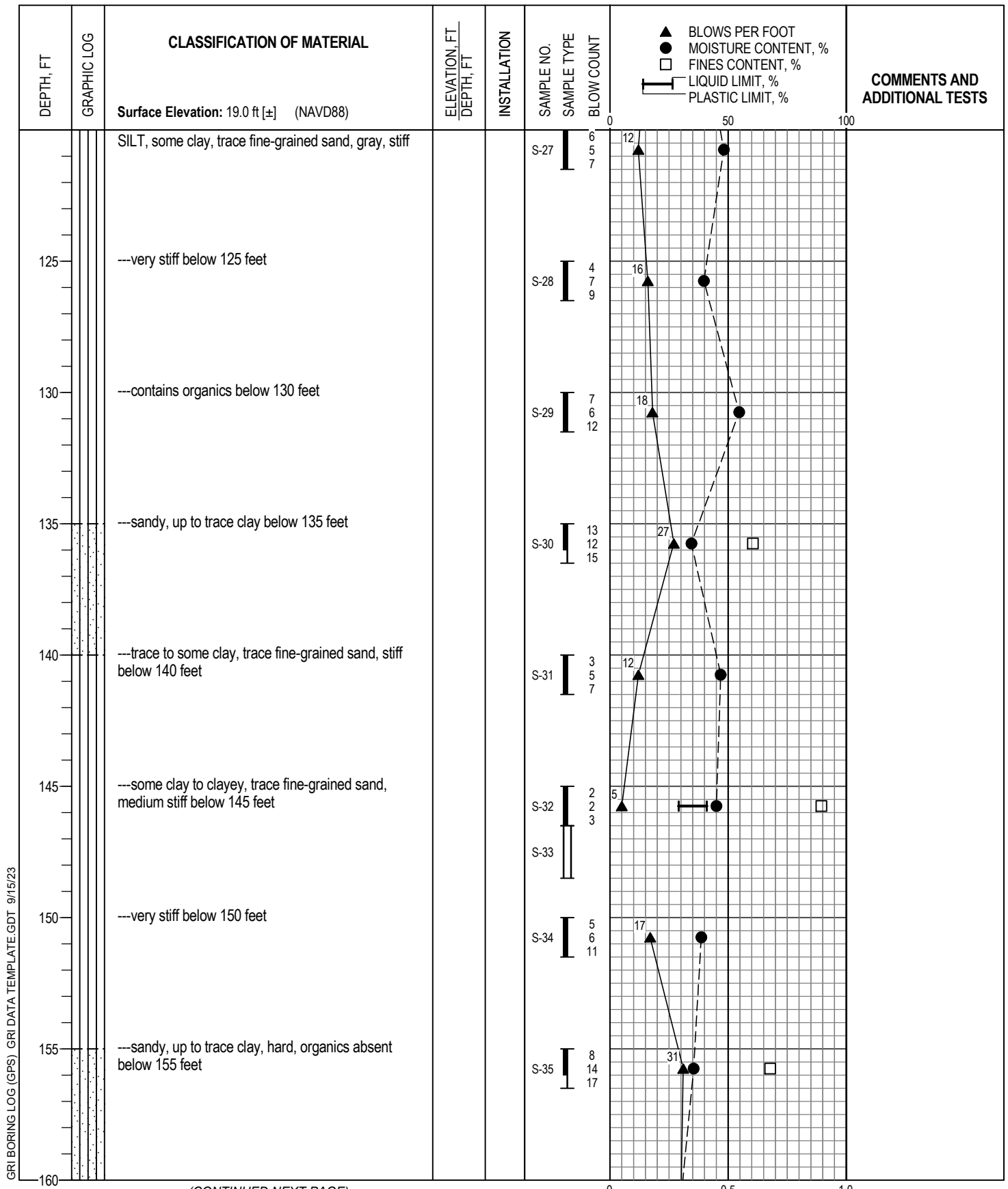
GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23

(CONTINUED NEXT PAGE)

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



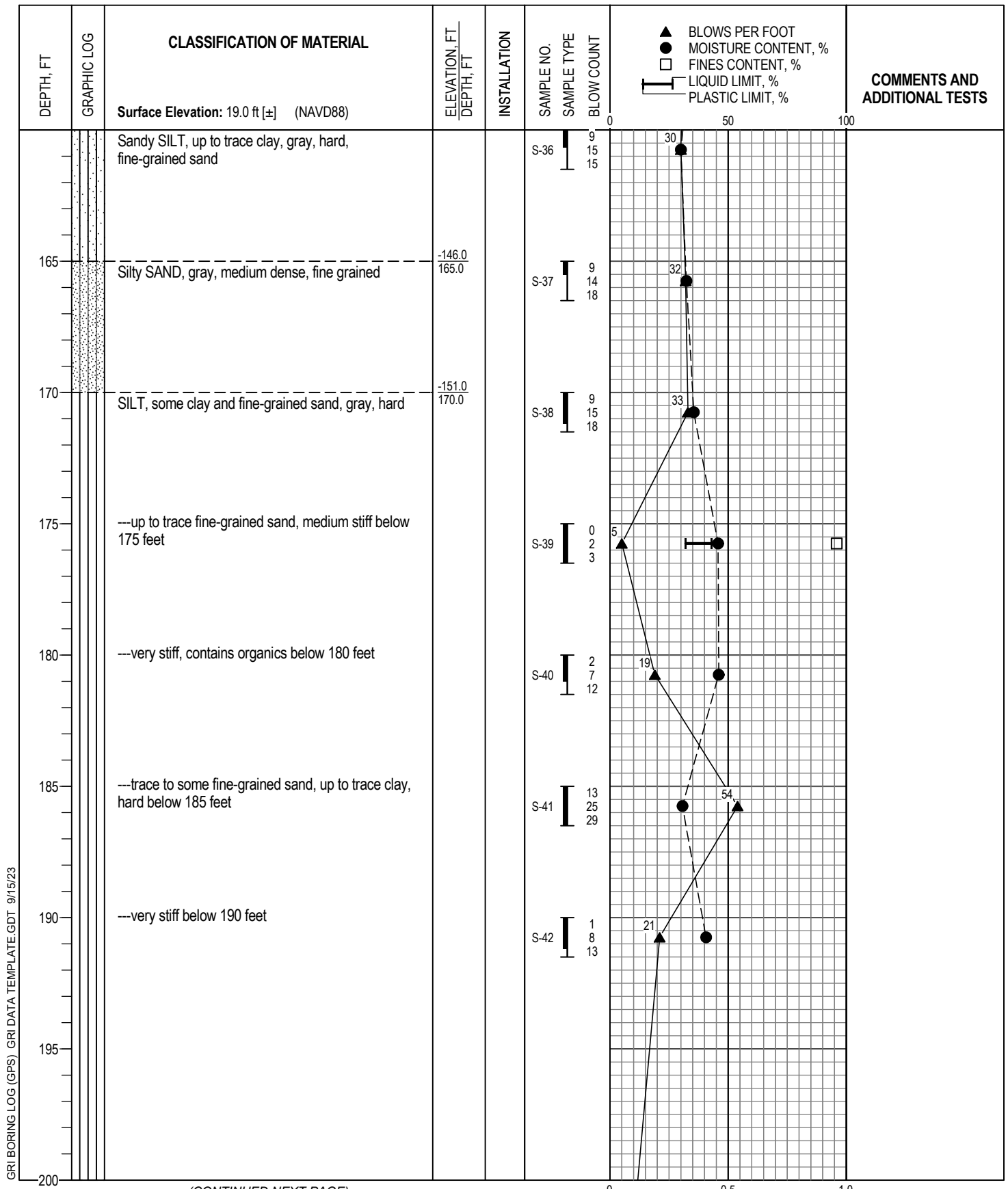
BORING B-3



(CONTINUED NEXT PAGE)

GRI BORING LOG (GPS) GRI DATA TEMPLATE.GDT 9/15/23

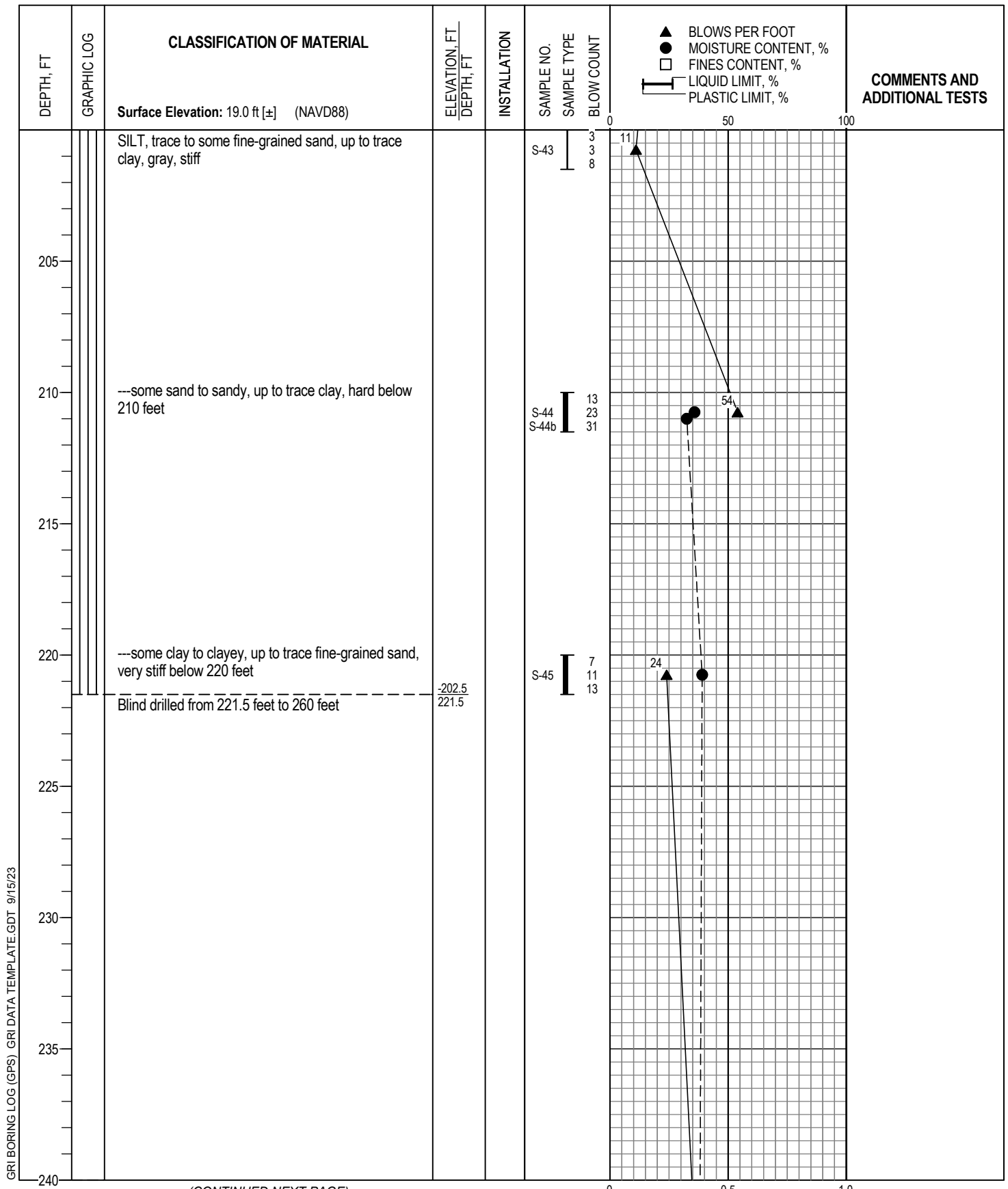
◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



(CONTINUED NEXT PAGE)

GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



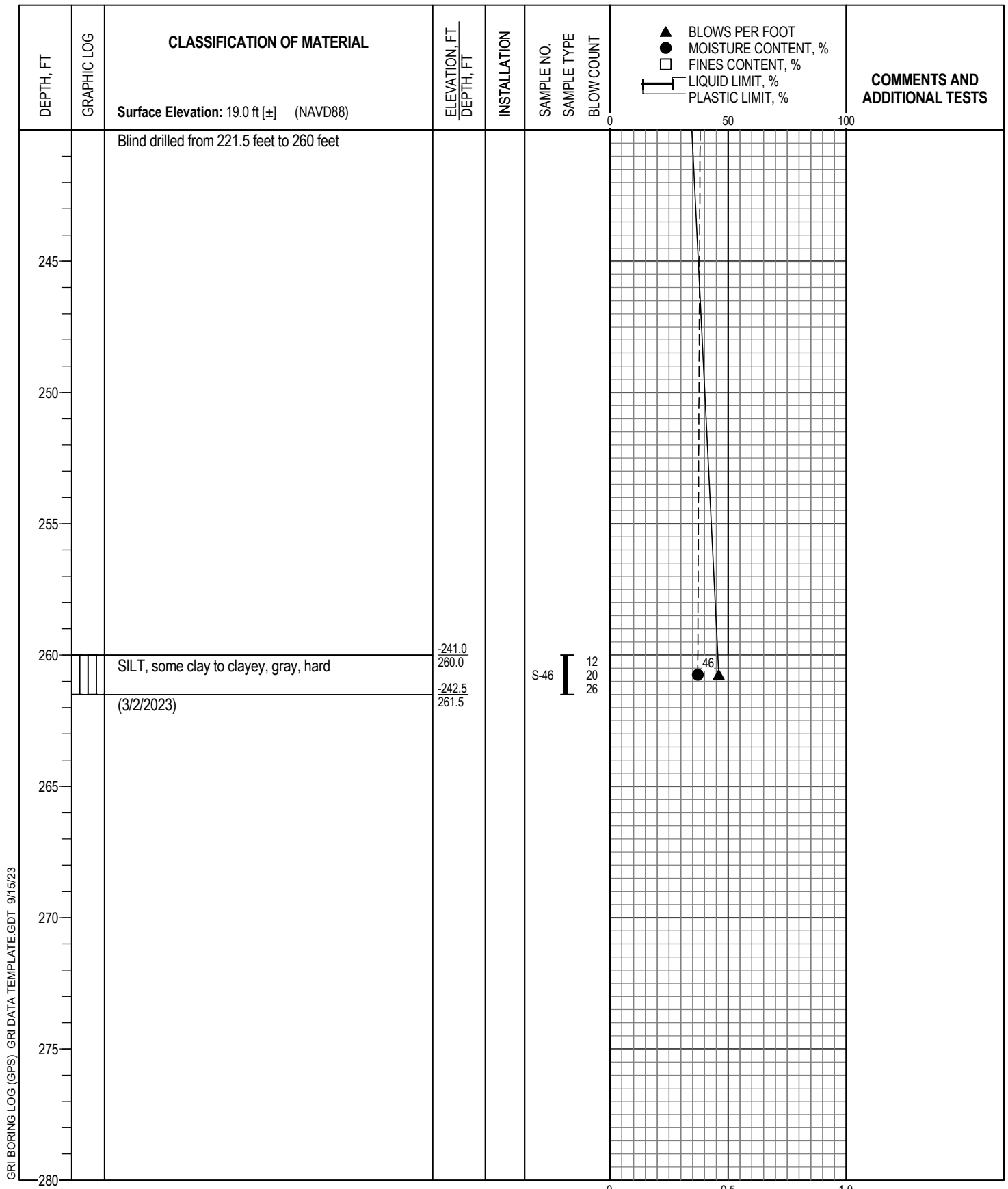
(CONTINUED NEXT PAGE)

◆ TORVANE SHEAR STRENGTH, TSF
 ■ UNDRAINED SHEAR STRENGTH, TSF



BORING B-3

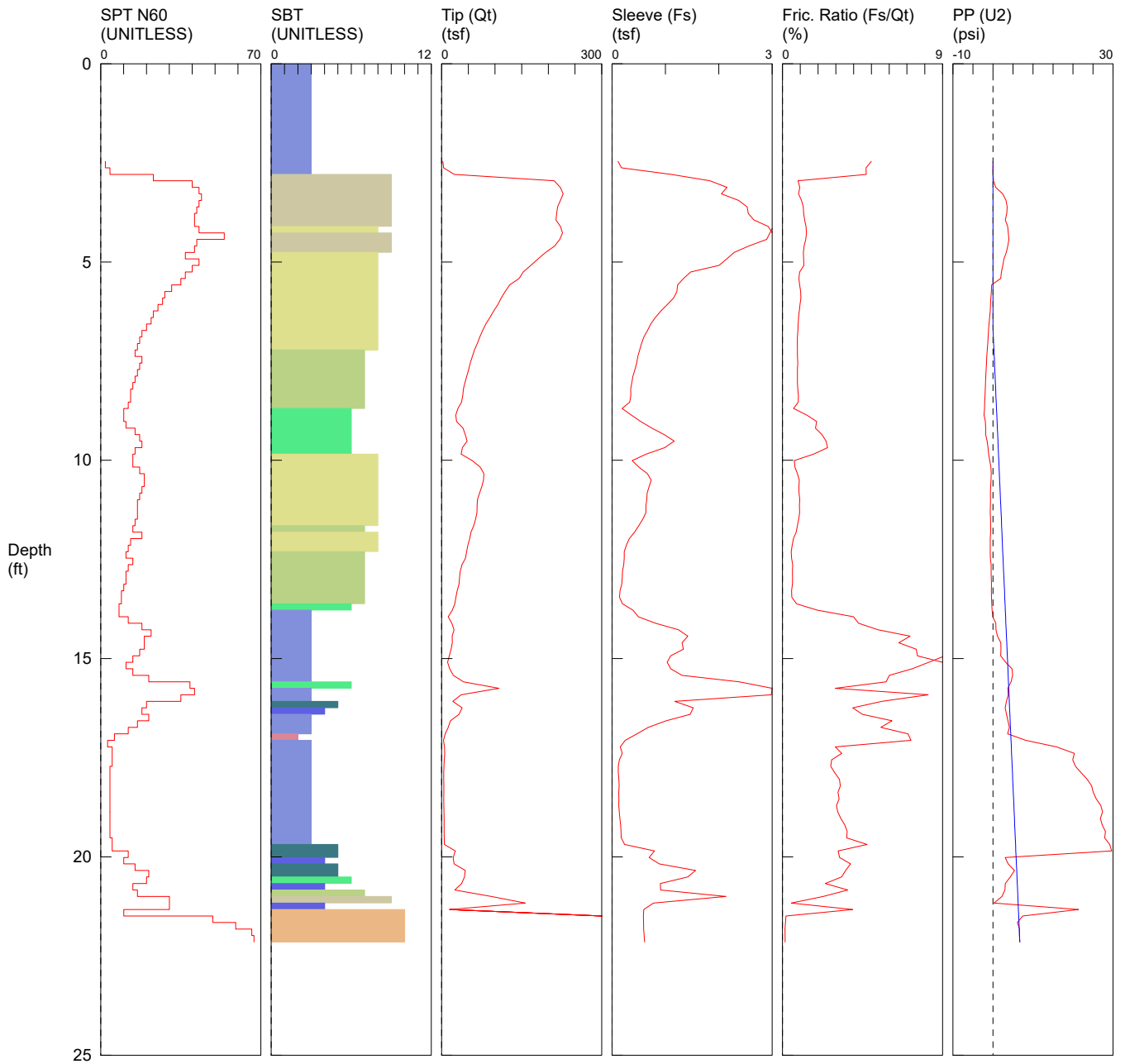
GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23



GRI BORING LOG (GPS), GRI DATA TEMPLATE.GDT 9/15/23



BORING B-3



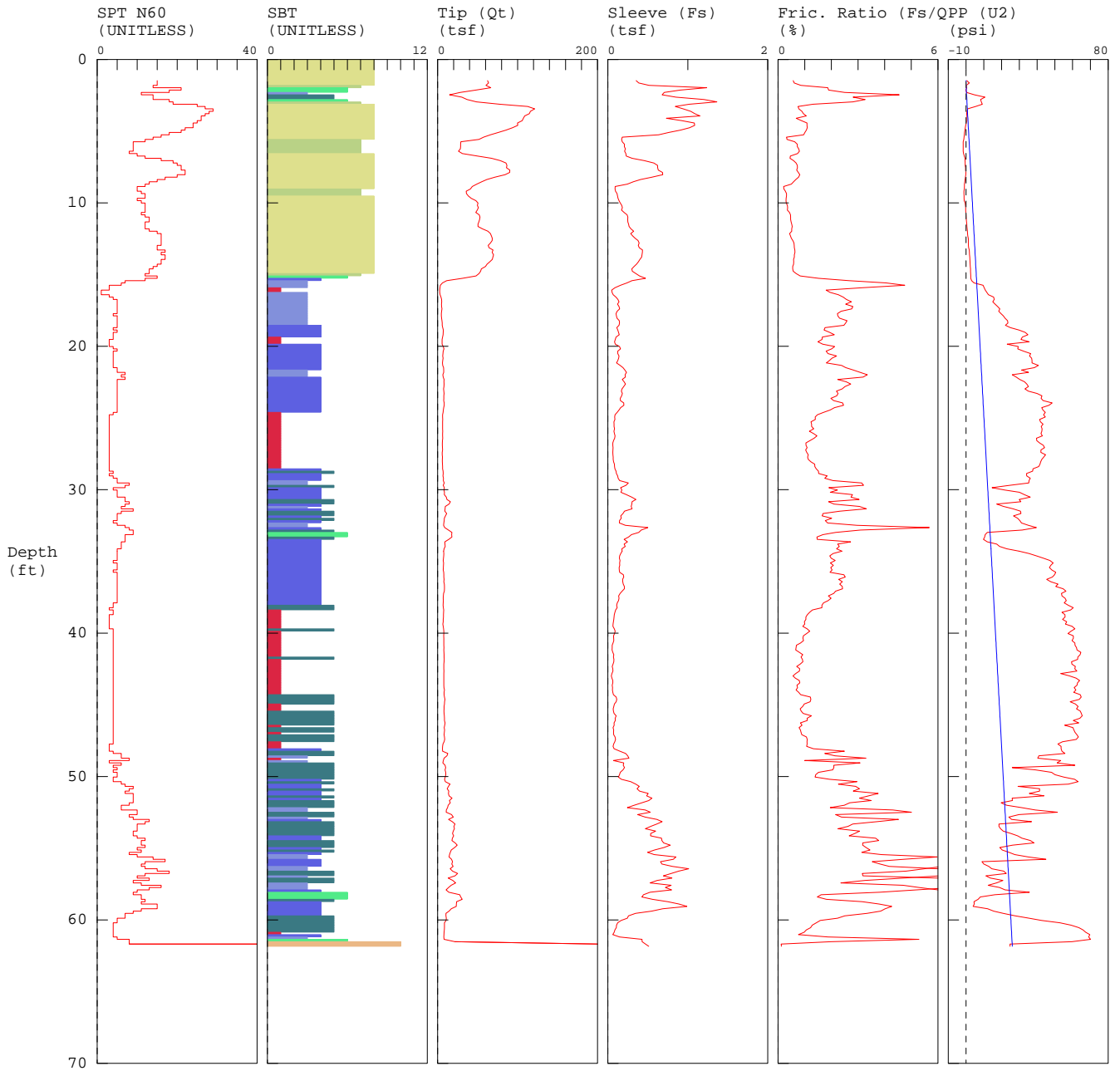
- 1 sensitive fine grained
 - 2 organic material
 - 3 clay
- 4 silty clay to clay
 - 5 clayey silt to silty clay
 - 6 sandy silt to clayey silt
- 7 silty sand to sandy silt
 - 8 sand to silty sand
 - 9 sand
- 10 gravelly sand to sand
 - 11 very stiff fine grained (*)
 - 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/30/19	Ground Surface Elevation: 25ft (NAVD 88)
Coordinates: Not Available	

CONE PENETRATION TEST CPT-1

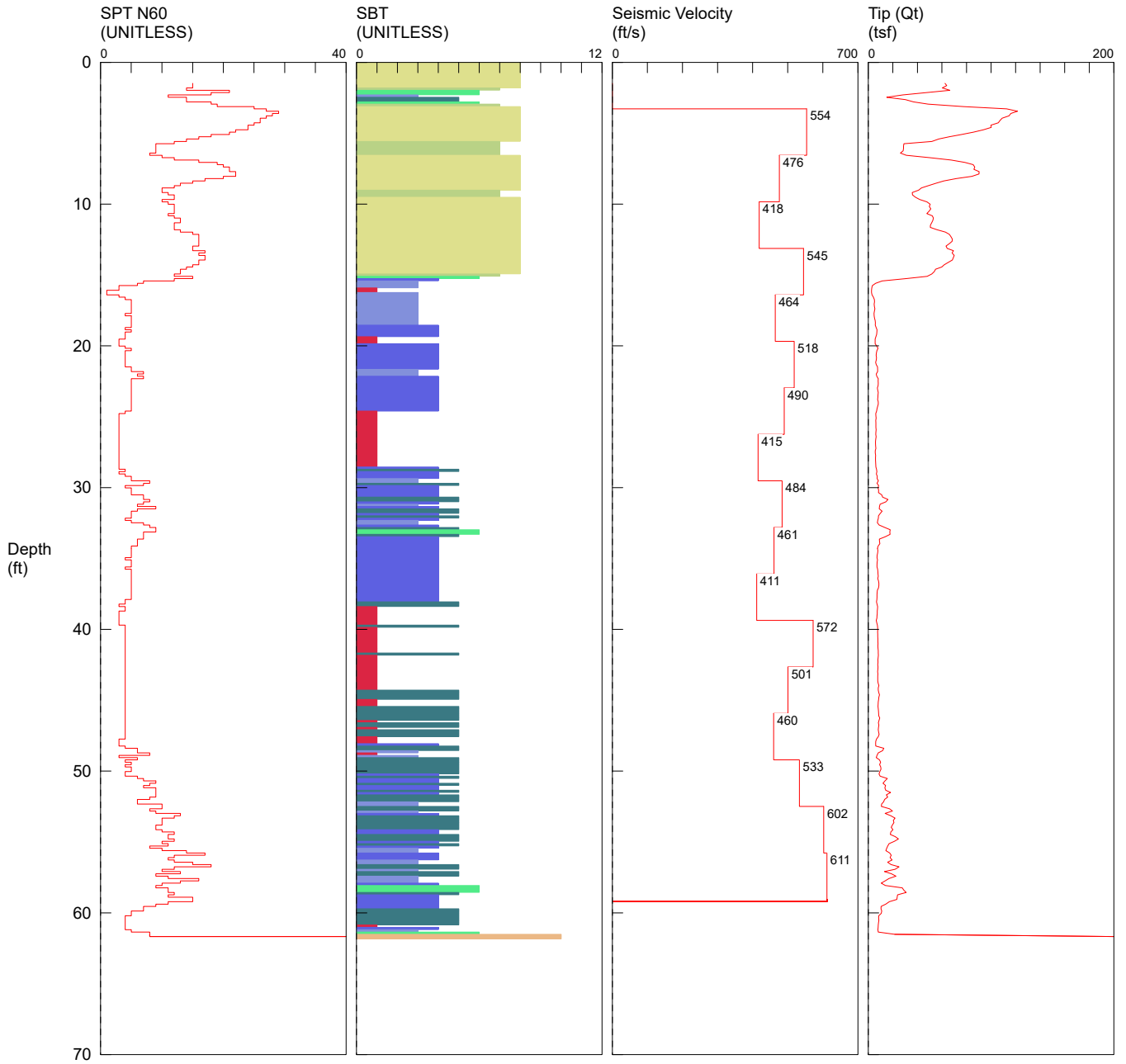


- | | | | |
|--------------------------|---------------------------|---------------------------|--------------------------------|
| 1 sensitive fine grained | 4 silty clay to clay | 7 silty sand to sandy sil | 10 gravelly sand to sand |
| 2 organic material | 5 clayey silt to silty cl | 8 sand to silty sand | 11 very stiff fine grained (*) |
| 3 clay | 6 sandy silt to clayey si | 9 sand | 12 sand to clayey sand (*) |
- *SBT/SPT CORRELATION: UBC-1983



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/30/19	Ground Surface Elevation: 25ft (NAVD 88)
Coordinates: Not Available	

CONE PENETRATION TEST CPT-2

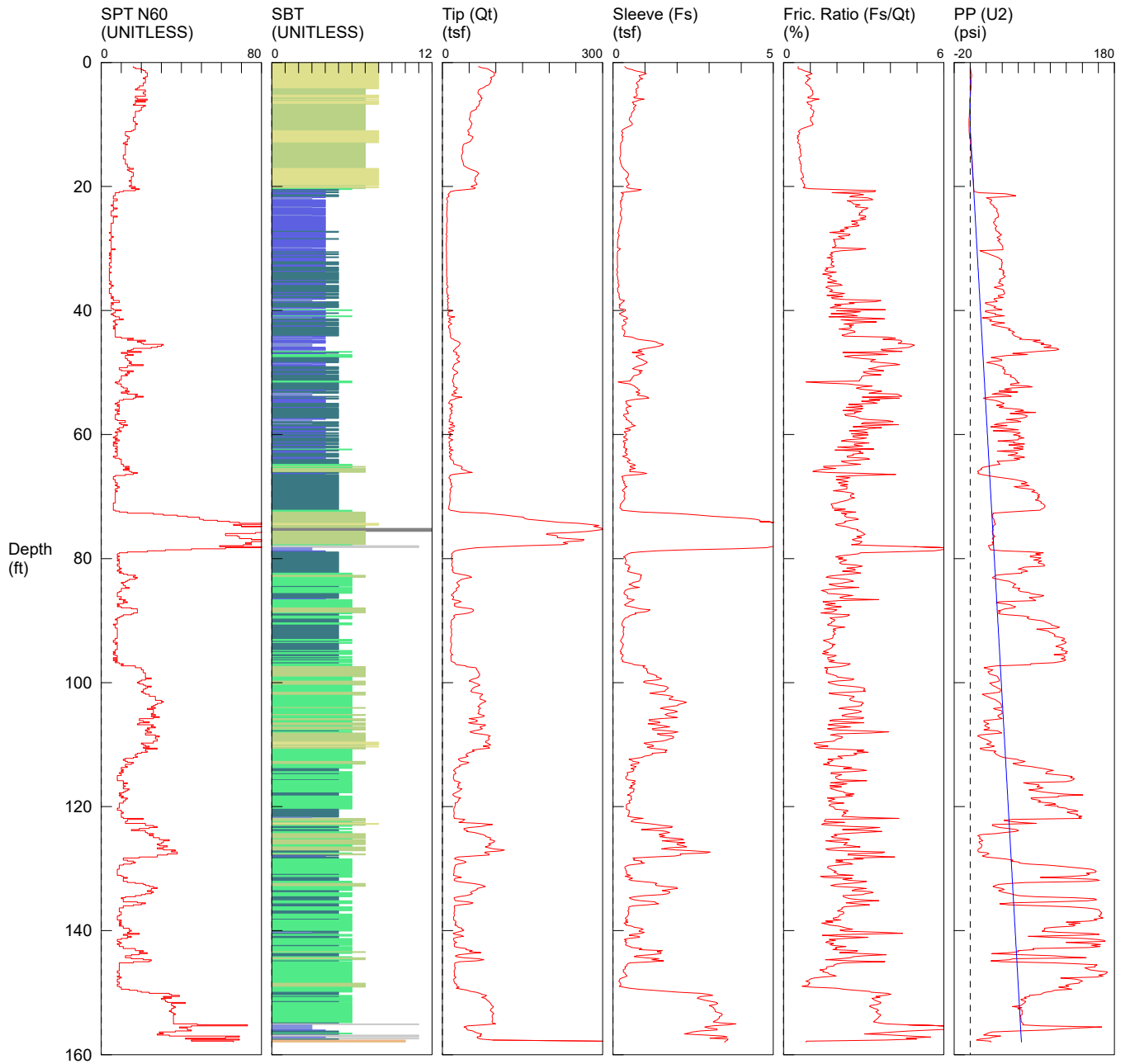


- | | | | |
|--------------------------|-----------------------------|----------------------------|--------------------------------|
| 1 sensitive fine grained | 4 silty clay to clay | 7 silty sand to sandy silt | 10 gravelly sand to sand |
| 2 organic material | 5 clayey silt to silty clay | 8 sand to silty sand | 11 very stiff fine grained (*) |
| 3 clay | 6 sandy silt to clayey silt | 9 sand | 12 sand to clayey sand (*) |
- *SBT/SPT CORRELATION: UBC-1983

Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/30/19	Ground Surface Elevation: 22ft (NAVD 88)
Coordinates: Not Available	



CONE PENETRATION TEST CPT-2 (SEISMIC VELOCITY PROFILE)



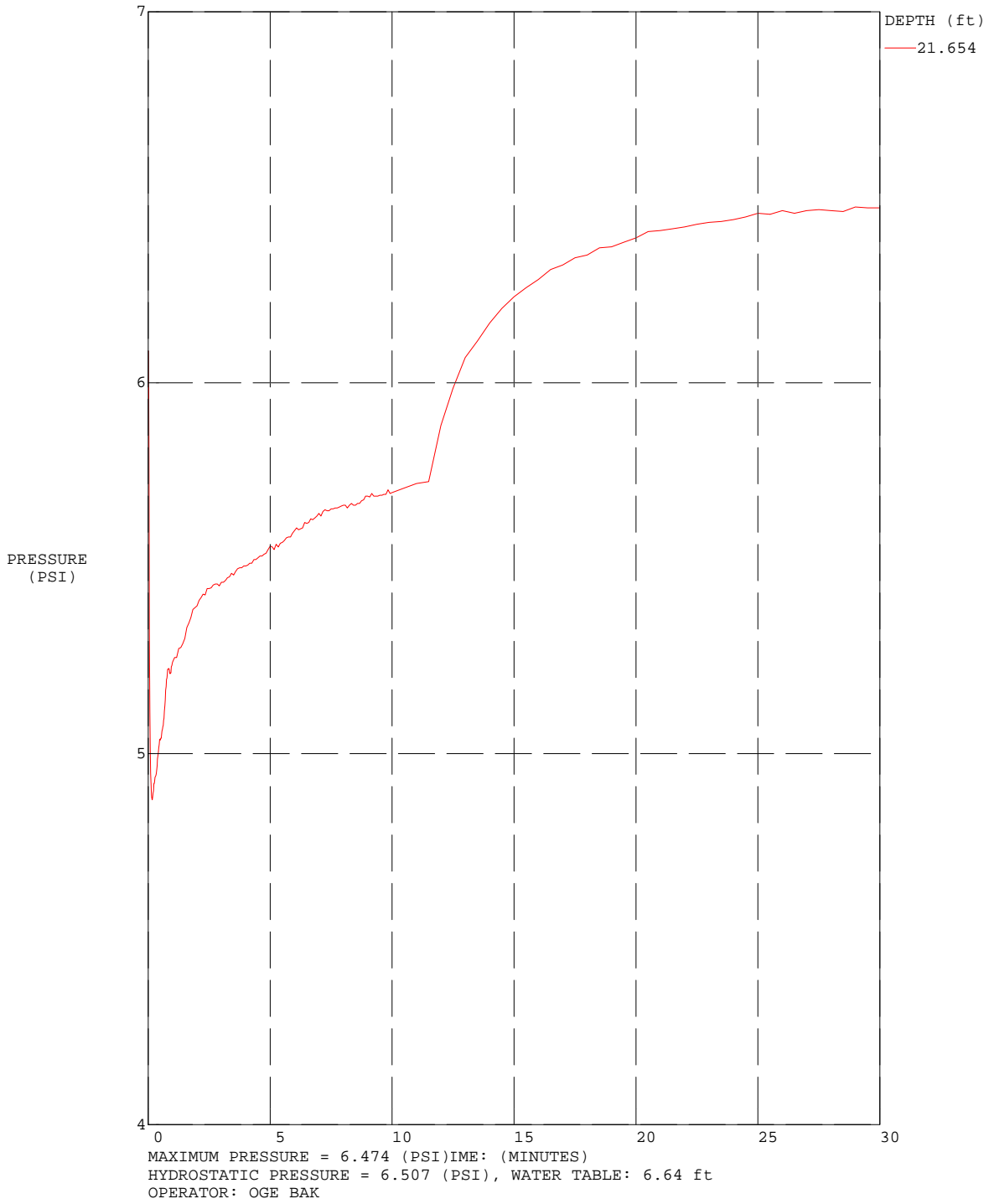
- | | | | |
|--------------------------|-----------------------------|----------------------------|--------------------------------|
| 1 sensitive fine grained | 4 silty clay to clay | 7 silty sand to sandy silt | 10 gravelly sand to sand |
| 2 organic material | 5 clayey silt to silty clay | 8 sand to silty sand | 11 very stiff fine grained (*) |
| 3 clay | 6 sandy silt to clayey silt | 9 sand | 12 sand to clayey sand (*) |

*SBT/SPT CORRELATION: UBC-1983



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/31/19	Ground Surface Elevation: 25ft (NAVD 88)
Coordinates: Not Available	

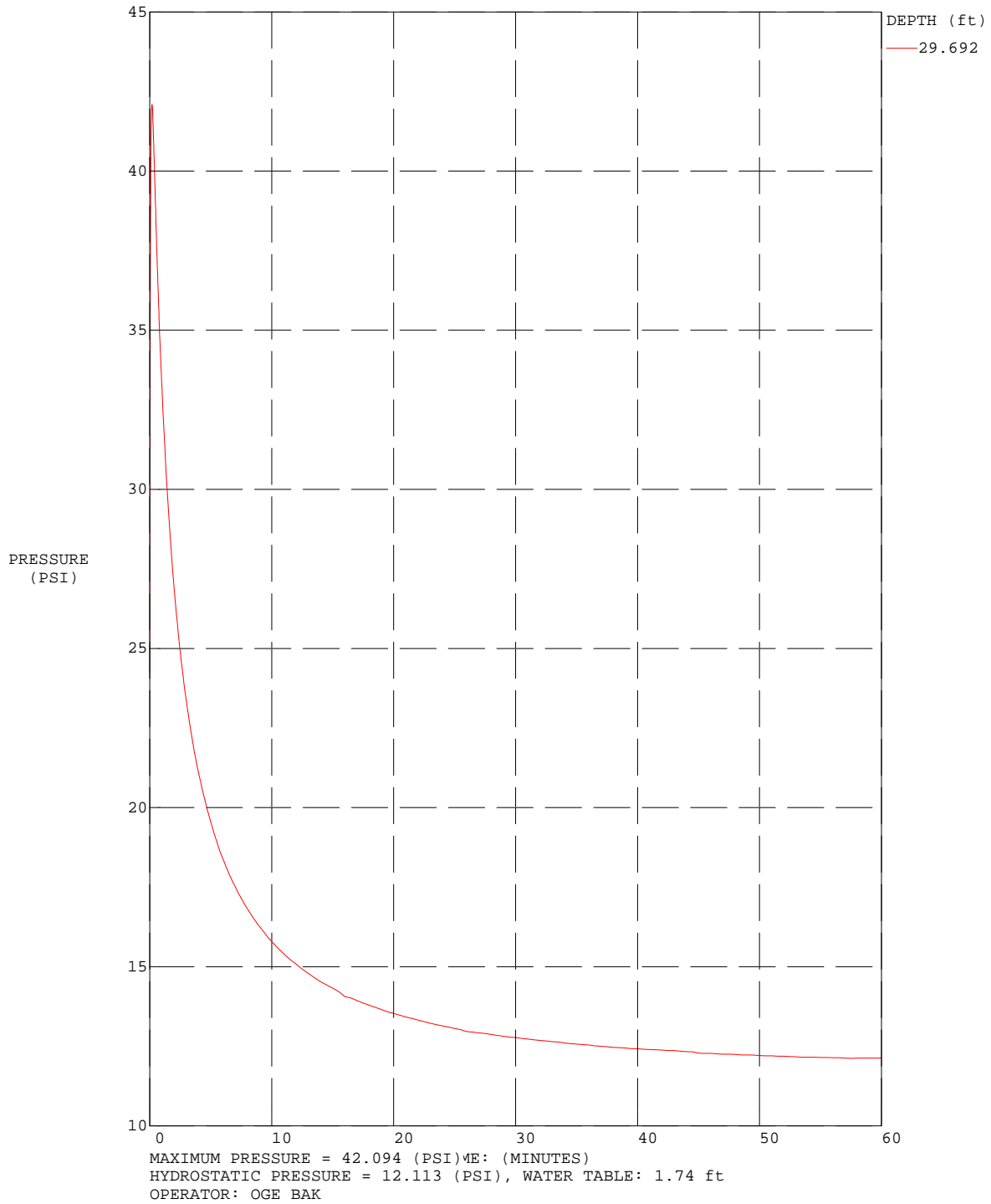
CONE PENETRATION TEST CPT-3



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/30/19	Ground Surface Elevation: 25ft (NAVD 88)
Coordinates: Not Available	



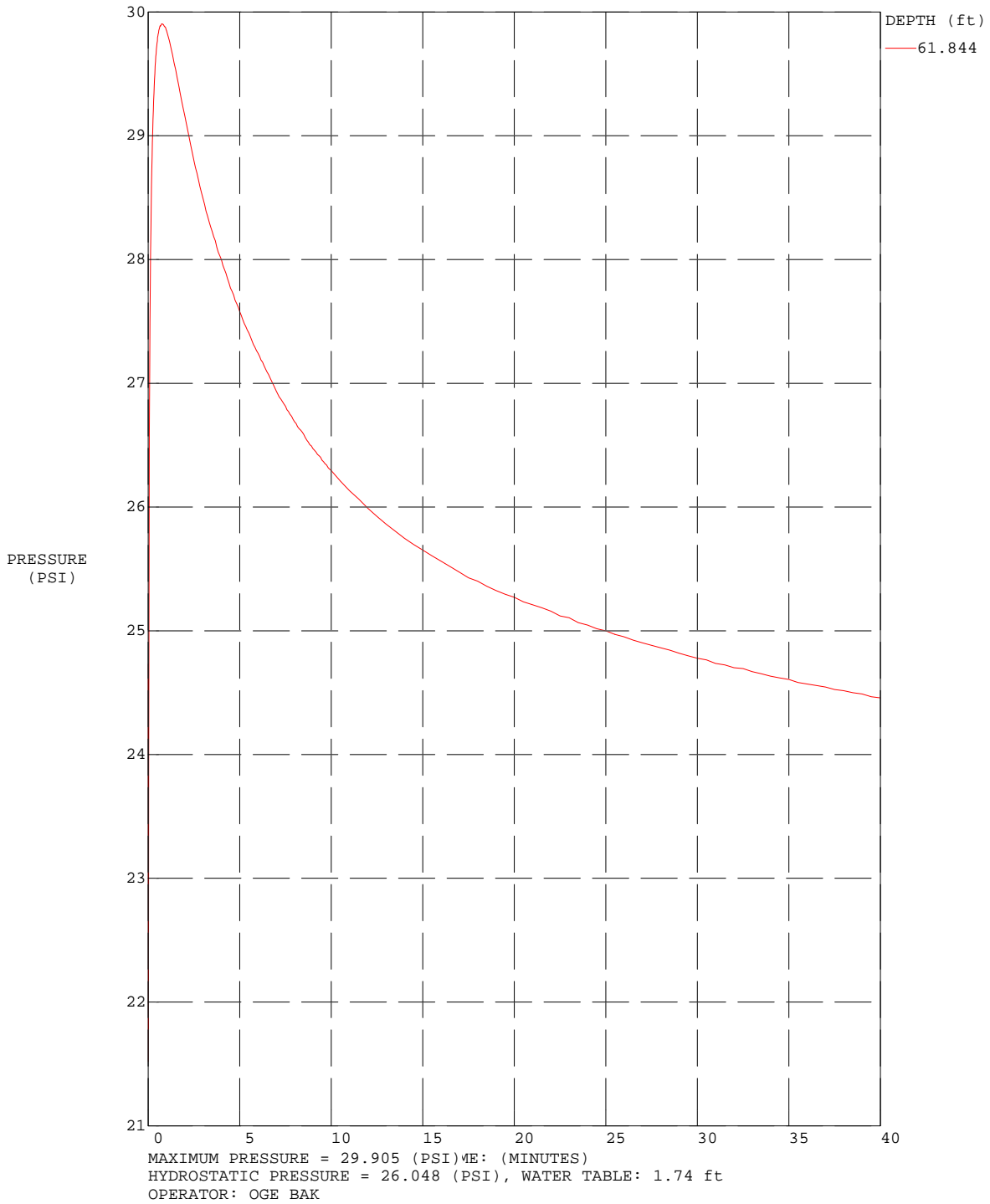
CONE PENETRATION TEST CPT-1 (PORE PRESSURE DISSIPATION)



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/30/19	Ground Surface Elevation: 25ft (NAVD 88)
Coordinates: Not Available	



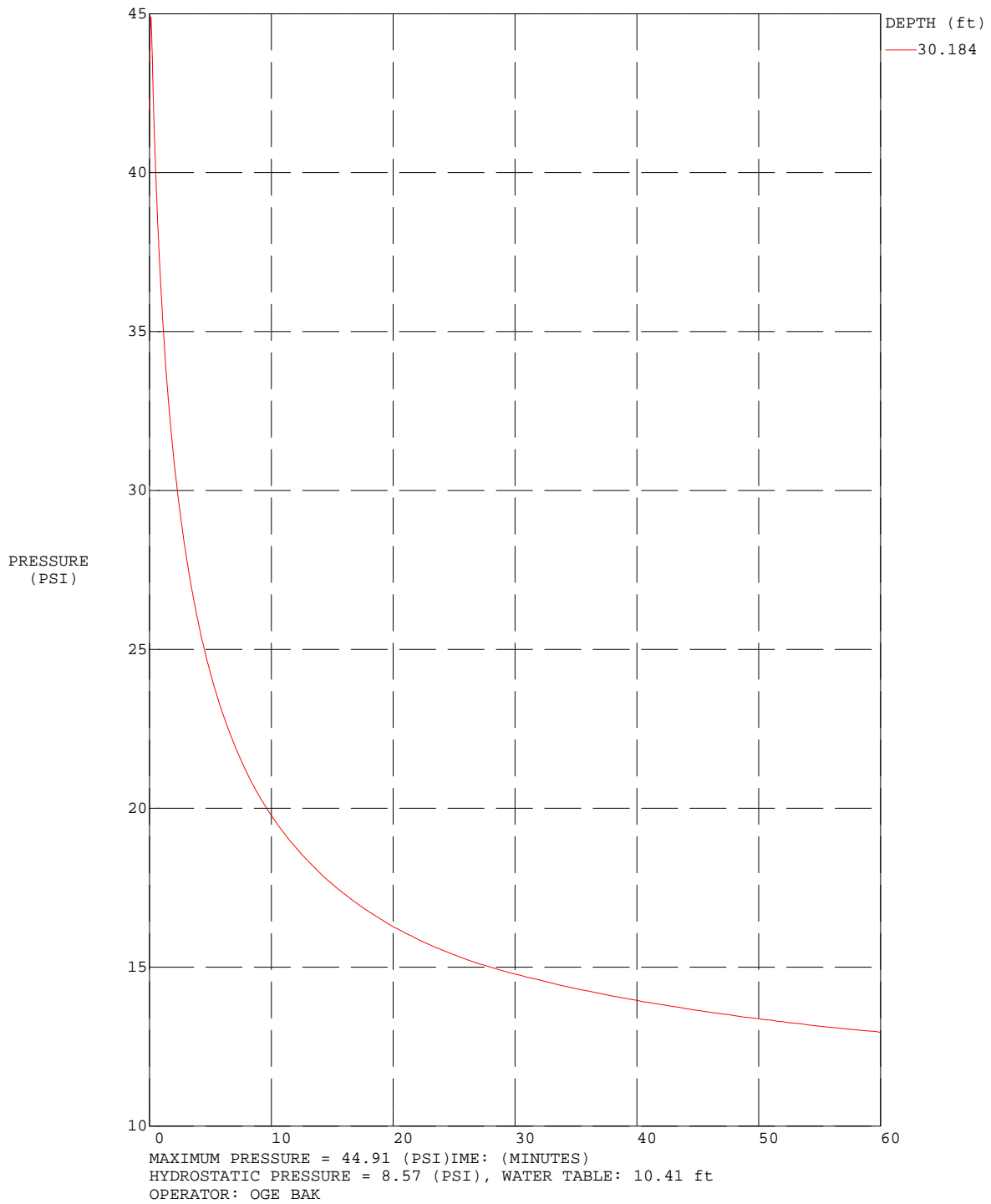
CONE PENETRATION TEST
CPT-2
 (PORE PRESSURE DISSIPATION)



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/30/19	Ground Surface Elevation: 25ft (NAVD 88)
Coordinates: Not Available	



CONE PENETRATION TEST CPT-2 (PORE PRESSURE DISSIPATION)



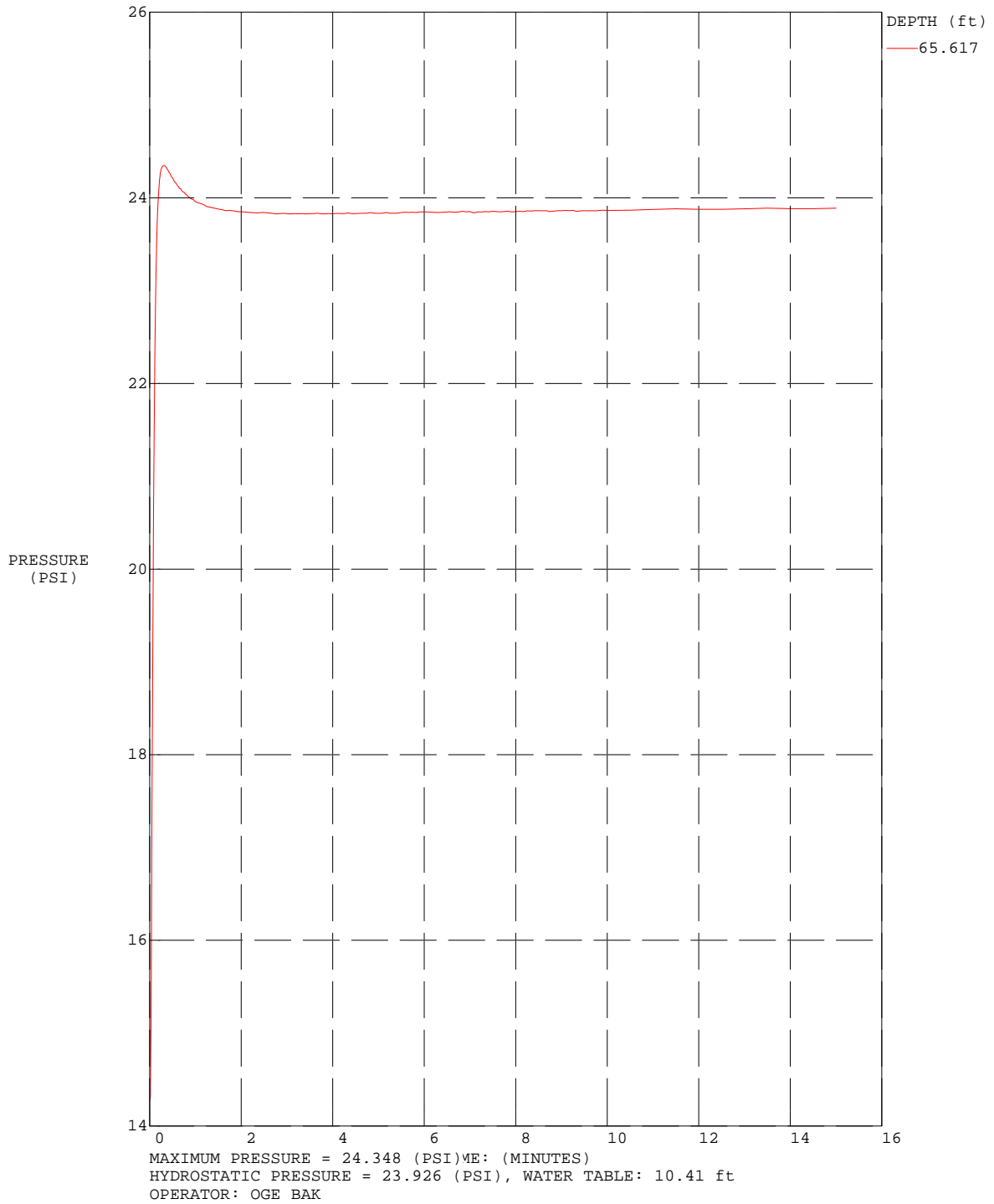
Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/31/19	Ground Surface Elevation: 22ft (NAVD 88)
Coordinates: Not Available	



CONE PENETRATION TEST

CPT-3

(PORE PRESSURE DISSIPATION)



Observed By: G. Martin	Advanced By: Oregon Geotechnical Explorations, Inc.
Date Started: 07/31/19	Ground Surface Elevation: 22ft (NAVD 88)
Coordinates: Not Available	



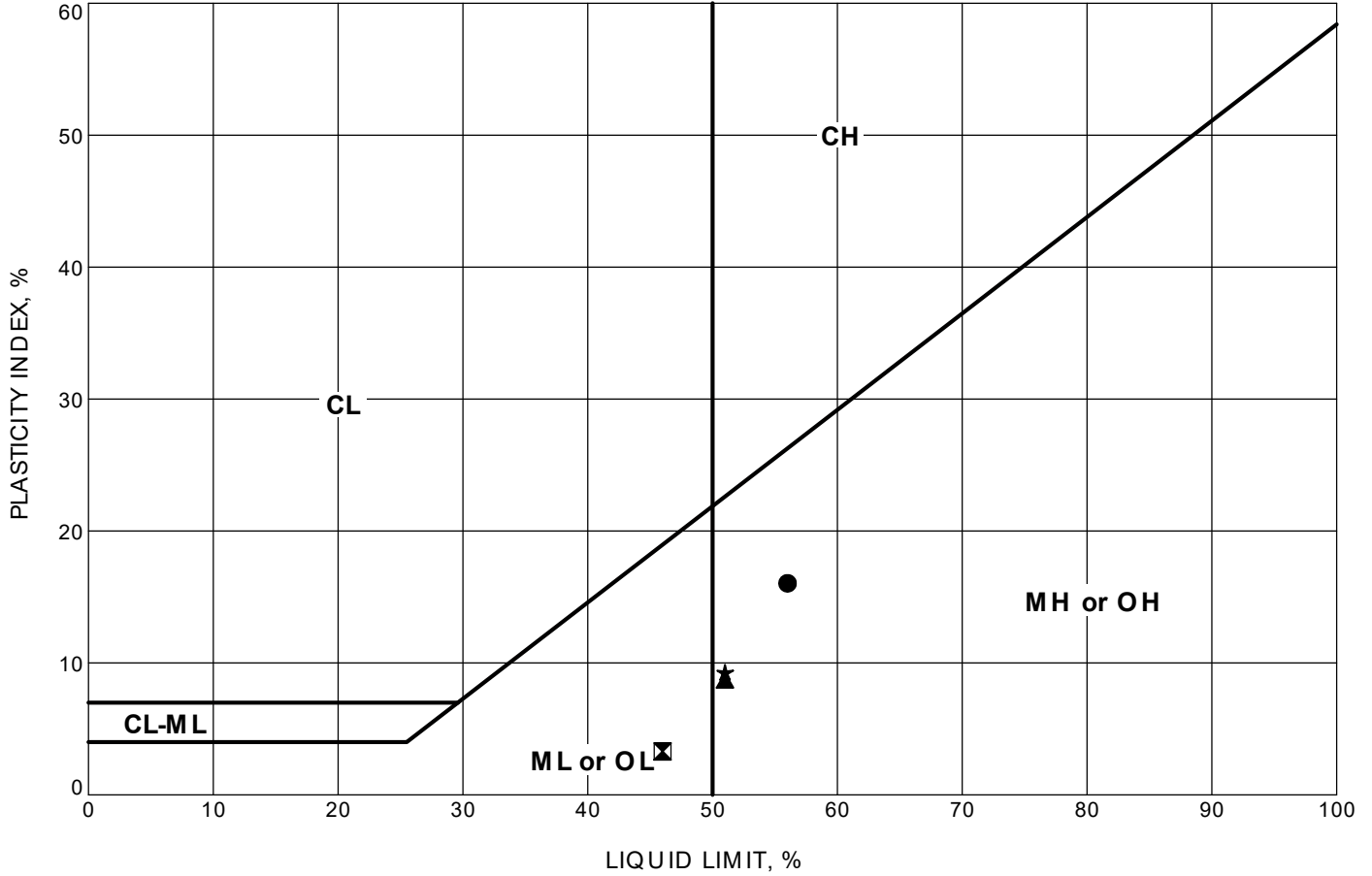
CONE PENETRATION TEST

CPT-3

(PORE PRESSURE DISSIPATION)

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



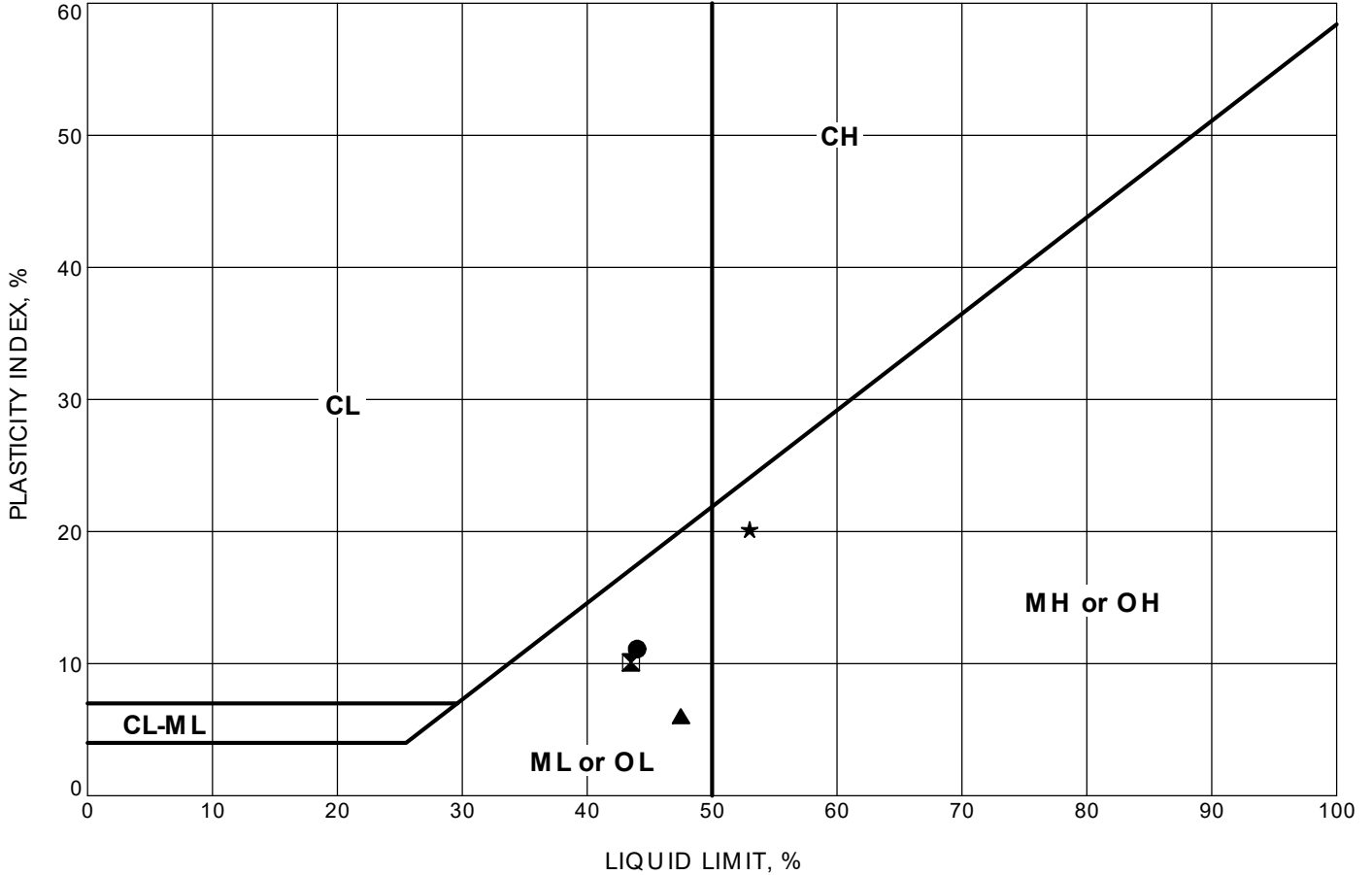
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-1	S-11	30.0	SILT, some clay to clayey, up to a trace of fine-grained sand, brown to dark-brown	56	40	16	52
☒	B-1	S-13	39.5	SILT, some fine-grained sand, trace clay, gray	46	43	3	46
▲	B-1	S-14	40.0	SILT, some clay, trace to some fine- to medium-grained sand, dark gray to brown-gray	51	42	9	51
★	B-1	S-17	50.0	SILT, some clay, trace to some fine- to medium-grained sand, dark gray to brown-gray	51	42	9	47



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



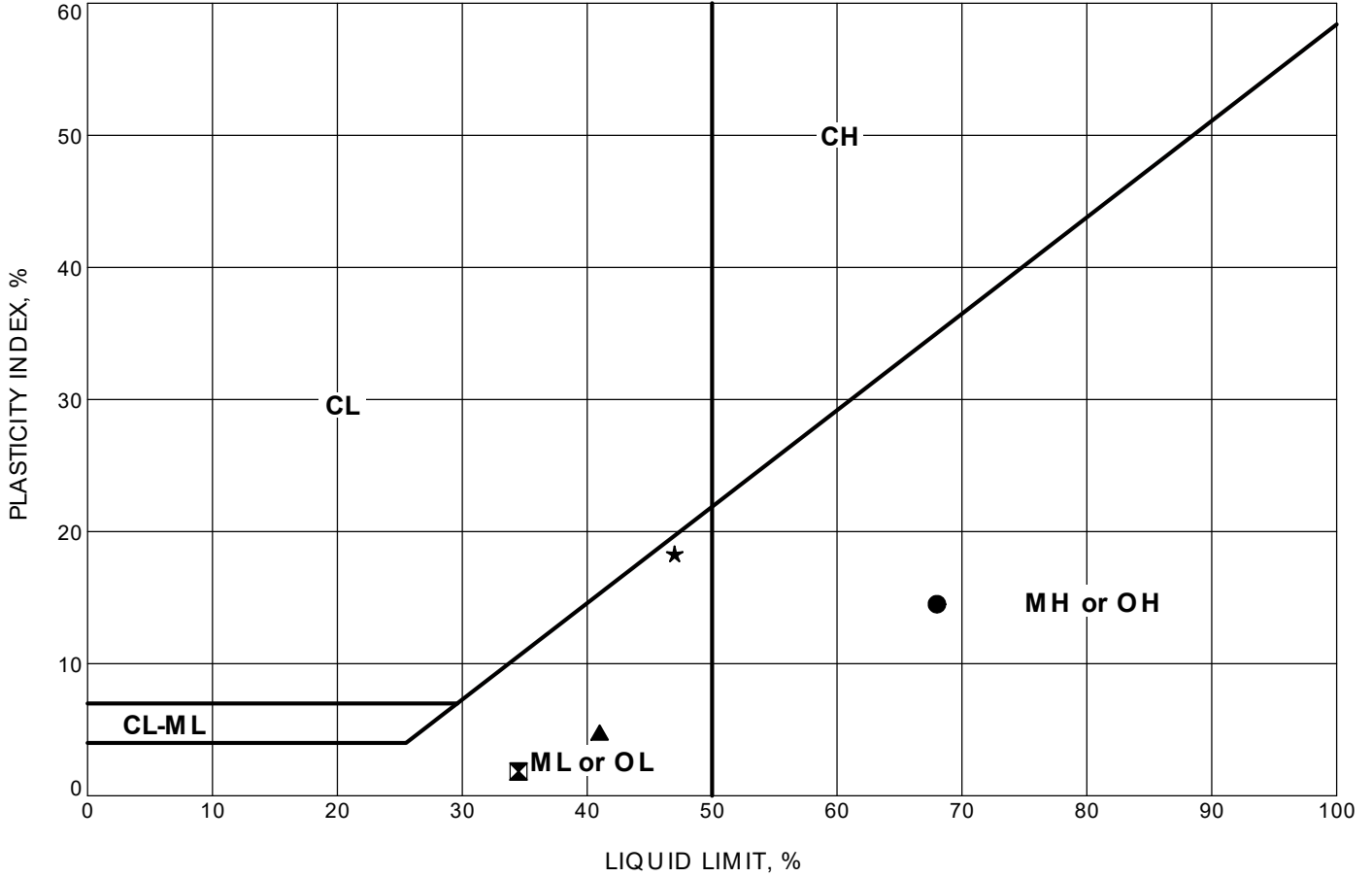
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-1	S-19	60.0	SILT, some clay and fine-grained sand, dark gray	44	33	11	49
☒	B-1	S-22	75.0	Sandy SILT, some clay to clayey, dark gray, fine-grained sand	44	33	11	54
▲	B-1	S-23	80.0	SILT, some fine-grained sand to sandy, trace to some clay, dark brown-gray	48	41	7	37
★	B-1	S-25	100.0	SILT, some clay to clayey, up to trace fine-grained sand, gray	53	33	20	52



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



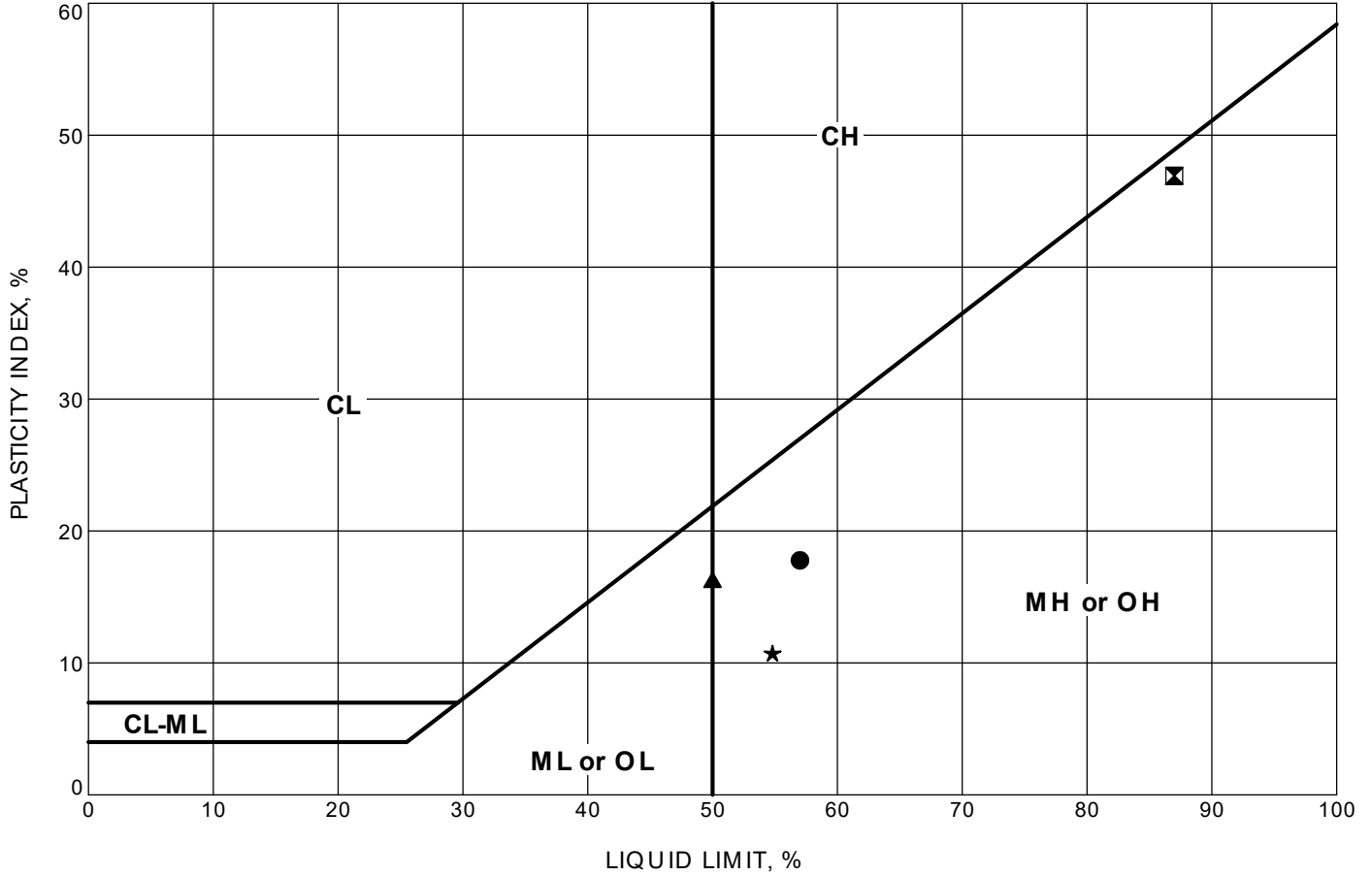
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-1	S-28	130.0	SILT, some clay to clayey, up to trace fine-grained sand	68	53	15	68
⊠	B-1	S-31	160.0	SILT, trace to some fine-grained sand, trace clay, gray	35	33	1	38
▲	B-1	S-33	180.0	SILT, trace to some clay, up to trace fine-grained sand, gray	41	36	5	42
★	B-2	S-4	10.0	Clayey SILT, up to trace fine-grained sand, dark gray-brown	47	29	18	44



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



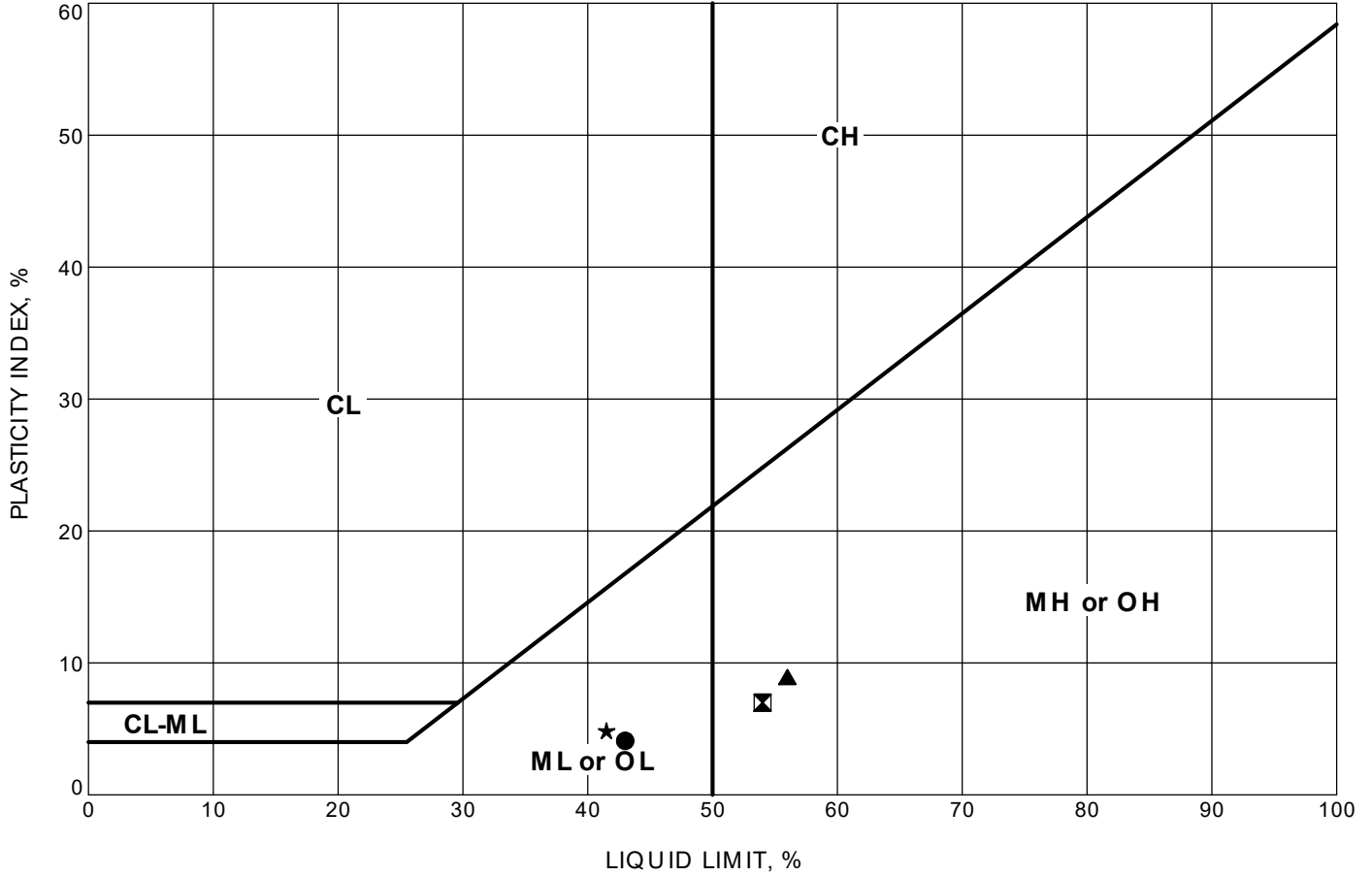
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-2	S-9	25.0	Clayey SILT, up to trace fine-grained sand, dark gray	57	39	18	55
⊠	B-2	S-16	50.0	Clayey SILT, up to trace fine-grained sand, dark gray to dark brown	87	40	47	68
▲	B-2	S-20	64.0	SILT, some clay, trace to some fine-grained sand, gray	50	34	16	48
★	B-2	S-21	65.0	SILT, trace to some clay and fine-grained sand, dark gray	55	44	11	46



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



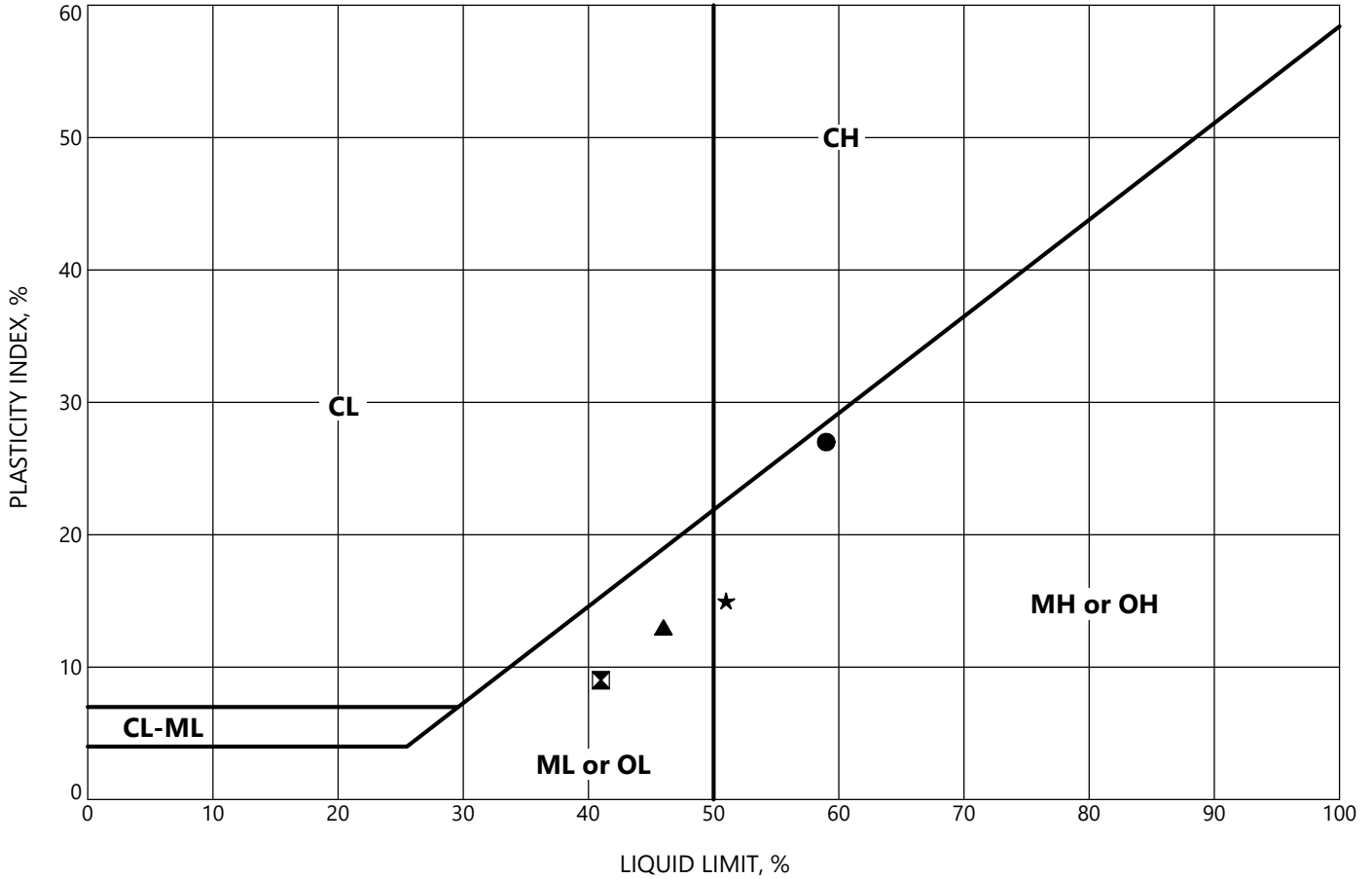
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-2	S-23	75.0	SILT, trace to some clay and fine-grained sand, dark gray	43	39	4	41
⊠	B-2	S-26	90.0	SILT, trace to some clay and fine-grained sand, dark gray-brown	54	47	7	48
▲	B-2	S-28	100.0	SILT, trace to some clay, up to trace fine-grained sand, dark gray-brown	56	47	9	56
★	B-2	S-30	115.0	SILT, trace to some clay and fine-grained sand, dark gray	42	37	5	40



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



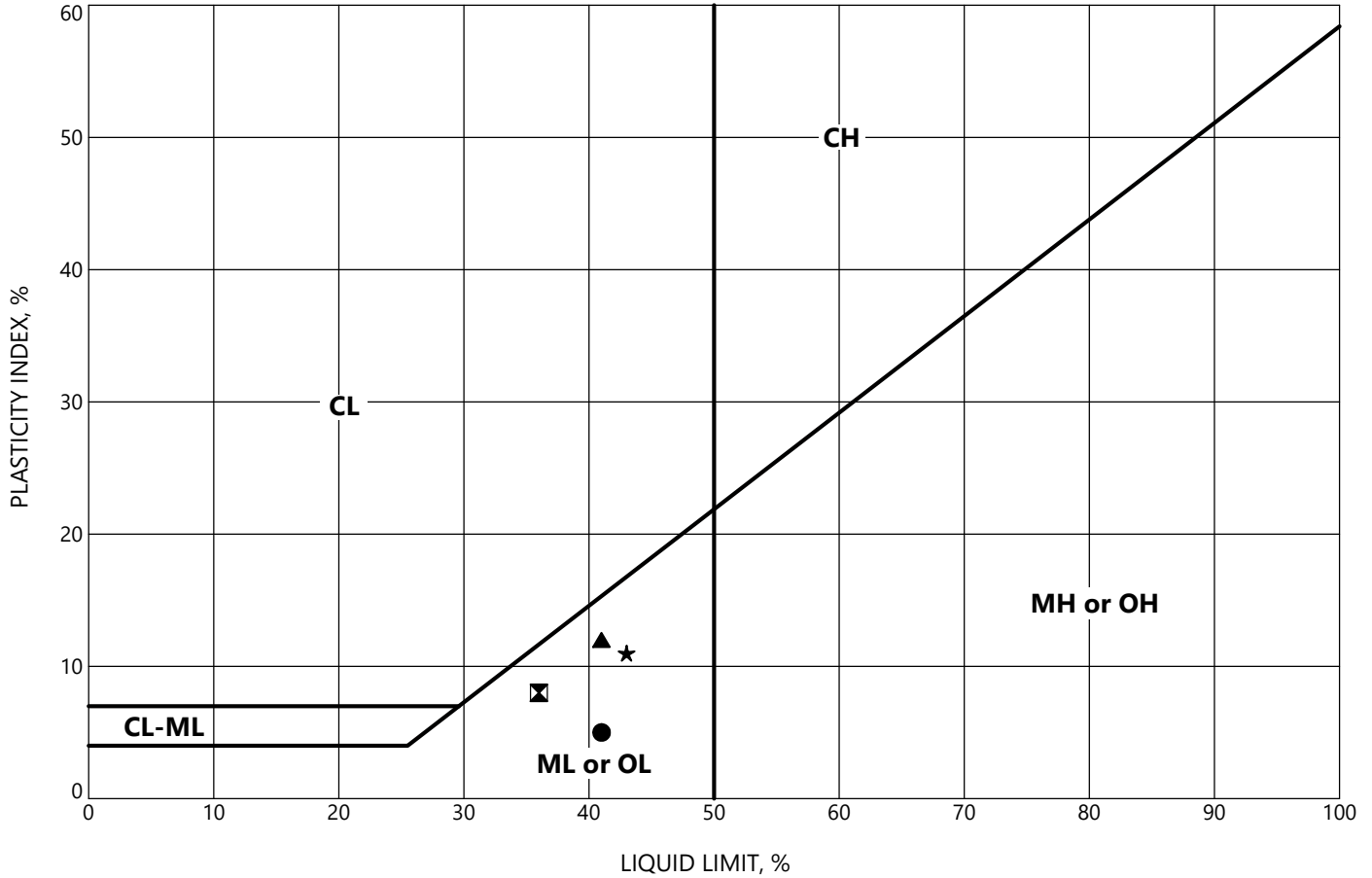
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-3	S-6	27.0	Clayey SILT, some fine-grained sand, gray	59	32	27	55
⊠	B-3	S-9	37.0	SILT, some clay, trace fine-grained sand, gray	41	32	9	51
▲	B-3	S-12	47.0	SILT, some clay, trace fine-grained sand, gray	46	33	13	50
★	B-3	S-15	65.0	SILT, some clay to clayey, trace fine-grained sand, gray	51	36	15	63



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

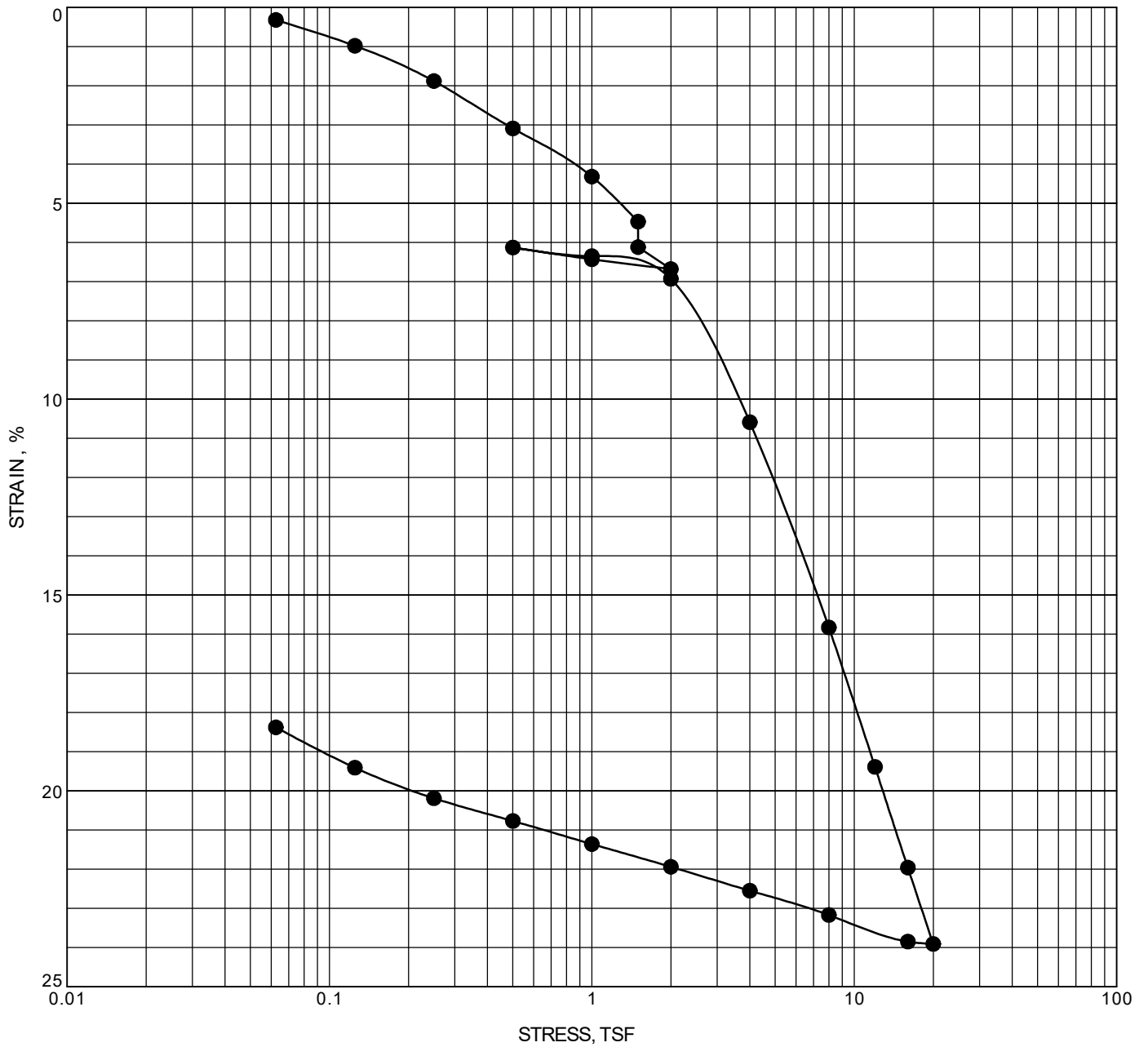
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-3	S-19	85.0	SILT, some clay, up to trace fine-grained sand, gray	41	36	5	45
☒	B-3	S-25	110.0	SILT, some clay, trace fine-grained sand, gray	36	28	8	42
▲	B-3	S-32	145.0	SILT, some clay to clayey, trace fine-grained sand, gray	41	29	12	45
★	B-3	S-39	175.0	SILT, some clay, trace fine-grained sand, gray	43	32	11	46



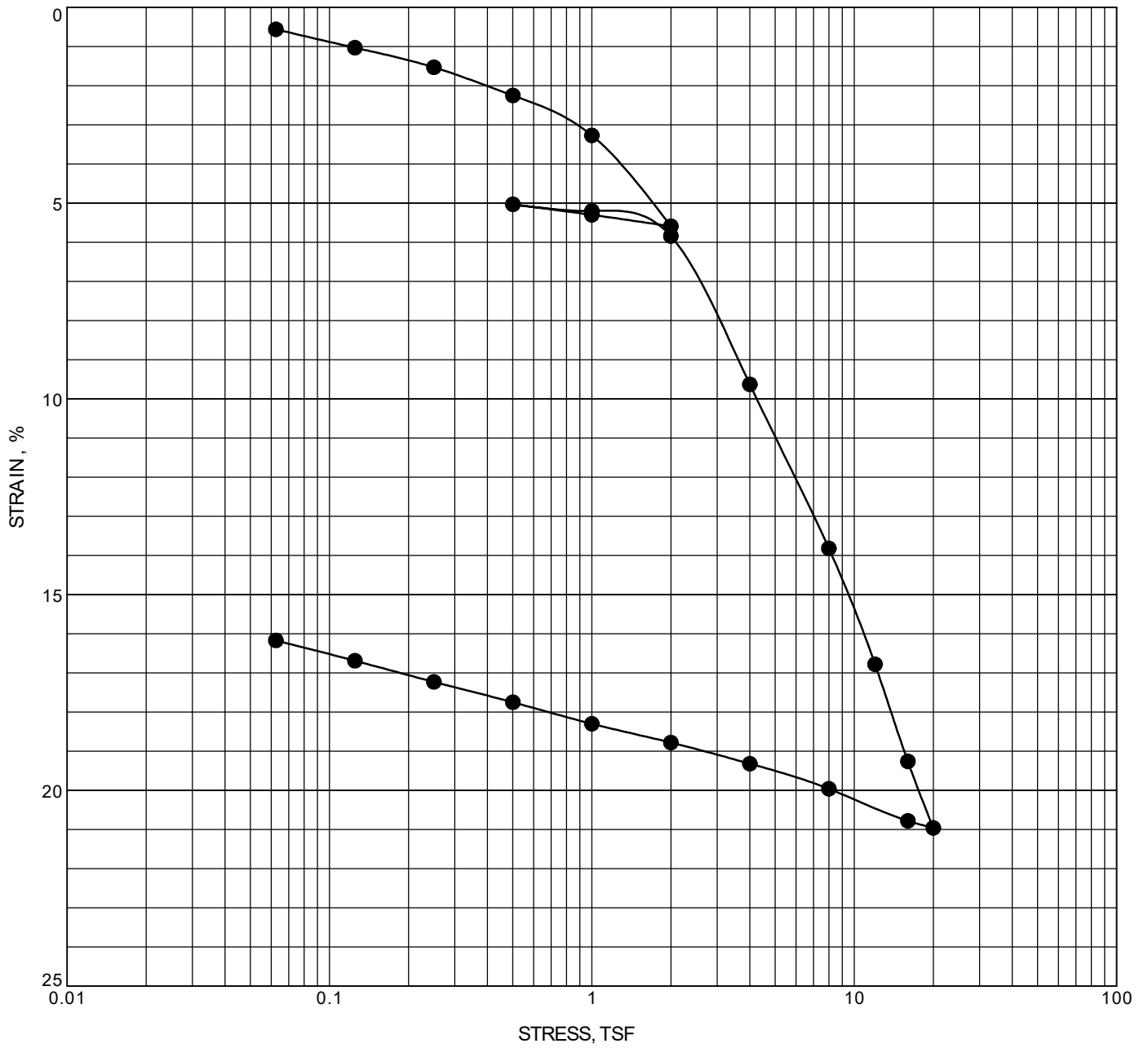
PLASTICITY CHART



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-1	S-10	29.8	SILT, some clay to clayey, up to trace fine-grained sand, gray, medium stiff	68	53



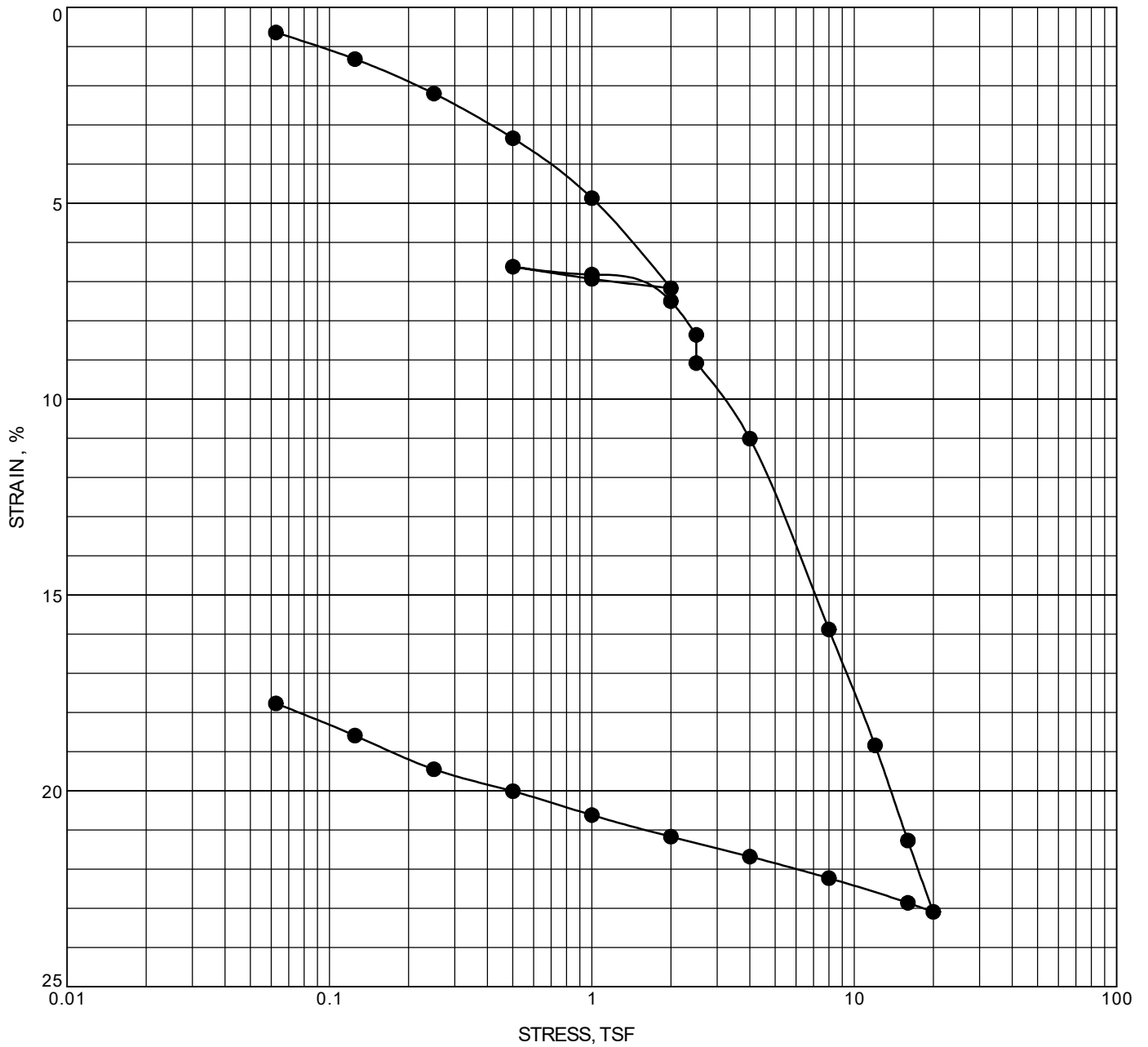
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-1	S-13	38.8	SILT, some fine-grained sand, trace clay, gray, soft to medium stiff	75	46



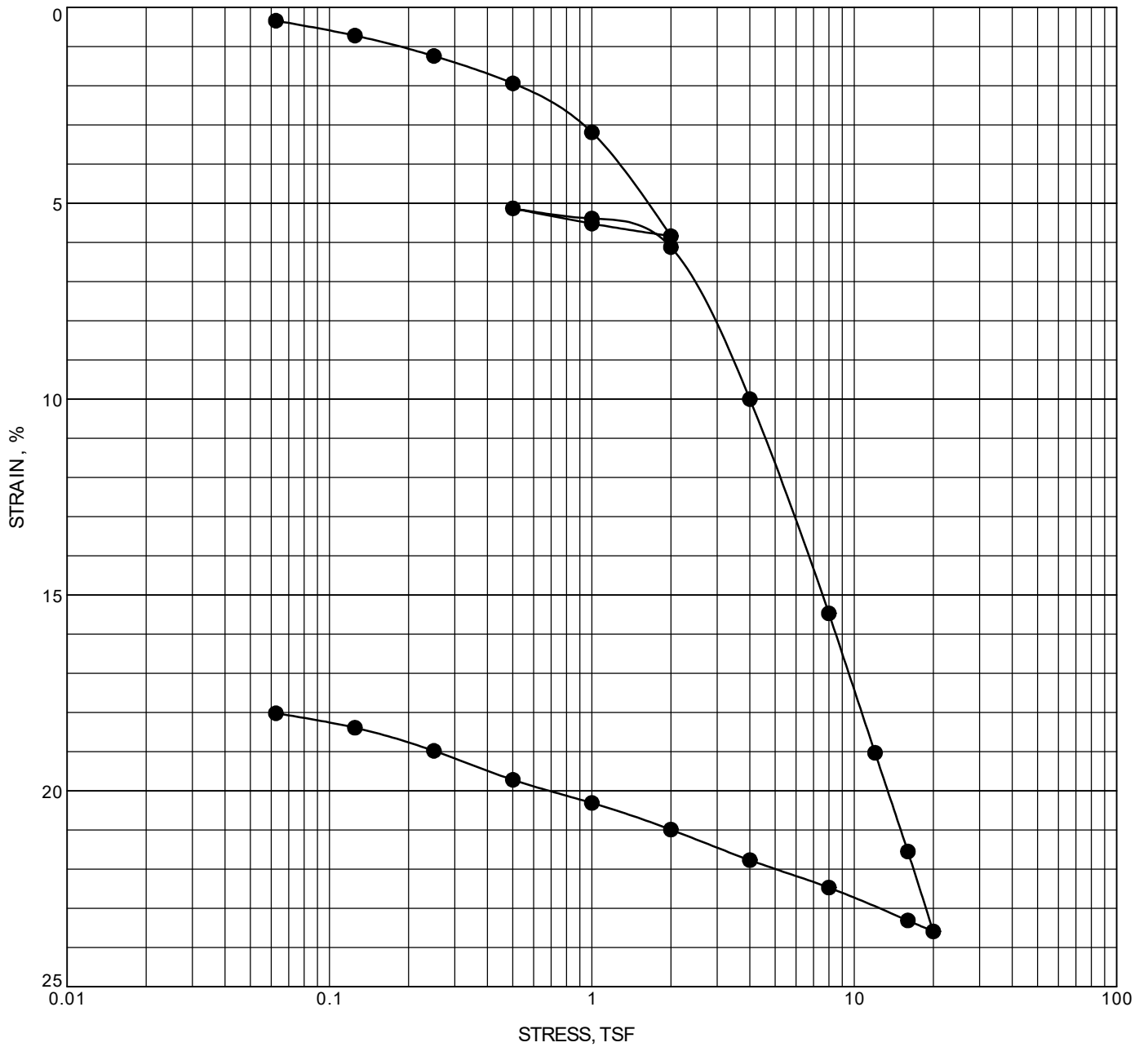
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-1	S-16	49.8	SILT, some clay, trace to some fine- to medium-grained sand, dark gray to brown-gray, medium stiff	70	50



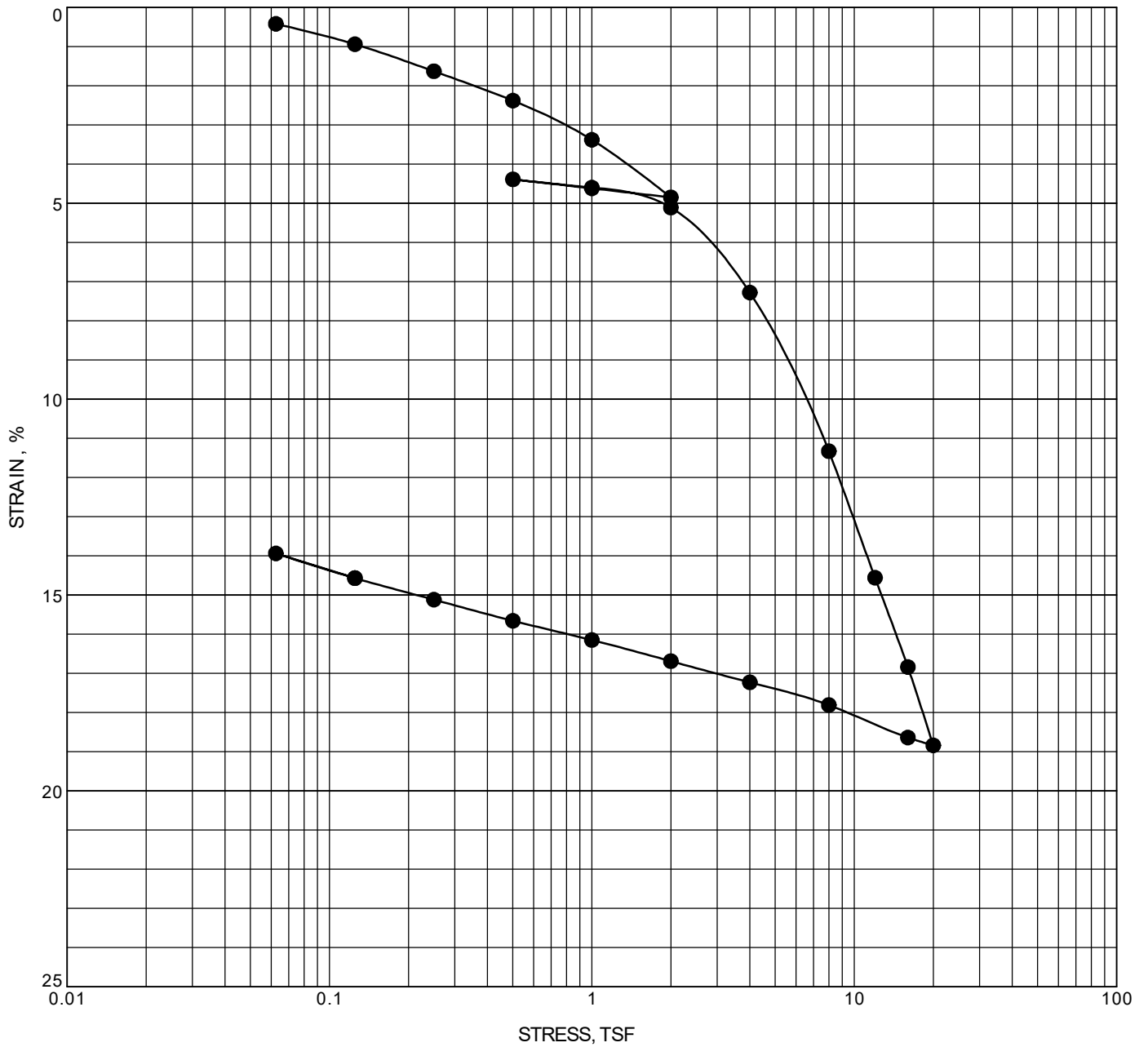
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-2	S-5	14.8	Clayey SILT, up to trace fine-grained sand, gray, medium stiff	74	50



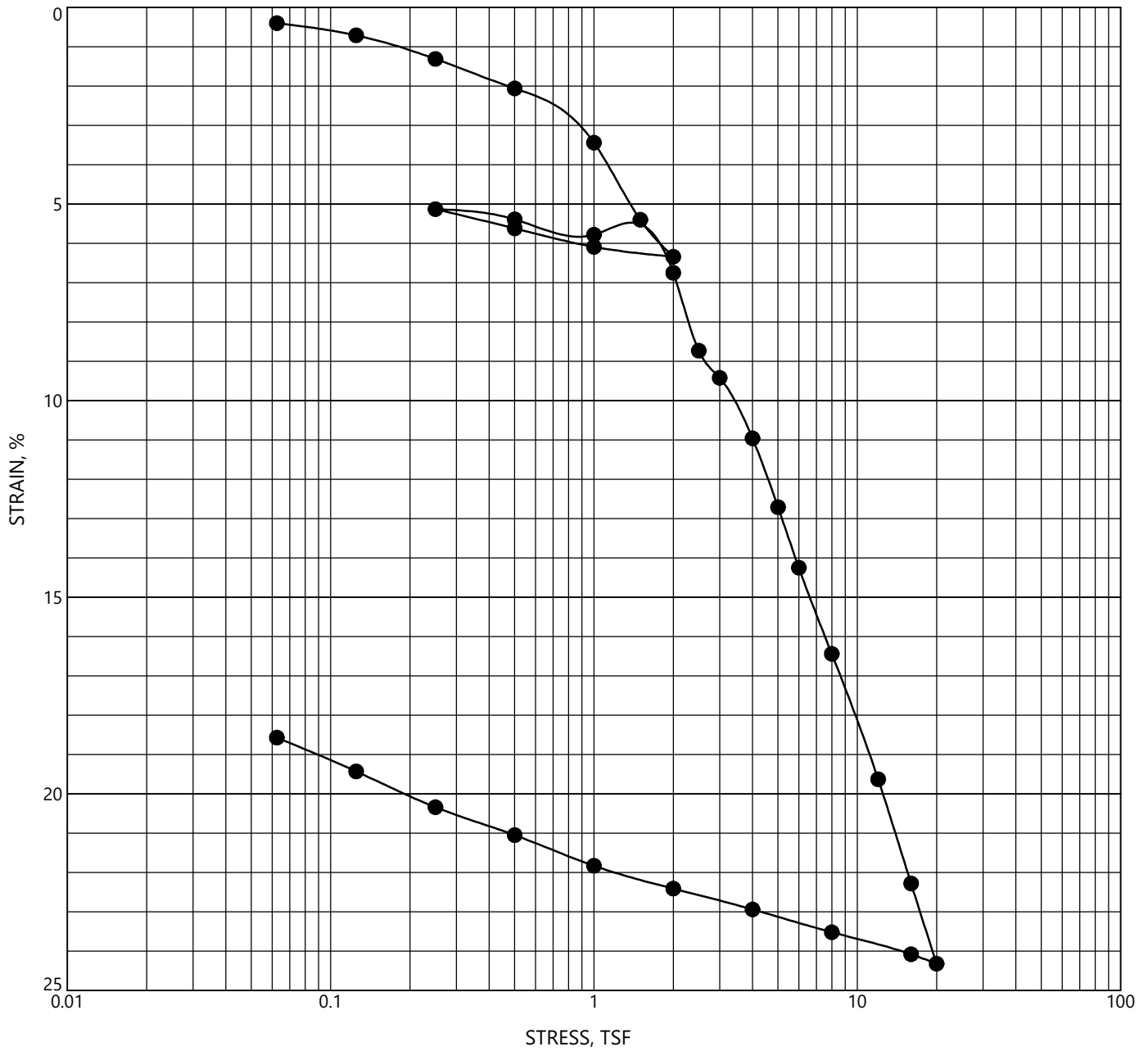
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-2	S-20	63.5	SILT, some clay, trace to some fine-grained sand, gray, soft to medium stiff	78	47



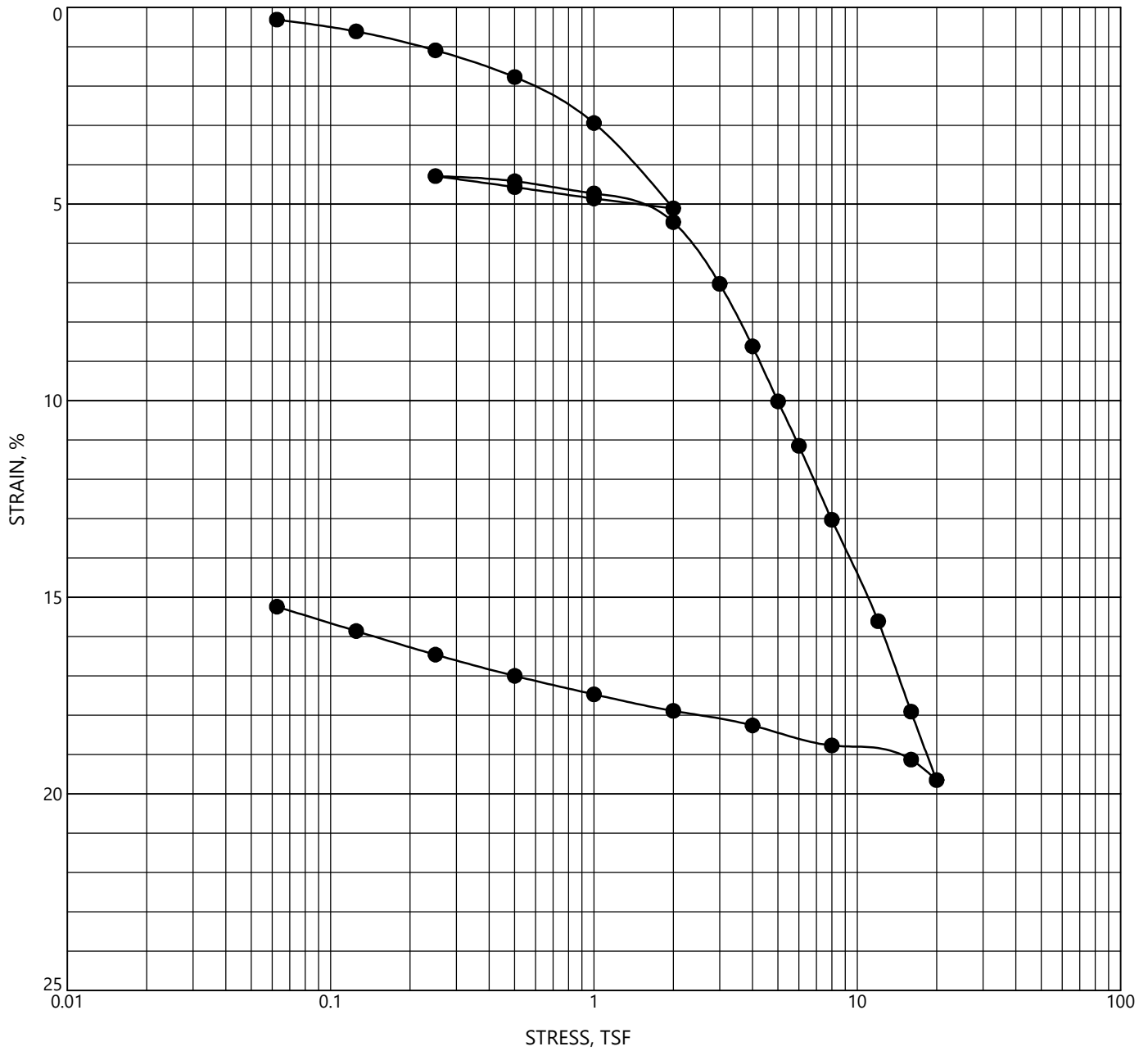
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-3	S-5	25.5	Clayey SILT, some fine-grained sand, gray	67	56



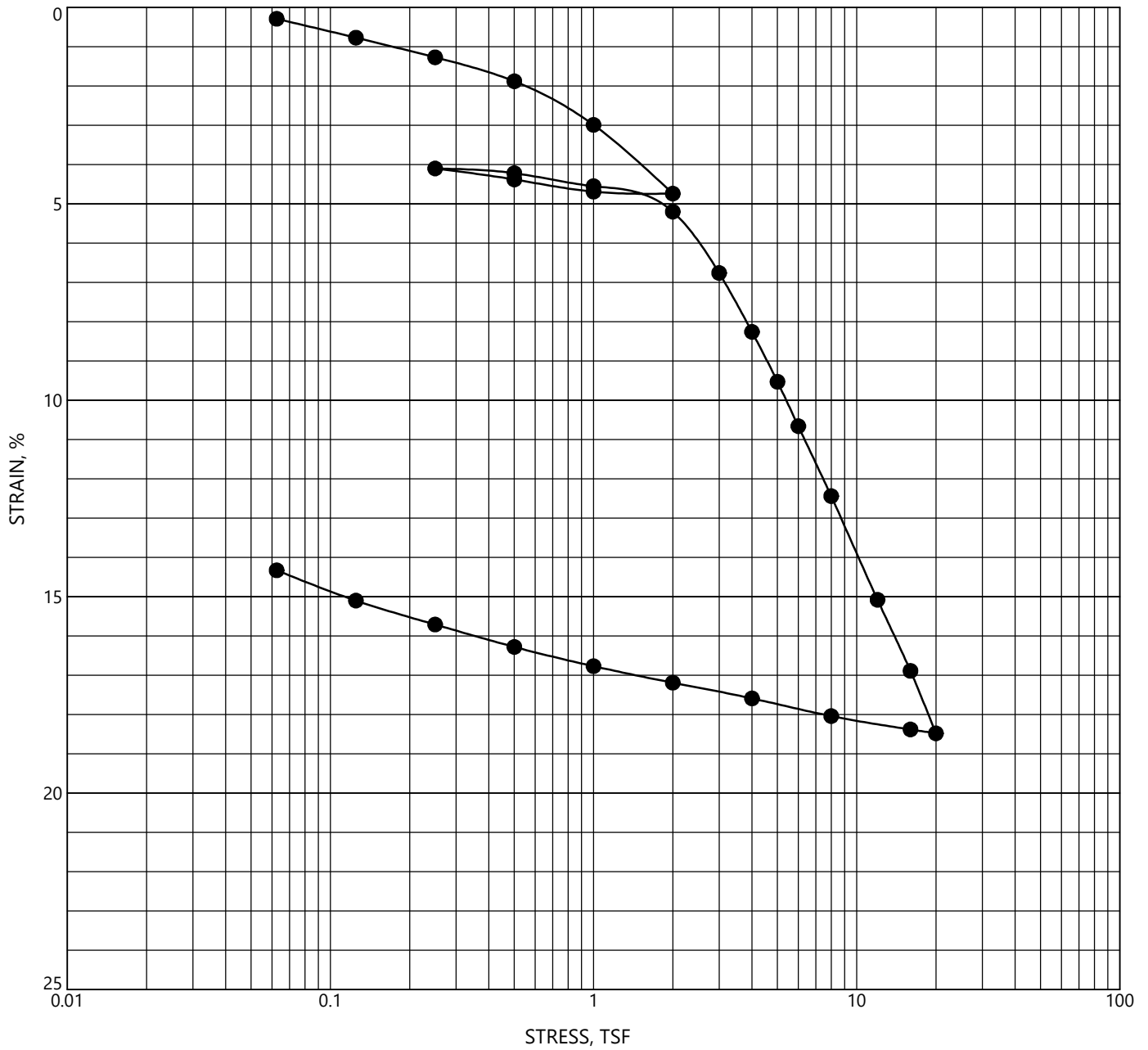
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-3	S-8	35.3	SILT, some clay, trace fine-grained sand, gray	74	48



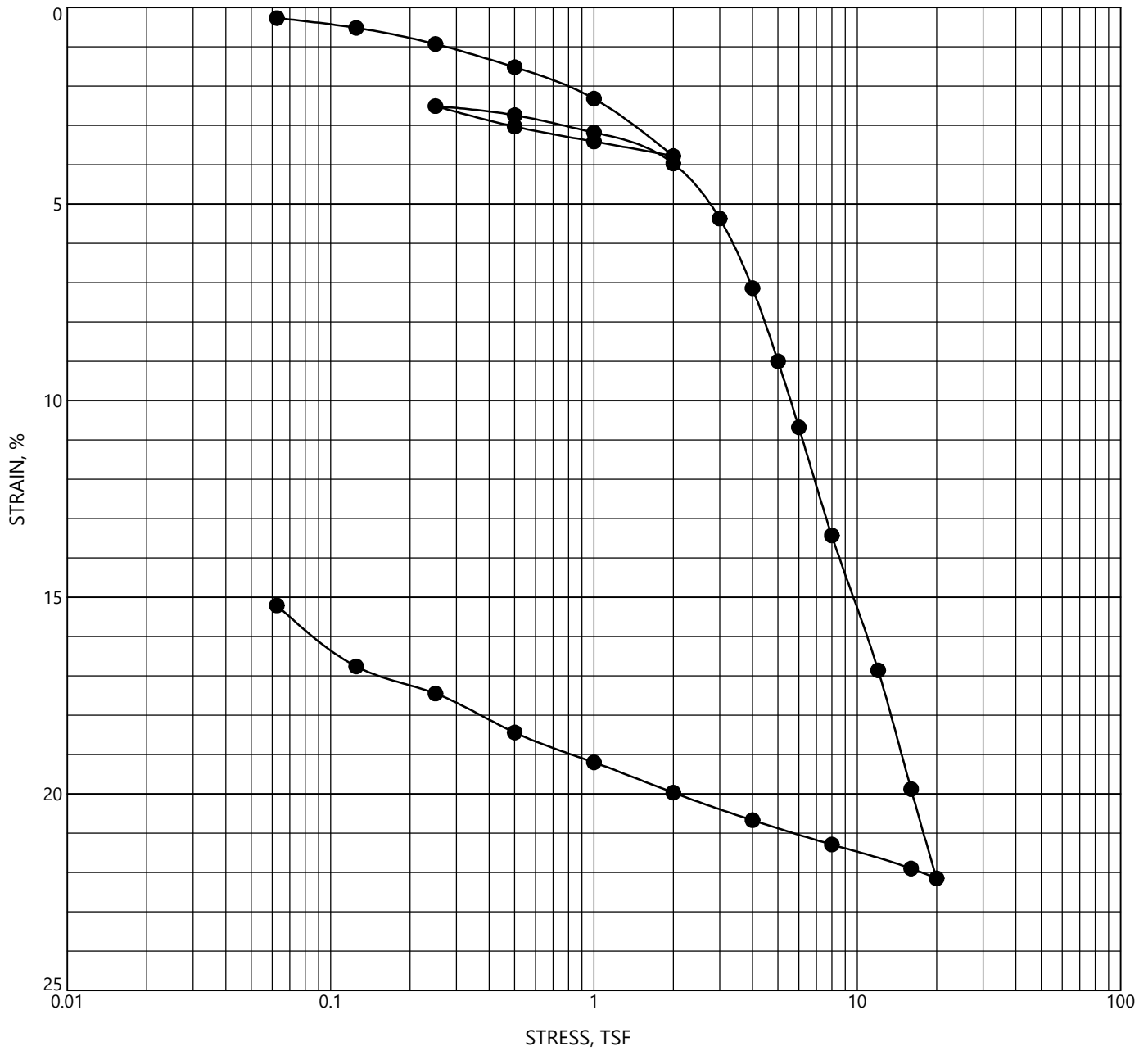
CONSOLIDATION TEST



●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-3	S-11	46.0	SILT, some clay, trace fine-grained sand, gray	76	46



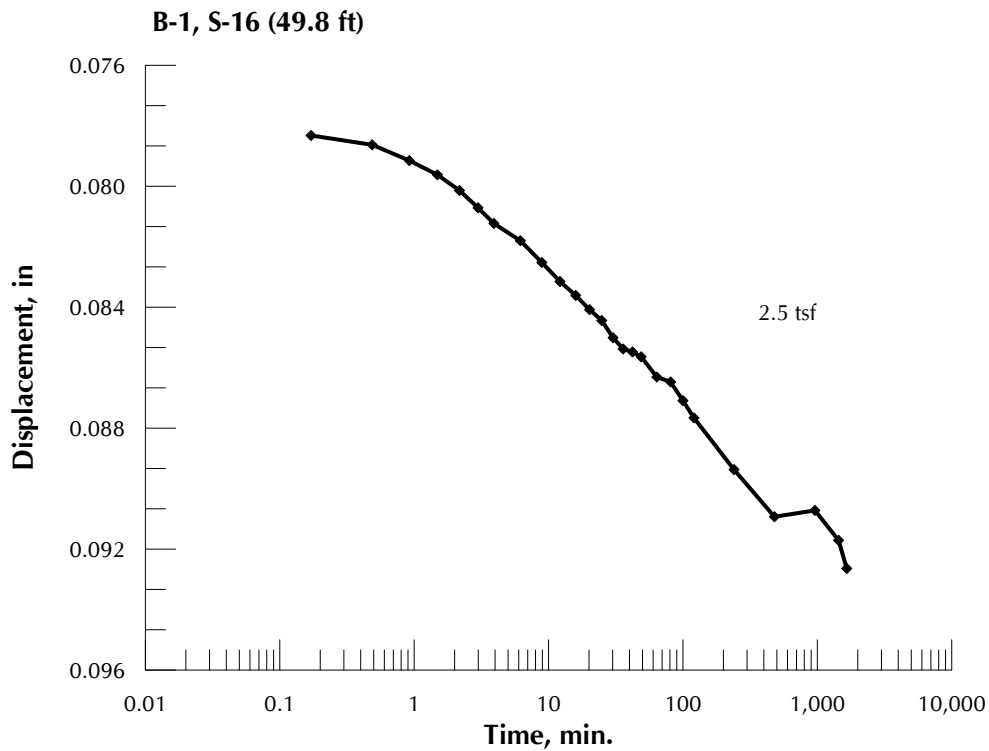
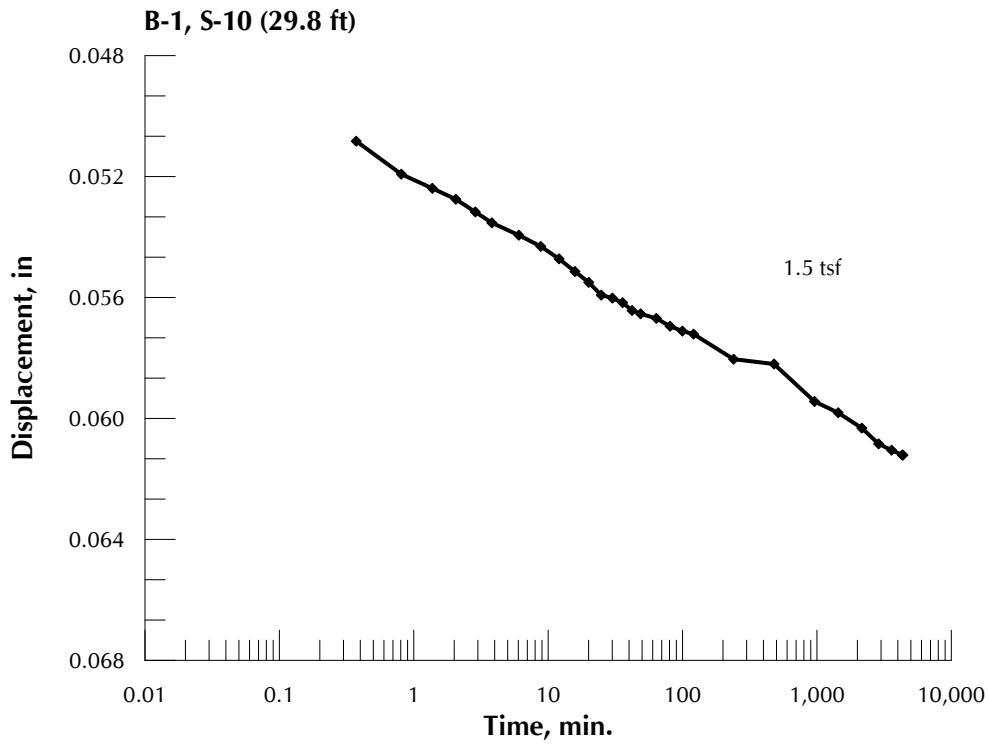
CONSOLIDATION TEST



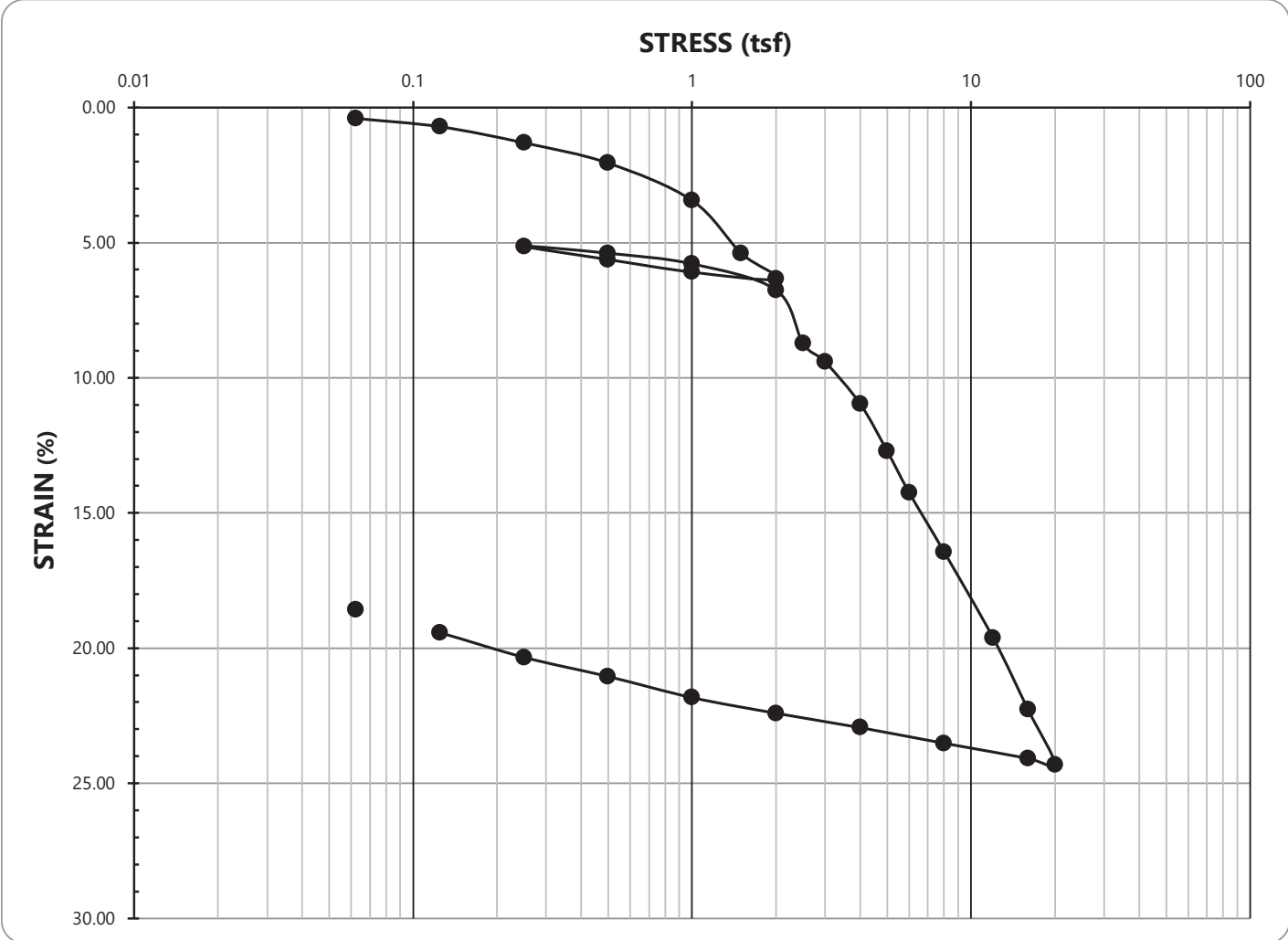
●	Location	Sample	Depth, ft	Classification	Initial	
					γ_d , pcf	MC, %
●	B-3	S-14	60.5	SILT, some clay and fine-grained sand, gray	70	54



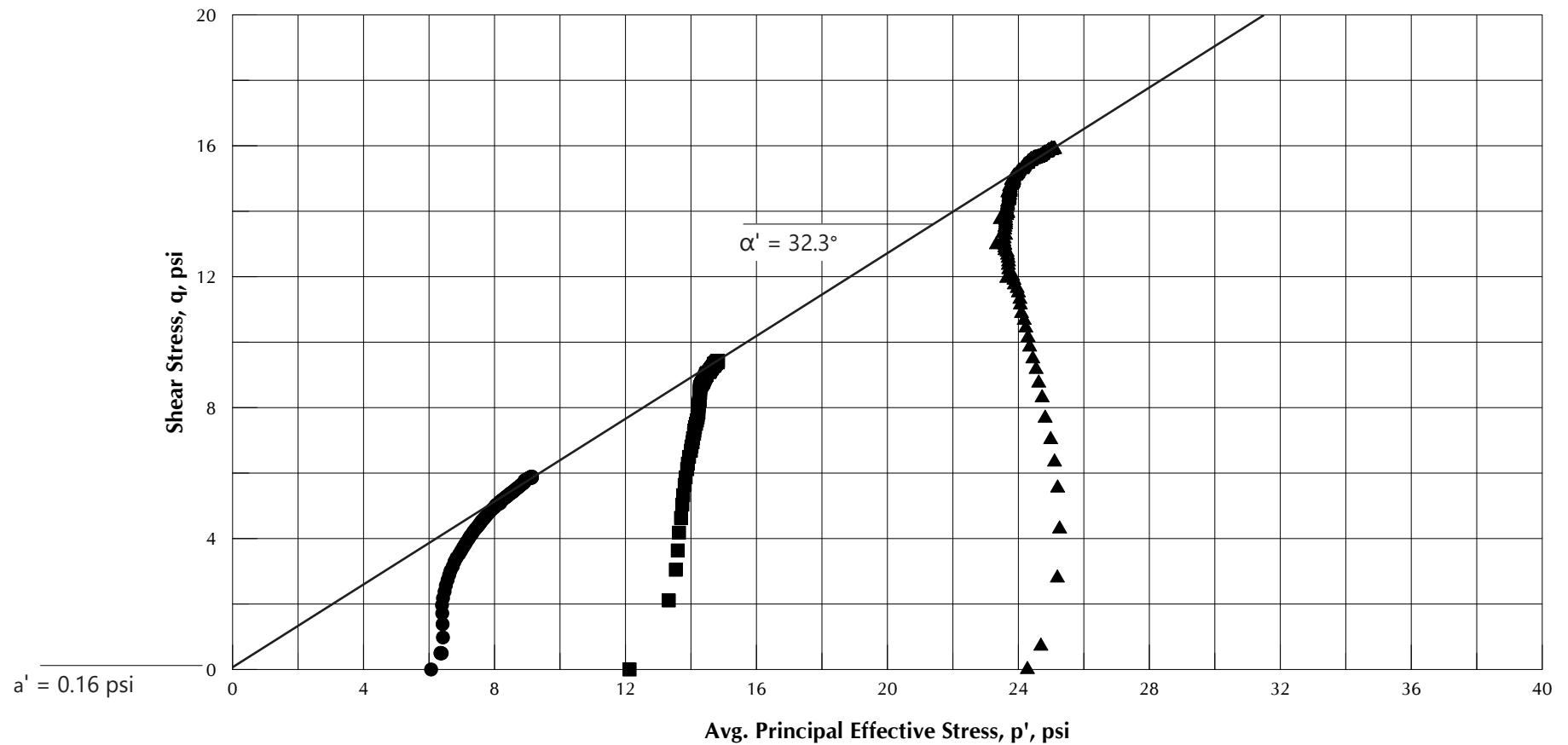
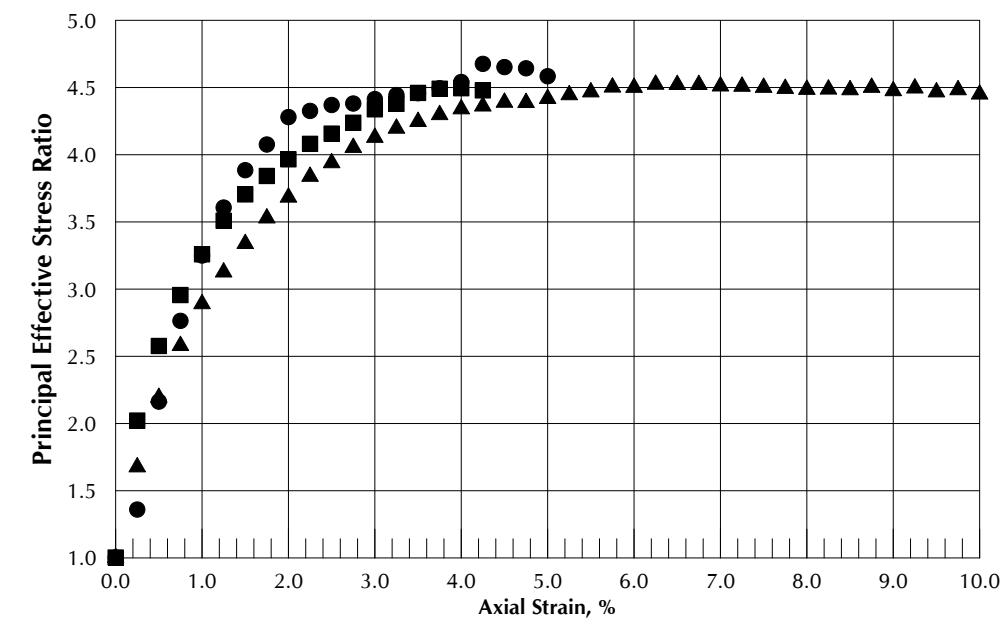
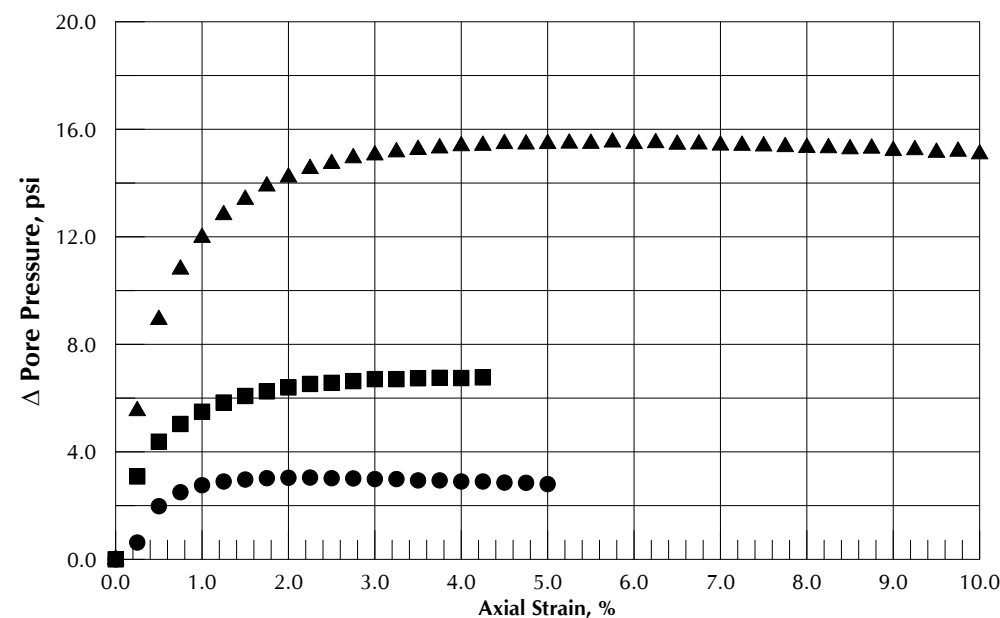
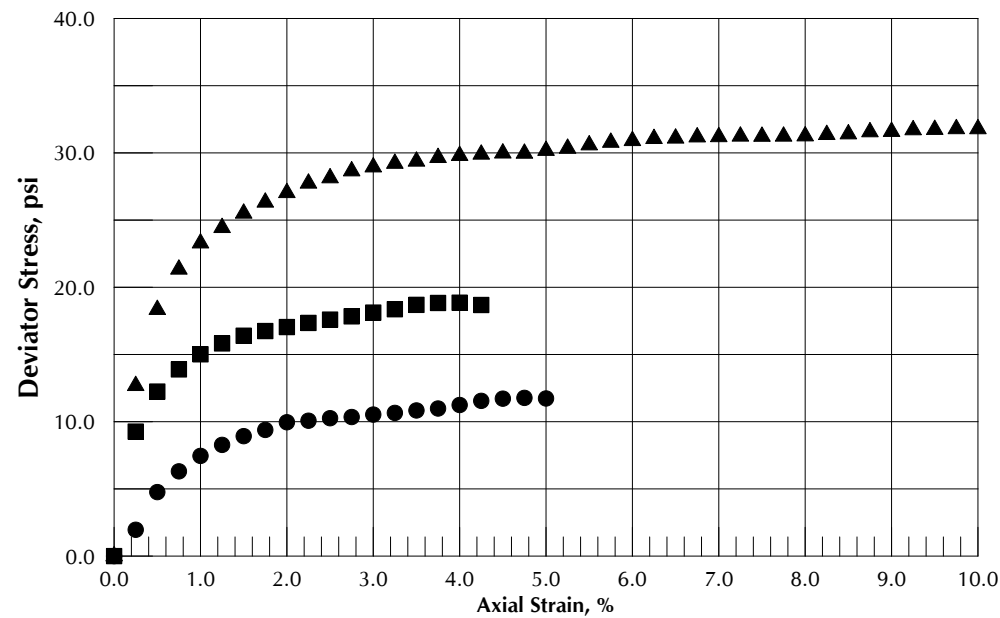
CONSOLIDATION TEST



SECONDARY COMPRESSION



SECONDARY COMPRESSION



	Stage 1	Stage 2	Stage 3
Test Symbol	●	■	▲
Boring No.	B-1	B-1	B-1
Sample No.	S-10	S-10	S-10
Depth, ft	29	29	29
Vertical Effective Consolidation Stress, psf	875	1,750	3,500
Sample Height, in.	6.0	5.7	5.5
Initial Sample Diameter, in.	2.85	--	--
Dry Unit Wt, pcf	68.3	--	--
W.C.% before test	55	--	--
W.C.% after test	--	--	41
Strain Rate, %/hr	1	1	1

TYPE OF TEST:
 ■ CU □ CD □ UU ■ UNDISTURBED □ REMOLDED
 ■ PRESATURATED ■ BACK PRESSURE

FAILURE CRITERIA: MAXIMUM DEVIATOR STRESS

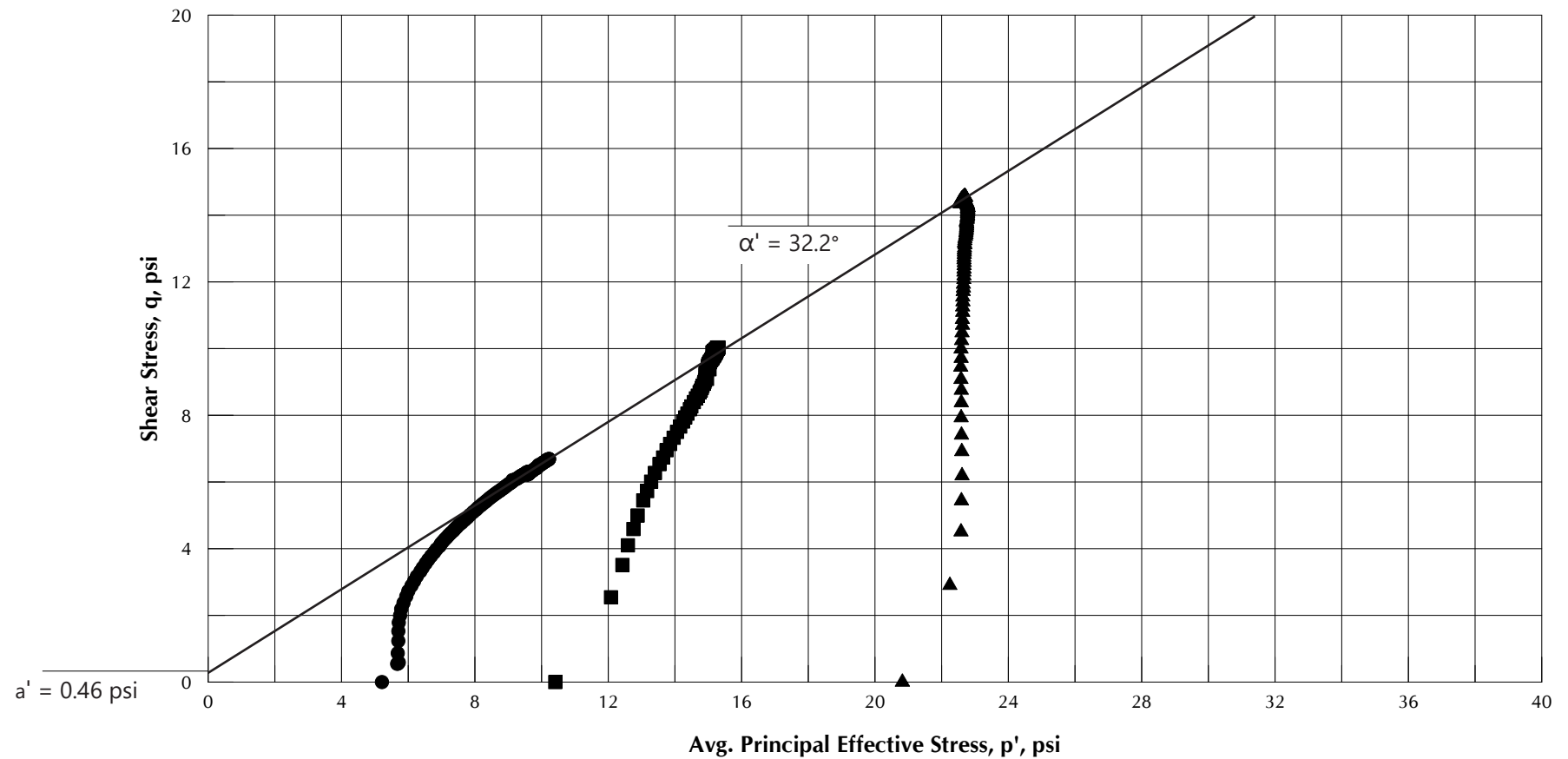
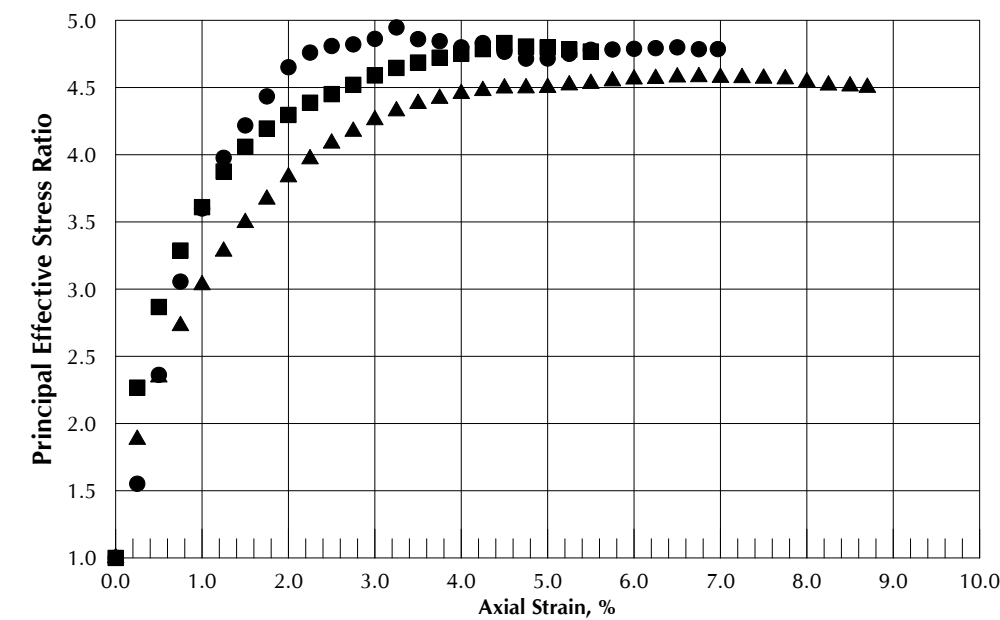
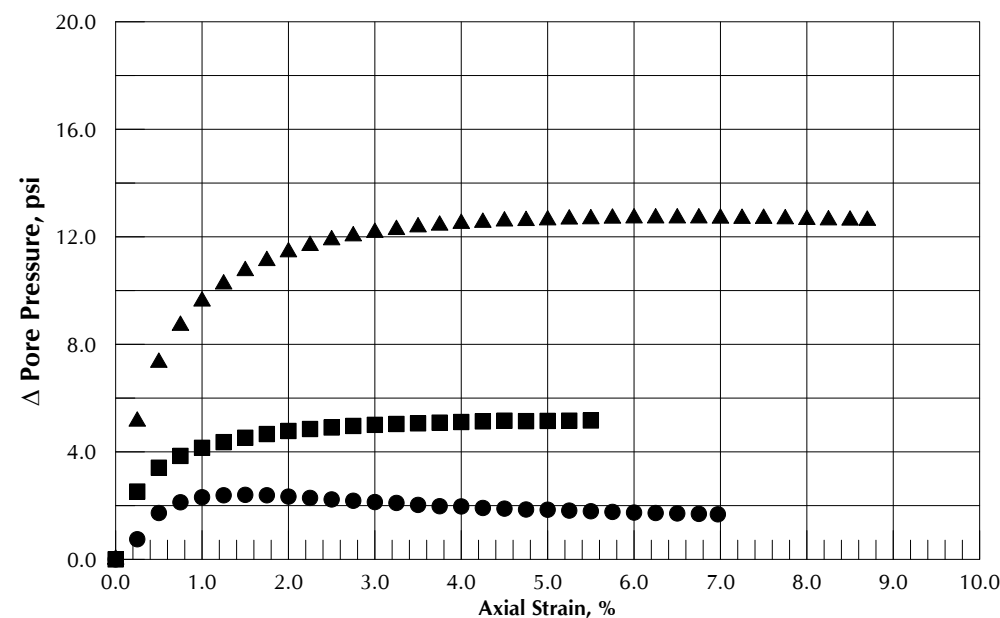
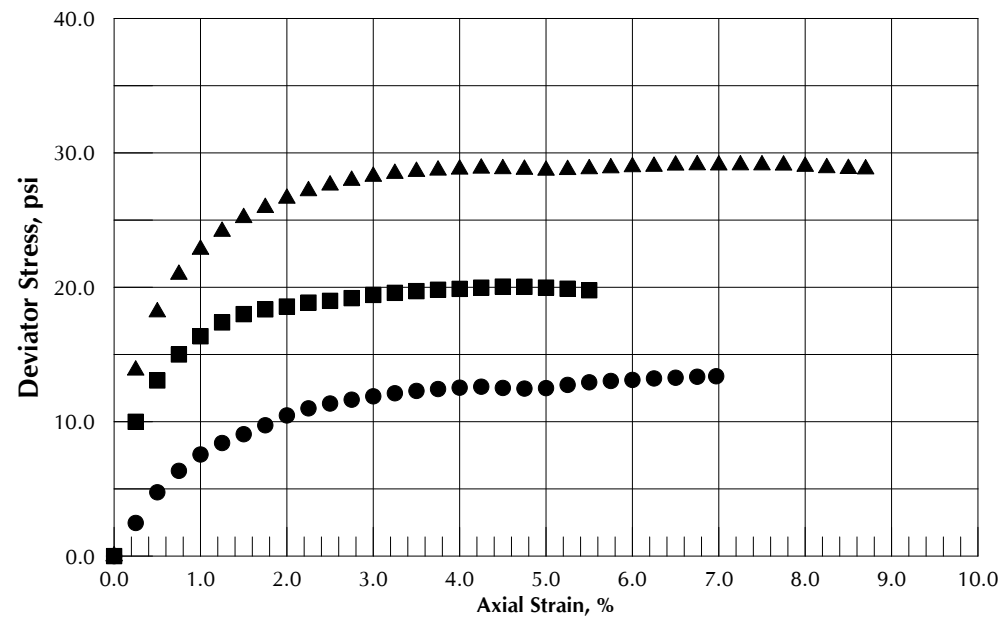
REMARKS: $TAN \alpha' = SIN \phi'$
 $a' = c' COS \phi'$ (psi)
 $\alpha' = 32.3^\circ$
 $\phi' = 34.3^\circ$
 $c' = 0.20$ psi
 $a' = 0.16$ psi

Soil Classification: SILT, some clay, gray, medium stiff



(CU MULTI-STAGE TEST)
TRIAXIAL SHEAR STRENGTH TEST

(BORING B-1, SAMPLE S-10)



	Stage 1	Stage 2	Stage 3
Test Symbol	●	■	▲
Boring No.	B-2	B-2	B-2
Sample No.	S-8	S-8	S-8
Depth, ft	24.5	24.5	24.5
Vertical Effective Consolidation Stress, psf	750	1,500	3,000
Sample Height, in.	6.0	5.6	5.4
Initial Sample Diameter, in.	2.85	--	--
Dry Unit Wt, pcf	70.0	--	--
W.C.% before test	53	--	--
W.C.% after test	--	--	46
Strain Rate, %/hr	1	1	1

TYPE OF TEST:

- CU □ CD □ UU ■ UNDISTURBED □ REMOLDED
- PRESATURATED ■ BACK PRESSURE

FAILURE CRITERIA: MAXIMUM DEVIATOR STRESS

REMARKS: $TAN \alpha' = SIN \phi'$
 $a' = c' COS \phi'$ (psi)
 $\alpha' = 32.2^\circ$
 $\phi' = 34.2^\circ$
 $c' = 0.60$ psi
 $a' = 0.46$ psi

Soil Classification: SILT, trace to some clay, gray, medium stiff



(CU MULTI-STAGE TEST)
TRIAxIAL SHEAR STRENGTH TEST

(BORING B-2, SAMPLE S-8)

APPENDIX C

Site-Specific Geologic Hazards

APPENDIX C

SITE-SPECIFIC GEOLOGIC HAZARDS

C.1 GENERAL

GRI completed a geologic hazards study for the proposed Wastewater Lagoon Repurposing in St. Helens to identify potential geologic and seismic conditions at the project site. This geologic hazard assessment of the project is generally intended to provide an assessment of the presence of geologic hazards and potential for earthquake damage based on preliminary investigations of the regional and site geology, subsurface conditions, and the potential for seismic shaking. The report sections below present discussions on tectonic, geologic, and seismic settings and primary geologic hazards of concern at the site.

C.2 TECTONIC AND GEOLOGIC SETTING

On a regional scale, the site lies at the northern end of the Willamette Valley, a broad, gently deformed, north-south-trending topographic feature separating the Coast Range to the west from the Cascade Mountains to the east. The site lies approximately 90 kilometers inland from the down-dip edge of the seismogenic extent of the CSZ, an active convergent-plate boundary along which remnants of the Farallon Plate (the Gorda, Juan de Fuca, and Explorer plates) are being subducted beneath the western edge of the North American continent. The subduction zone is a broad, eastward-dipping zone of contact between the upper portion of the subducting slabs of the Gorda, Juan de Fuca, and Explorer plates and the overriding North American Plate, as shown on the Tectonic Setting Summary, Figure 1C.

On a local scale, the site lies within the Portland Basin, a large, well-defined, northwest-trending structure characterized as a right-lateral pull-apart basin in the forearc of the CSZ. The local surface geology in close proximity to the site is shown on the Local Geologic Map, Figure 2C. The site is generally mantled with a relatively thin layer of wind-deposited silt, referred to as Portland Hills Silt. These deposits consist of well-sorted silt and fine-grained sand that, on exposed surfaces, weather to clayey silt. These deposits are underlain by a thick sequence of basalt lava flows of the Columbia River Basalt Group. The boundary between the overlying sedimentary materials and underlying basalt is unconformable, indicating a considerable period of time elapsed between the solidification of the last of the basalt flows and the deposition of the overlying sedimentary materials. During this period, the upper portion of the basalt was subjected to surficial processes, including erosion, mass wasting, and chemical and physical degradation. These processes resulted in severe, non-uniform weathering of the upper portions of the basalt.

The Portland Basin is bounded by high-angle, northwest-trending, right-lateral strike-slip faults considered to be seismogenic; however, the relationship between specific earthquakes and individual faults in the area is not well understood since few of these faults are expressed clearly at the ground surface. A limited number of intrabasin faults have been mapped based on stratigraphic offsets and geophysical evidence, and the site is located within 25 km of the inferred traces of the Portland Hills Fault, the East Bank Fault east of the site and the Oatfield Fault south of the site (Personius et al., 2003). The distribution of nearby Quaternary faults is shown on the Local Fault Map, Figure 3C.

C.3 SEISMIC SETTING

C.3.1 General

Because of the proximity of the site to the CSZ and its location within the Portland Basin, three seismic sources contribute to the potential for damaging earthquake motions at the site. Two of these sources are associated with tectonic activity related to the CSZ, including the interface subduction-zone events related to sudden slip between the upper surface of the Juan de Fuca Plate and lower surface of the North American Plate and subcrustal (Benioff zone) events related to deformation and volume changes within the deeper portion of the subducted Juan de Fuca Plate. The third source is associated with movement on relatively shallow faults within and adjacent to the Portland Basin. Each of these sources is considered capable of producing damaging earthquakes in the Pacific Northwest; however, there are no historical records of significant subcrustal earthquakes ($M_w > 6.0$) in northwest Oregon and southwest Washington. Wong (2005) hypothesizes that due to subduction-zone geometry, geophysical conditions, and local geology, southwest Washington and northwest Oregon may not be subject to subcrustal earthquakes of significant magnitude.

Based on review of historical records and evaluation of USGS national seismic-hazard maps (NSHMs), the two primary types of seismic sources at the site are the CSZ interface and local crustal faults.

C.3.2 Cascadia Subduction Zone

Coastal paleoseismic evidence, offshore geological studies, and historical tsunami accounts indicate the CSZ is capable of producing large-magnitude, megathrust earthquakes (M_w 8 to M_w 9) at the interface between the Juan de Fuca and North American plates (Atwater et al. 1995, Goldfinger et al. 2012). Geological studies indicate these megathrust earthquakes have occurred repeatedly in the past 10,000 years (Walton et al., 2021). A combination of paleoseismic and geologic studies (Kelsey et al., 2005), and geodetic studies (Savage et al., 2000) indicate rate of strain accumulation consistent with the assumption that the CSZ is locked beneath offshore northern California, Oregon, Washington, and southern British Columbia (Fluck et al., 1997; Wang et al., 2001).

Numerous geological and geophysical studies suggest the CSZ may be segmented (Hughes and Carr, 1980; Weaver and Michaelson, 1985; Guffanti and Weaver, 1988; Goldfinger, 1994; Kelsey and Bockheim, 1994; Mitchell et al., 1994; Personius, 1995; Nelson and Personius, 1996; Witter, 1999), but the most recent studies suggest that for the last great earthquake in 1700, most of the subduction zone ruptured in a single M_w 9.0 earthquake (Satake et al., 1996; Atwater and Hemphill-Haley, 1997; Clague et al., 2000). There is consensus within the scientific community that the most recent great earthquake occurred along the CSZ in January 1700 (Atwater et al., 2015), based on paleoseismic evidence and historical records of an orphan-tsunami in Japan. Tsunami modeling completed for the 1700 orphan-tsunami indicated the 1700 earthquake ruptured the whole length of the CSZ and had a moment magnitude of about M_w 9.0 (Satake et al. 2003).

The average recurrence interval for a CSZ megathrust event is estimated to be around 350 years to 600 years based on prehistoric geologic evidence (Atwater and Hemphill-Haley 1997, Kelsey et al., 2002; Witter et al., 2003). Tsunami inundation in buried marshes along the Washington and Oregon coast and stratigraphic evidence from the Cascadia margin support these recurrence intervals (Kelsey et al., 2005; Goldfinger et al., 2003). Goldfinger et al. (2003, 2012, 2016) evaluated turbidite evidence at the heads of Cascadia submarine canyons, results of which indicated the occurrence of more than 40 great earthquakes over the past 10,000 years with partial or entire length rupture of the CSZ. About 20 of the earthquake events are associated with partial ruptures concentrated in the southern part of the margin and have estimated recurrence intervals of about 220 years to 320 years. About 19 of the events are associated with a rupture of the full CSZ, characterized by a moment magnitude (M_w) of about 8.5 to 9.1 or greater earthquake. Considering a combination of recent paleoseismic, geodetic, and geologic research, the average recurrence interval for a full-rupture CSZ earthquake is estimated to be about 500 years to 540 years (Walton et. al 2021).

The USGS probabilistic analysis assumes four potential locations (three alternative down-dip edge options and one up-dip edge option) for the eastern edge of the earthquake rupture zone for the CSZ, as shown on Figure 4C. As discussed in Petersen et al. (2014), the 2014 USGS mapping effort represents the 2014 CSZ source model with the full-CSZ ruptures with moment magnitudes from M_w 8.6 to M_w 9.3, supplemented by partial ruptures with smaller magnitudes (M_w 8.0 to M_w 9.1). There is also a possibility of serial M_w 8 earthquakes that rupture the entire CSZ over a period of a few decades or less; however, this is not implemented in the current NSHMs. The partial ruptures were accounted for using a segmented model and an unsegmented model. The magnitude-frequency distribution showing the contributions to the earthquake rates from each of the models and how the estimated rates vary along the fault is presented on Figure 5C.

C.3.3 Local Crustal Event

Sudden crustal movements along relatively shallow, local faults in the project area, although rare, have been responsible for local crustal earthquakes. The precise relationship between specific earthquakes and individual faults is not well understood since few of the faults in the area are expressed at the ground surface and there is a limited history of crustal events in the region. The history of local seismic activity is commonly used as a basis for determining the size and frequency to be expected of local crustal events. Although the historical record of local earthquakes is relatively short (the earliest reported seismic event in the area occurred in 1920), it can serve as a guide for estimating the potential for seismic activity in the area.

The locations of and general information regarding Quaternary faults (i.e., those that have experienced movement during the last 1.6 million years and are considered potentially active) are available through the USGS Earthquake Hazards Program. The USGS Quaternary Fault and Fold Database shows the Portland Hills Fault as one of the closest shallow crustal faults located near the site. The Portland Hills Fault is a northwest-striking, reverse-oblique fault located about 18 kilometers south of the site that dips to the southwest beneath the eastern base of the Portland Hills. The length of the Portland Hills Fault is approximately 40 kilometers to 60 kilometers and has a characteristic earthquake magnitude of M_w 7.0.

C.4 GEOLOGIC HAZARDS

C.4.1 Ground Shaking Hazard

In general, the Pacific Northwest is a seismically active region where moderate to severe earthquakes are expected to cause strong ground shaking. As previously discussed, potential damaging earthquake motions at the site come from the Portland Hills Fault and the CSZ. In general, CSZ megathrust earthquakes typically result in ground shaking that lasts substantially longer than shallow crustal faults. The Seismic Design Guidance for Municipal Solid Waste Landfill facilities (RCRA Subtitle D) document generally specify the use of an earthquake event having a 10% probability of exceedance in 250 years (an average return period of 2,373 years) for seismic design.

C.4.2 Fault Rupture Hazard

Identification of potentially active faults in the immediate vicinity of the project site is one of the key components of the geologic hazard study. There are about four faults (considered to have been active in the last 1.6 million years by the USGS) located within 30 kilometers of the site based on review of the USGS Quaternary Fault and Fold Database (i.e., Figure 3A shows the local faults in the vicinity of the site). However, there are no known or mapped potentially active faults within the specific project site. Therefore, the risk of fault surface rupture at the site is considered to be low. Several normal faults and fault splays are mapped south of the site.

C.4.3 Liquefaction, Cyclic Softening and Lateral Spread Hazards

Liquefaction is a process by which loose, saturated, granular materials, such as sand, and to a somewhat lesser extent, soft to medium-stiff, non-plastic and low-plasticity silts, temporarily lose strength during and immediately after a seismic event. Liquefaction occurs as seismic shear stresses propagate through a saturated soil and distort the soil structure, causing loosely packed groups of particles to contract or collapse. If drainage is impeded and cannot occur quickly, the collapsing soil structure increases the pore-water pressure between the soil grains. If the pore-water pressure increases to a level approaching the weight of the overlying soil, the soil temporarily behaves as a viscous liquid rather than a solid. Cyclic softening describes a relatively gradual and progressive increase in shear strain that occurs in normally consolidated to slightly overconsolidated, moderate-plasticity silts and clays as a result of seismic loading. Cyclic softening may result in elevated pore-water pressures and a reduction of shear strength of sensitive silts and clays. Due to the presence of loose to medium-dense sand and low-plasticity silt layers below the groundwater level identified in our recent explorations, it is our opinion there is a risk of liquefaction, cyclic softening and lateral spreading at the site. A detailed discussion on engineering analyses related to liquefaction and cyclic softening is included in the main text of the report.

C.4.4 Landslide Hazard

Landslides are defined as “the movement of a mass of rock, debris, or earth down a slope” (Cruden, 1991). Landslide hazard areas are defined as areas susceptible to strength failure of the underlying soil or rock and subsequent downhill movement of the debris. These areas are susceptible to landslides due to a combination of factors, including slope inclination, material type and strength characteristics, geologic structure, and presence of water. There are many different types of mass movement, including rockfalls, topples, slides, spreads, soil slumps, soil creep, and debris slides and flows. As the slope angle increases, the slope becomes more susceptible to landslides. Landslides can move very slowly in the case of soil creep or can move downhill extremely rapidly. Some of the most common causes of landslides are soils becoming saturated by water (e.g., rainfall, change in groundwater), earthquakes, or modification of existing slopes by construction activities. Modification of slopes or natural vegetation can lead to a reduction of slope stability both upslope and downslope of where the modifications take place.

The potential landslide hazard at the project site was evaluated by reviewing the SLIDO and lidar elevation published online by the Oregon Department of Geology and Mineral Industries (DOGAMI). SLIDO provides a statewide database of historical landslide records and information developed based on published geologic reports and geologic hazard studies by USGS, DOGAMI, and others. The landslide inventory map indicates a number of past landslides that occurred north of the site along Columbia River Highway. In general,

the landslide susceptibility map shows a potential of moderate to high landslides at the project site.

C.4.5 Volcanic Hazard

The Pacific Northwest region is home to a large number of active volcanoes along the Cascade Mountain Range. Mount St. Helens and Mount Hood are the two closest potentially active volcanos to the project site at approximate distances of 60 kilometers and 100 kilometers, respectively. The major explosive eruption of Mount St. Helens occurred on May 18, 1980, and killed 57 people. Mount Hood's last major eruption occurred about 200 years ago, while Mount St. Helens had two eruptive episodes in the past four decades: a sequence of explosive and dome-forming eruptions during 1980–1986, and a continuous dome-forming eruption during 2004–2008 (Dzurisin, 2018). The primary hazard from these volcanos to the project site is deposition of volcanic ash.

The project site is located within the Portland basin, which includes the Boring volcanic field. The Boring volcanic field constitutes more than 80 small volcanic vents and associated lava flows dispersed throughout the greater Portland-Vancouver metropolitan area (Evarts et al. 2009) which became active about 2.7 million years ago and last eruptions took place about 57,000 years ago. All existing Boring volcanic centers are considered to be extinct, and the probability of an eruption in the Portland/Vancouver metropolitan area is very low.

C.4.6 Other Hazards

Although detailed tsunami modeling of the Columbia and Willamette rivers in response to a CSZ earthquake has not been completed, the limited tsunami modeling by Allan et al. (2018) indicates the risk of damage by tsunami is low due to the distance from the Pacific Ocean.

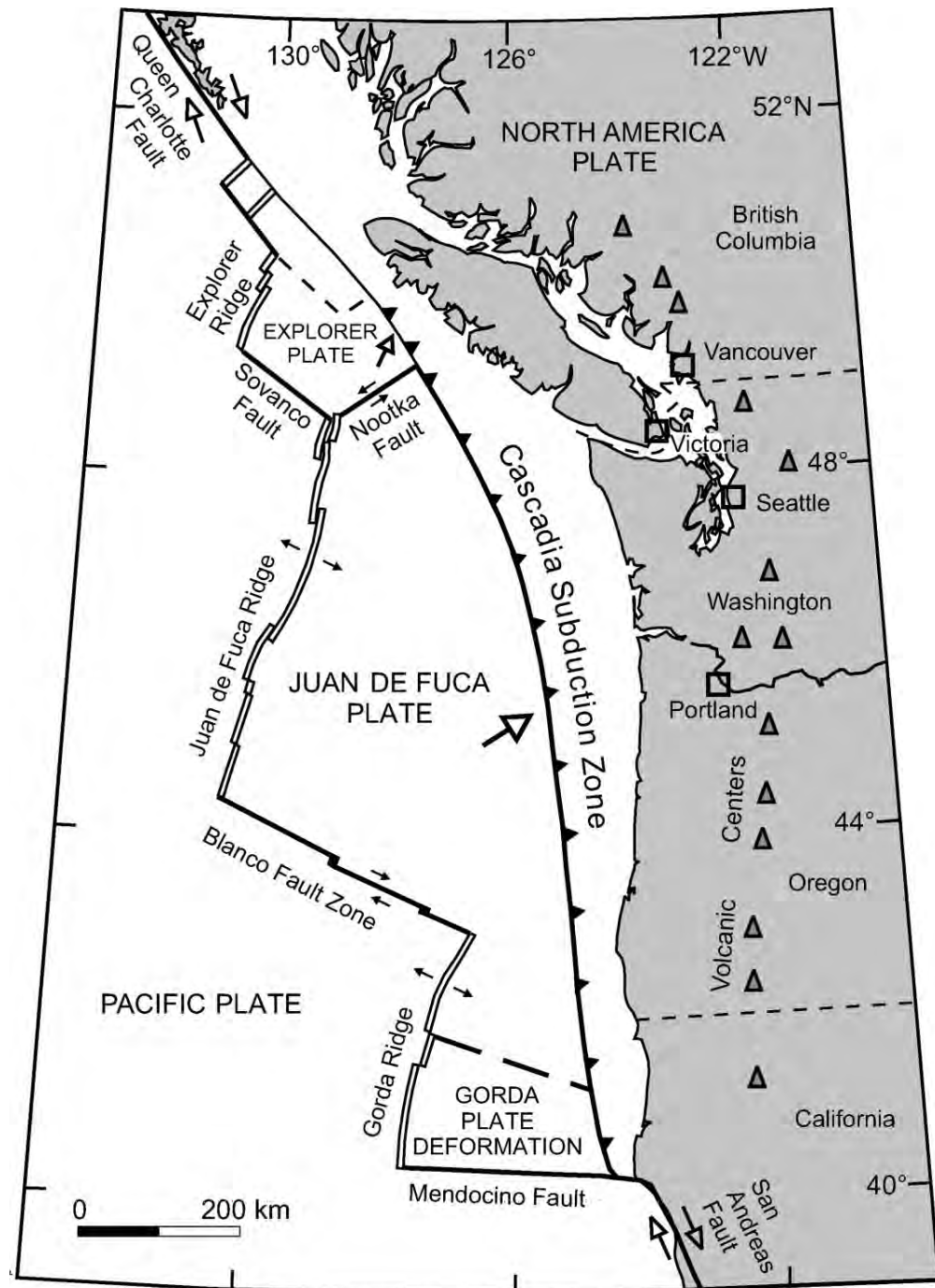
C.5 REFERENCES

- Allan, J., Zhang, J., O'Brien, F., and Gabel, L., 2018, Columbia River Tsunami Modeling: Toward Improved Maritime Planning Response, Oregon Department of Geology and Mineral Industries Special Paper 51.
- Atwater, B. F., Nelson, A. R., Clague, J. J., Carver, G. A., Yamaguchi, D. K., Bobrowsky, P. T., Bourgeois, J., Darienzo, M. E., Grant, W. C., Hemphill-Haley, E., Kelsey, H. M., Jacoby, G. C., Nishenko, S. P., Palmer, S. P., Peterson, C. D., and Reinhart, M. A., 1995, Summary of coastal geologic evidence for past great earthquakes at the Cascadia subduction zone: *Earthquake Spectra*, 11:1, pp. 1-18.
- Atwater, B. F., and Hemphill-Haley, E., 1997, Recurrence intervals for great earthquakes of the past 3,500 years at northeastern Willapa Bay, Washington, U.S. Geological Survey, Professional Paper 1576, 108 pages.
- Atwater, B. F., Musumi-Rokkaku, S., Satake, K., Tsuji, Y., Ueda, K., and Yamaguchi, D. K., 2015, The orphan tsunami of 1700—Japanese clues to a parent earthquake in North America, 2nd ed., U.S. Geological Survey, Professional Paper 1707, Seattle, University of Washington Press, 135 pages.
- Clague, J. J., Atwater, B. F., Wang, K., Wang, Y., and Wong, I., 2000, Penrose conference report--Great Cascadia earthquake tricentennial: *GSA Today*, v. 10, no. 11, pp. 14-15.
- Cruden, D. M., 1991, A very simple definition for a landslide, *IAEG Bulletin*, pp. 27–29.
- Dzurisin, D., 2018, Mount St. Helens retrospective: lessons learned since 1980 and remaining challenges, *Frontiers in Earth Science*, Vol.6, Article 142.
- Evarts, R. C., Conrey, R. M., Fleck, R. J., and Hagstrum, J. T., 2009, The Boring Volcanic Field of the Portland-Vancouver area, Oregon and Washington: Tectonically anomalous forearc volcanism in an urban setting, in O'Connor, J. E., Dorsey, R. J., and Madin, I. P., eds., *Volcanoes to vineyards: Geologic field trips through the dynamic landscape of the Pacific Northwest: Geological Society of America Field Guide 15*, doi: 10.1130/2009.fld015(13).
- Fluck, P., Hyndman, R. D., and Wang, K., 1997, Three-dimensional dislocation model for great earthquakes of the Cascadia subduction zone: *Journal of Geophysical Research*, v. 102, no. B9, pp. 20539-20550.

- Goldfinger, C., 1994, Active deformation of the Cascadia Forearc--Implications for great earthquake potential in Oregon and Washington, Oregon State University, unpublished dissertation.
- Goldfinger, C., Nelson, C. H., and Johnson, J. E., 2003, Holocene earthquake records from the Cascadia subduction zone and northern San Andreas fault based on precise dating of offshore turbidites: *Annual Review of Earth and Planetary Sciences* 31, pp. 555-577.
- Goldfinger, C., Nelson, C. H., Morey, A., Johnson, J. E., Gutierrez-Pastor, J., Eriksson, A. T., Karabanov, E., Patton, J., Gracia, E., Enkin, R., Dallimore, A., Dunhill, G., and Vallier, T., 2012, Turbidite event history: Methods and implications for holocene paleoseismicity of the Cascadia Subduction Zone, U.S. Geological Survey, Professional Paper 1661.
- Goldfinger, C., Galer, S., Beeson, J., Hamilton, T., Black, B., Romsos, C., Patton, J., Nelson, C. H., Hausmann, R., and Morey, A., 2017, The importance of site selection, sediment supply, and hydrodynamics: A case study of submarine paleoseismology on the northern Cascadia margin, Washington USA: *Marine Geology*, v. 384, pp. 4-16.
- Guffanti, M., and Weaver, C. S., 1988, Distribution of Late Cenozoic volcanic vents in the Cascade Range--Volcanic arc segmentation and regional tectonic considerations: *Journal of Geophysical Research*, v. 93, no. B6, pp. 6513-6529.
- Hughes, J. M., and Carr, M. J., 1980, Segmentation of the Cascade volcanic chain: *Geology*, v. 8, pp. 15-17.
- Kelsey, H. M., and Bockheim, J. G., 1994, Coastal landscape evolution as a function of eustasy and surface uplift rate, Cascadia margin, southern Oregon: *Geological Society of America Bulletin*, v. 106, pp. 840-854.
- Kelsey, H. M., Witter, R. C., and Hemphill-Haley, E., 2002, Pl.-boundary earthquakes and tsunamis of the past 5500 yr, Sixes River estuary, southern Oregon: *Geological Society of America Bulletin*, v. 114, no. 3, pp. 298-314.
- Kelsey, H. M., Nelson, A. R., Hemphill-Haley, E., and Witter, R. C., 2005, Tsunami history of an Oregon coastal lake reveals a 4600 yr record of great earthquakes on the Cascadia subduction zone: *GSA Bulletin*, v. 117, pp. 1009-1032.
- Mitchell, C. E., Vincent, P., Weldon, R. J. III, and Richards, M. A., 1994, Present-day vertical deformation of the Cascadia margin, Pacific Northwest, United States: *Journal of Geophysical Research*, v. 99, no. B6, pp. 12257-12277.

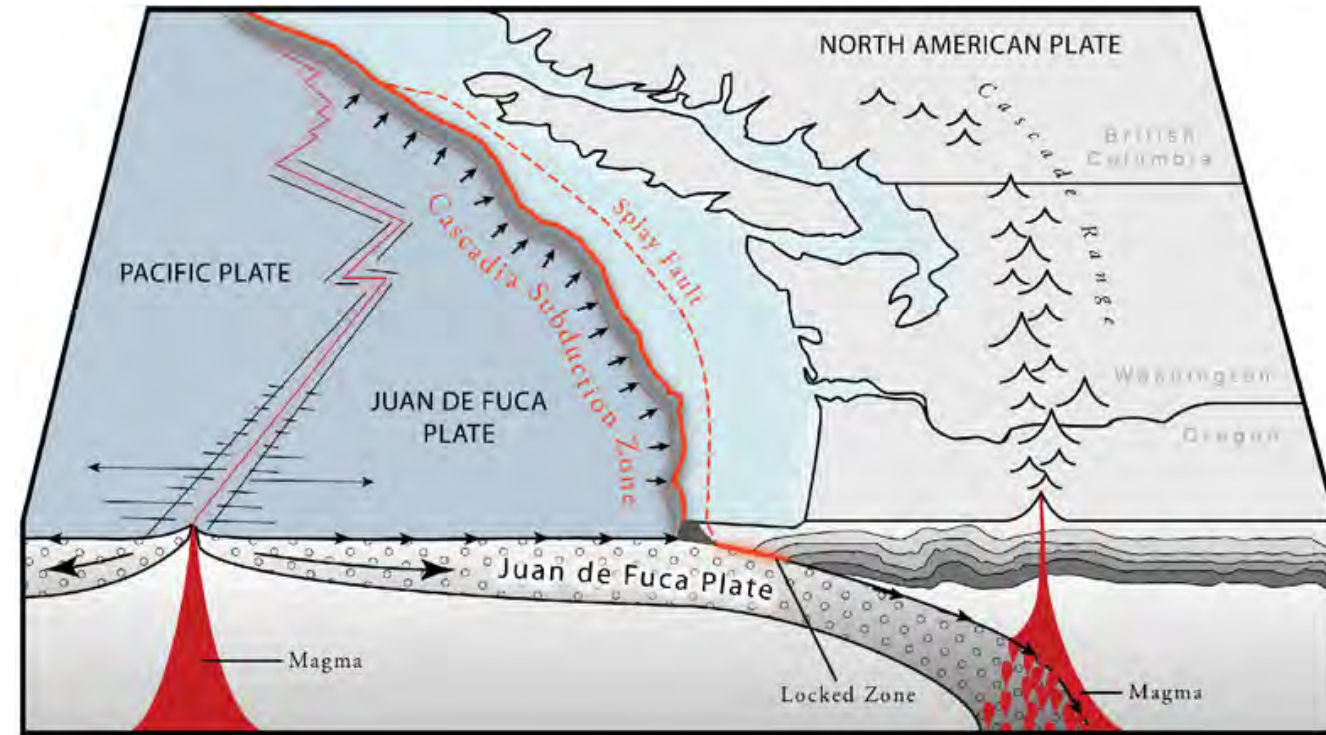
- Nelson, A. R., and Personius, S. F., 1996, Great-earthquake potential in Oregon and Washington--An overview of recent coastal geologic studies and their bearing on segmentation of Holocene ruptures, central Cascadia subduction zone, in Rogers, A.M., Walsh, T.J., Kockelman, W.J., and Priest, G.R., eds., *Assessing earthquake hazards and reducing risk in the Pacific Northwest*, U.S. Geological Survey, Professional Paper 1560, v. 1, pp. 91-114.
- Personius, S. F., 1995, Late Quaternary stream incision and uplift in the forearc of the Cascadia subduction zone, western Oregon: *Journal of Geophysical Research*, v. 100, no. B10, pp. 20193-20210.
- Personius, S.F., Dart, R.L., Bradley, L.A., and Haller, K.M., 2003, Map and data for Quaternary faults and folds in Oregon, U.S. Geological Survey, Open-File Report OF-2003-95.
- Petersen, M. D., Moschetti, M. P., Powers, P. M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Rukstales, K. S., Nico, L., Wheeler, R. L., Williams, R. A., and Olsen, A. H., 2014, Documentation for the 2014 update of the United States national seismic hazard maps, U.S. Geological Survey, Open-File Report 2014-1091, 243 pages, <http://dx.doi.org/10.3133/ofr20141091>.
- Satake, K., Shimazaki, K., Tsuji, Y., and Ueda, K., 1996, Time and size of a giant earthquake in Cascadia inferred from Japanese tsunami records of January 1700: *Nature*, v. 379, pp. 246-249.
- Satake, K., Wang, K., and Atwater, B.F., 2003, Fault slip and seismic moment of the 1700 Cascadia earthquake inferred from Japanese tsunami descriptions: *Journal of Geophysical Research*, v. 108, no. B11, p. 2535, doi: 10.1029 /2003JB002521.
- Savage, J. C., Svarc, J. L., Prescott, W. H., and Murray, M. H., 2000, Deformation across the forearc of the Cascadia subduction zone at Cape Blanco, Oregon: *Journal of Geophysical Research*, v. 105, no. B2, pp. 3,095-3,102.
- Shimazaki, K., and Nakata, T., 1980, Time-predictable recurrence model for large earthquakes. *Geophys. Res. Lett.*, v. 7, no. 4, pp. 279-282.
- Stein, S., Salditch, L., Brooks, E., Spencer, B., Campbell, M., 2017, Is the coast toast? Exploring Cascadia earthquake probabilities, *The Geological Society of America*, v. 27.

- Wang, Y., He, J., Dragert, H., and James, T. S., 2001, Three-dimensional viscoelastic interseismic deformation model for the Cascadia subduction zone: *Earth, Planets and Space*, v. 53, pp. 295-306.
- Weaver, C. S., and Michaelson, C. A., 1985, Seismicity and volcanism in the Pacific Northwest--Evidence for the segmentation of the Juan de Fuca Pl.: *Geophysical Research Letters*, v. 12, no. 4, pp. 215-218.
- Witter, R. C., 1999, Late Holocene Paleoseismicity, tsunamis and relative sea-level changes along the south-central Cascadia subduction zone, southern Oregon: University of Oregon, unpublished PhD dissertation, 178 pages.
- Witter, R. C., Kelsey, H. M., and Hemphill-Haley, E., 2003, Great Cascadia earthquakes and tsunamis of the past 6700 years, Coquille River estuary, southern coastal Oregon: *Geological Society of America Bulletin* 115, pp. 1,289-1,306.
- Walton, M., Staisch, L., Dura., T, Pearl, J., Sherrod, B., Gomberg, J., Engelhart, S., Tréhu,A., Watt, J., Perkins,J., Witter, R., Bartlow, N., Goldfinger, C., Kelsey, H., Morey, A., Sahakian, V., Tobin, H., Wang, K.,Wells, R., Wirth, E, 2021,Toward an Integrative Geological and Geophysical View of Cascadia Subduction Zone Earthquakes, *Annu. Rev. Earth Planet. Sci.* 2021, v. 49, pp. 367-398.
- Wong, I., 2005, Low potential for large intraslab earthquakes in the central Cascadia Subduction Zone: *Bulletin of the Seismological Society of America*, v. 95, no. 5.

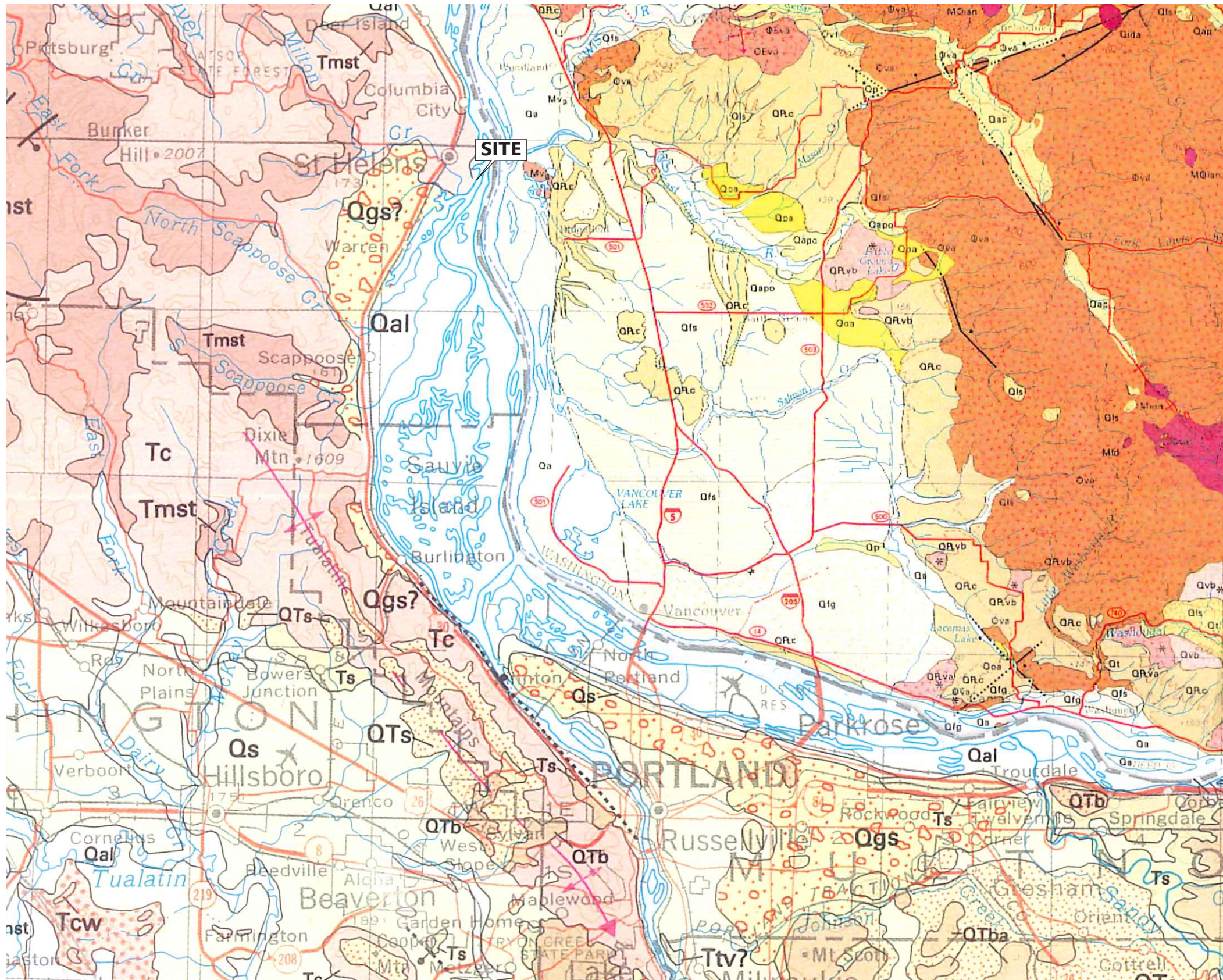


A) TECTONIC MAP OF PACIFIC NORTHWEST, SHOWING ORIENTATION AND EXTENT OF CASCADIA SUBDUCTION ZONE (MODIFIED FROM DRAGERT AND OTHERS, 1994)

Cascadia Subduction Zone Setting



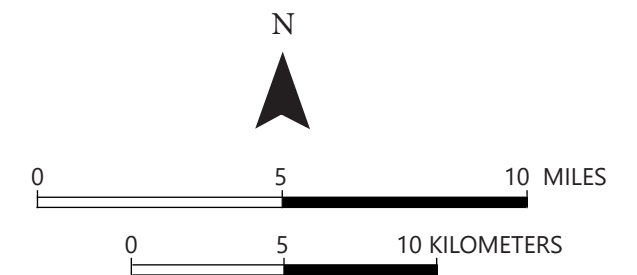
CASCADIA SUBDUCTION ZONE SETTING, TSUNAMI INUNDATION MAPS, OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRY, 2013



FROM:

WALSH, T.J., KOROSK, M.A., PHILLIPS, W.M., LOGAN, R.L., AND SCHASSE, H.W., 1987, GEOLOGIC MAP OF WASHINGTON-SOUTHWEST QUADRANT; 1:250,000; WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES, 6M-34

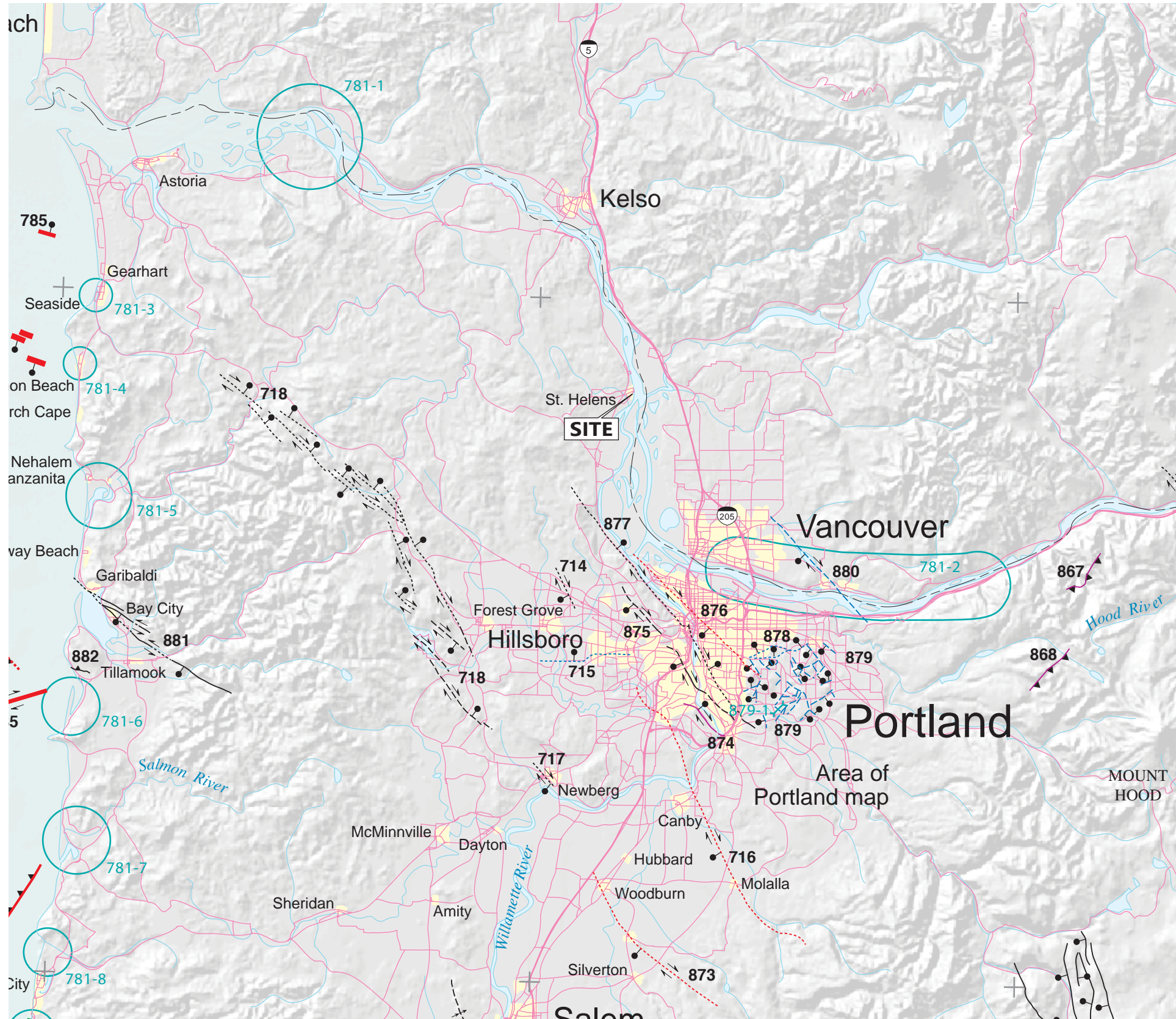
WALKER, G.W., AND MACLEOD, N.S., 1991, GEOLOGIC MAP OF OREGON: U.S. GEOLOGICAL SURVEY



- Contact — Approximately located
- ?—... Fault — Dashed where inferred; dotted where concealed; queried where doubtful; ball and bar on downthrown side
- ▲?▲▲ Thrust fault — Dashed where inferred; dotted where concealed; queried where doubtful; sawteeth on upper plate
- 7 Strike and dip of bed



REGIONAL GEOLOGIC MAP



TIME OF MOST RECENT SURFACE RUPTURE

- Holocene (<10,000 years) or post last glaciation (<15,000 years; 15 ka); no historic ruptures in Oregon to date
- Late Quaternary (<130,000; post penultimate glaciation)
- Late and middle Quaternary (<750,000 years; 750 ka)
- Quaternary, undifferentiated (<1,600,000 years; <1.6 Ma)
- Class B structure (age or origin uncertain)

SLIP RATE

- >5 mm/year
- 1.0-5.0 mm/year
- 0.2-1.0 mm/year
- <0.2 mm/year

TRACE

- Mostly continuous at map scale
- Mostly discontinuous at map scale
- Inferred or concealed

STRUCTURE TYPE AND RELATED FEATURE

- Normal or high-angle reverse fault
- Strike-slip fault
- Thrust fault
- Anticlinal fold
- Synclinal fold
- Monoclinical fold
- Plunge direction of fold
- Fault section marker

DETAILED STUDY SITES

- Trench site
- Subduction zone study site

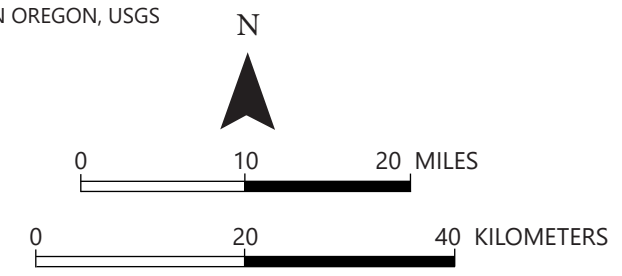
CULTURAL AND GEOGRAPHIC FEATURES

- Divided highway
- Primary or secondary road
- Permanent river or stream
- Intermittent river or stream
- Permanent or intermittent lake

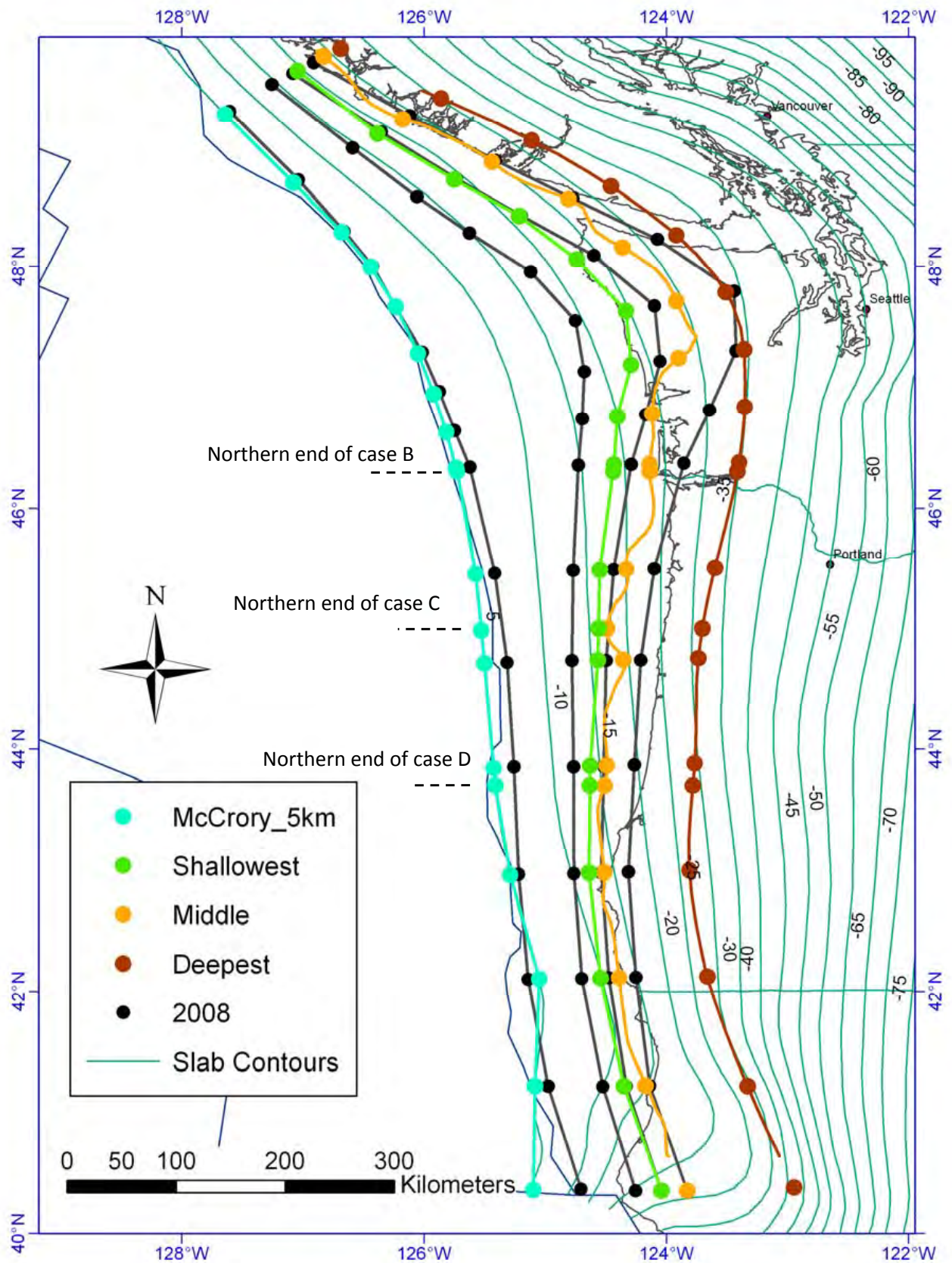
FAULT NUMBER	NAME OF STRUCTURE
714	HELVETIA FAULT
715	BEAVERTON FAULT
716	CANBY-MOLALLA FAULT
717	NEWBERG FAULT
718	GALES CREEK FAULT ZONE
719	SALEM-EOLA HILLS HOMOCLINE
864	CLACKAMAS RIVER FAULT ZONE
867	EAGLE CREEK THRUST FAULT
868	BULL RUN THRUST FAULT
872	WALDO HILLS FAULT
873	MOUNT ANGEL FAULT
874	BOLTON FAULT
875	OATFIELD FAULT
876	EAST BANK FAULT
877	PORTLAND HILLS FAULT
878	GRANT BUTTE FAULT
879	DAMASCUS-TICKLE CREEK FAULT ZONE
880	LACAMAS LAKE FAULT
881	TILLAMOOK BAY FAULT ZONE

NOTE: NOT ALL QUATERNARY FAULTS ARE SHOWN.

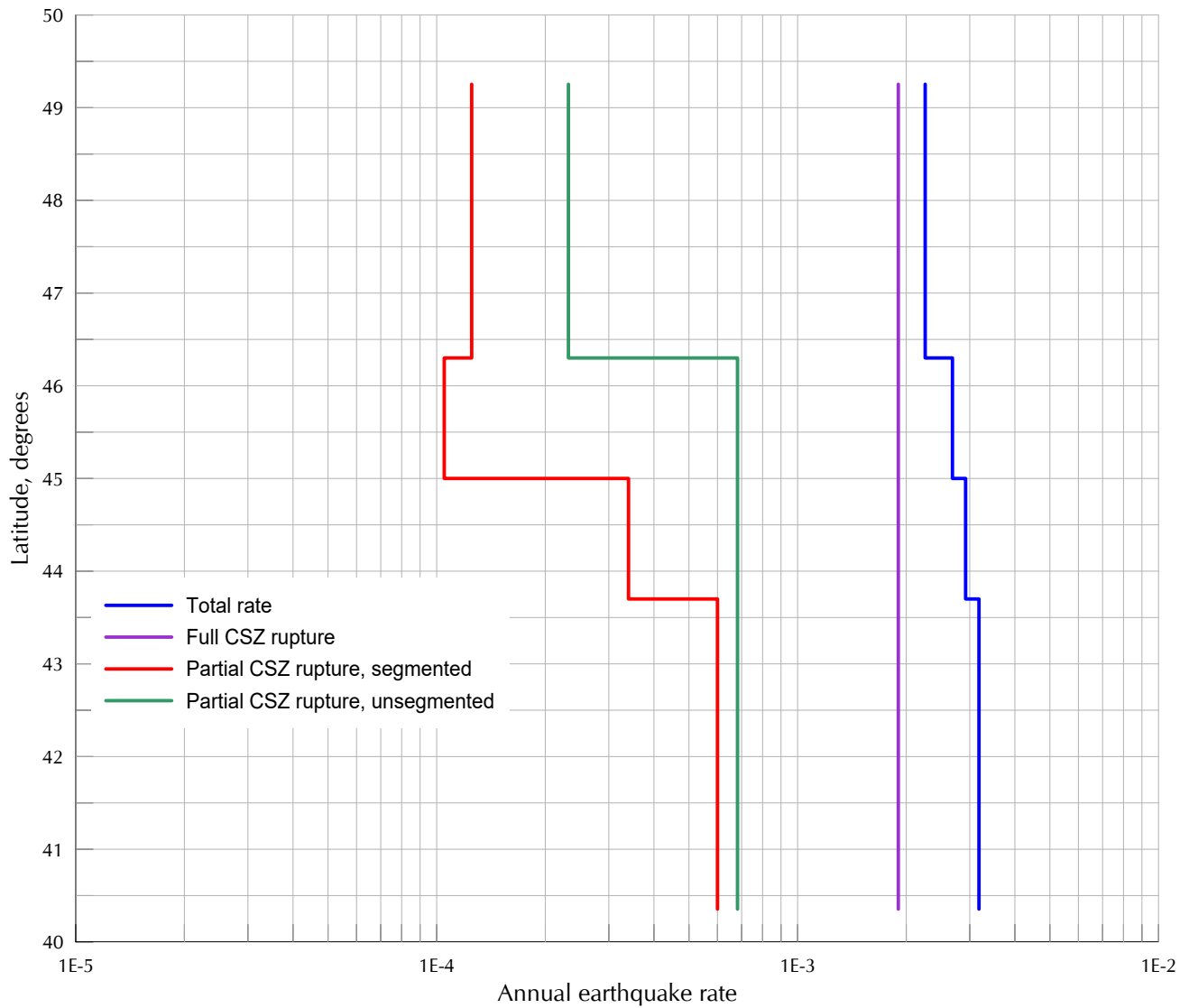
FROM: PERSONIUS, S.F., AND OTHERS, 2003, MAP OF QUATERNARY FAULTS AND FOLDS IN OREGON, USGS OPEN FILE REPORT OFR-03-095.



LOCAL FAULT MAP



LOCATION OF SURFACE TRACES FOR
 UP-DIP EDGE & THREE DOWN-DIP EDGE
 OPTIONS USED IN 2014 NSHMS
 (CHEN ET. AL 2014)



REFERENCE:

PETERSEN, M.D., MOSCHETTI, M.P., POWERS, P.M., MUELLER, C.S., HALLER, K.M., FRANKEL, A.D., ZENG, Y., REZAEIAN, S., HARMSSEN, S.C., BOYD, O.S., FIELD, N., CHEN, R., RUKSTALES, K.S., NICO, L., WHEELER, R.L., WILLIAMS, R.A., AND OLSEN, A.H., 2014, DOCUMENTATION FOR THE 2014 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: U.S. GEOLOGICAL SURVEY OPEN-FILE REPORT 2014-1091, 243 P.



VARIATION OF EARTHQUAKE RATES
CASCADIA SUBDUCTION ZONE (CSZ)

APPENDIX D

Earth Dynamics LLC – Geophysical Exploration for St. Helens Water Treatment Plant

Report on

Geophysical Exploration for
St. Helens Water Treatment Plant
St. Helens, OR

Report Date: May 25, 2023

Prepared for:

GRI
16950 SW Upper Boones Fry
Tigard, OR 97224



Prepared by:

EARTH DYNAMICS LLC
2284 N.W. Thurman St.
Portland, OR 97210
(503) 227-7659
Project No. 23207

1.0 - Introduction

GRI engaged Earth Dynamics LLC to conduct geophysical explorations in the vicinity of the St. Helens Water Treatment Plant in St. Helens, Oregon. The purpose of the explorations is to determine the depth to basalt bedrock at the site. These data are needed for site development.

This work was requested and authorized by Mr. Brian Bayne of GRI. The geophysical field work was conducted on March 6, May 2 and May 3, 2023 under the supervision of Mr. Daniel Lauer of Earth Dynamics LLC. Seismic refraction data were acquired along one profile and electrical resistivity data were acquired along two profiles. This report describes the methodology and results of the geophysical investigation.

2.0 - Method

2.1 - Seismic Refraction

The seismic velocity of soil and rock is a function of the density and elastic properties of the material. Therefore, variations in subsurface materials can be inferred from analysis of the seismic velocity. Application of the method is limited to areas where seismic velocity increases or is constant with depth. Low velocity zones, which are common in basalt, cannot be resolved with seismic refraction.

A seismic refraction exploration consists of measuring the time required for a seismic wave to travel from a seismic source to a receiving transducer. A sledgehammer, large weight dropped, or explosive device is typically used for the seismic source and vertical geophones are used as receiving transducers. A seismograph records signals from the geophones. By analyzing the arrival time of the seismic wave as a function of distance from the seismic source, the seismic velocities of the underlying soil/rock units and the depth to geologic contacts can be determined. The seismic refraction method requires that seismic sources be placed at each end of the geophone array. Intermediate and off end sources are also often used to increase resolution and penetration. The depth of penetration is typically one-quarter to one-third of the geophone array length, and lateral resolution is typically one-half of the geophone spacing.

The seismic refraction survey for this study was conducted using two Seismic Source 24-channel DAQ Link IV seismographs equipped with forty-eight vertical geophones. One-half to two pounds of Kine-Pak explosive was used as the seismic source at five shot points for each array.

The seismic data are analyzed using SeisOpt@2D Ver. 6.0 by Optim Software. SeisOpt@2D uses a forward modeling global optimization technique. The technique consists of creating a finite element velocity model through which travel

times are computed. The computed times are compared with the observed data. Thousands of iterations are completed to find the velocity model with the minimum travel time error. Comparison of the computed travel times to the measured values provides an indication of the validity of the model. Several velocity models are run using different grid resolution and depth values to obtain the best result for each data set. SeisOpt generates xyz data files that are input to Surfer® 17 for contouring, scaling, and data presentation. The SeisOpt modeling technique is generally superior to discrete layer modeling because lateral, as well as vertical variations can be resolved, and gradual increases in seismic velocity with depth can be quantified.

For this study, data were acquired for two profiles using a 48-channel geophone array. The profiles are identified as S1A and S1B. Details of the profile setups are summarized in Table 2-1.

Table 2-1. Seismic Refraction Profile Detail Summary

Profile	Geophone Spacing (ft)	Number of 48 channel Arrays	Nominal Profile Length (ft)
S1A	30	1	1,410
S1B	20	1	940

2.2 – Electrical Resistivity

Electrical resistivity is an intrinsic property of all materials. The properties that affect the resistivity of soil or rock include porosity, water content, composition (clay mineral and metal content), salinity of the pore water, and grain size distribution. Therefore, the electrical resistivity method is ideally suited to provide information for ground water surveys, alluvial stratigraphy, bedrock topography and identification of basalt interflows and weathered zones.

A Dipole-Dipole array was used for this study to acquire data for determination of a two-dimensional electrical resistivity image. In a Dipole-Dipole array, two current electrodes form a dipole at one end of the line and two potential electrodes form a second dipole at the other end of the line. An electric current of up to 2,000 mA is applied to the ground by the current electrodes. This applied current causes a potential field. The voltage associated with the potential field is measured by the potential electrodes. The spacing between the electrodes and the distance between the dipoles is varied to obtain data as a function of depth along the line.

For this study, an Advanced Geosciences, Inc. (AGI) SuperSting R8 equipped with a Sting/Swift automatic multi-electrode system was used to acquire resistivity data. The SuperSting R8 is programmed to automatically select current and potential electrode pairs to provide the desired spacing and separation. The data are stored in the SuperSting R8 and subsequently downloaded to a computer for processing and analysis.

The penetration depth and resolution of the resistivity technique depends upon the electrode spacing and overall profile length. The penetration depth is typically twenty percent of the array length, and the resolution is typically one half of the minimum electrode spacing.

This study includes two electrical resistivity profiles. The profiles are designated R1 and R2. The data for each profile were acquired using fifty-six electrodes spaced nineteen feet apart. The “roll-along” method is used to extend the profile length to 2,109 feet. The details of the profiles are summarized in Table 2-2.

Table 2-2. Summary of Resistivity Profiles.

Profile Designation	Electrode Spacing (ft)	Number of electrodes	Nominal Profile Length (ft)
R1	19	112	2,109
R2	19	112	2,109

The resistivity data are analyzed using EarthImager software by AGI. EarthImager is a two-dimensional inversion program which was specifically designed for use with the AGI Sting/Swift system. Anomalous and unrealistic data points are removed prior to the inversion analysis. Anomalous data are typically due to low signal-to-noise ratio for the measured electric potential. The inversion program uses both finite-difference and finite-element forward modeling techniques. In the program, a non-linear least-squares optimization technique is used to automatically determine the best fit to the data.

The results of the inversion are presented as three contoured cross-sections. One cross-section shows the measured values of apparent resistivity. A second cross-section shows the computed apparent resistivity values which correspond to the computed model. The third cross-section is the computed model. Comparison of the measured to the computed apparent resistivity cross-sections provides an indication of the validity of the computed model. The computed model is then corrected for topography, and it is scaled for presentation.

2.2 - Location and Elevation Survey

Horizontal position data were obtained with a Trimble GEOXH 6000 GPS receiver equipped with a Tornado external antenna. The position data were post-processed to increase the accuracy of the GPS positions. Location data were recorded at the end points of each geophone array. Recorded GPS data are summarized in Table 2-3. The GPS data are displayed in degrees, decimal minutes Latitude and Longitude using the WGS 1984 datum. The elevations along each profile are extrapolated from GPS elevation data.

**Table 2-3. GPS Position and Elevation Data for Profile Endpoints.
(WGS 1984).**

Profile Location	Latitude	Longitude
S1A – 0'	45° 51.3346'N	122° 47.8575'W
S1A – 1,410'	45° 51.1187'N	122° 47.9771'W
S1B – 1,200'	45° 51.1512'N	122° 47.9594'W
S1B – 2,140'	45° 51.0076'N	122° 48.0386'W
R1 – 0'	45° 51.3321'N	122° 47.8127'W
R1 – 2,109'	45° 51.0114'N	122° 47.9773'W
R2 – 0'	45° 51.3440'N	122° 47.8363'W
R2 – 2,109'	45° 51.0167'N	122° 47.9947'W

3.0 - Results

The approximate locations of the geophysical profiles are shown in the Google Earth image in Figure 3-1. Computed seismic velocity models with interpreted geology for the seismic refraction profiles are contained in Appendix A. Computed electrical resistivity models are contained in Appendix B. Electrical resistivity model fit images are contained in Appendix C.

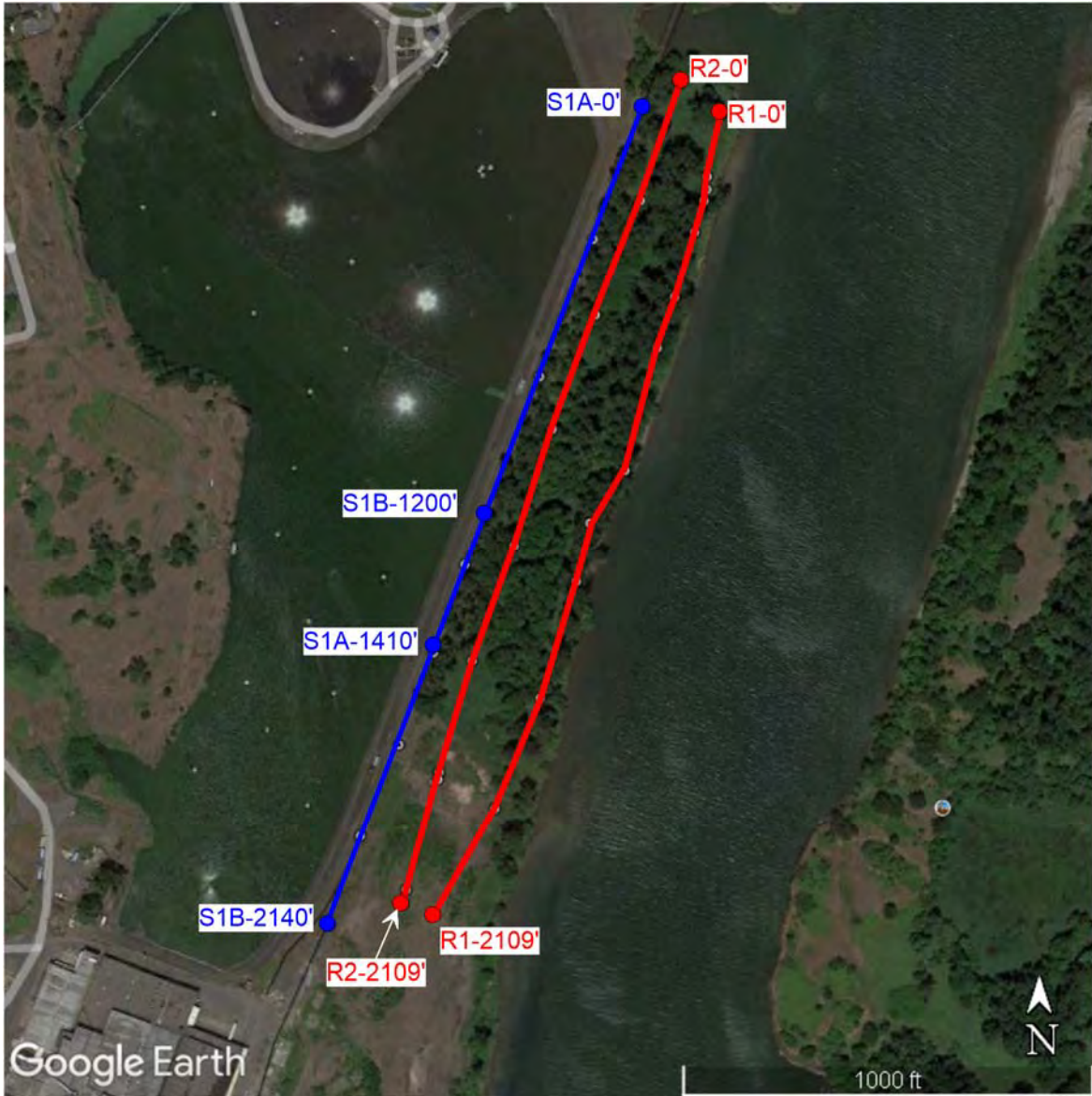


Figure 3-1. Site plan showing approximate locations of geophysical profiles.

4.0 - Discussion

4.1 - Seismic Refraction

The use of explosives as a seismic source provides sufficient energy to provide moderately good confidence in the first arrival picks along the long profiles and the seismic refraction data acquired in this study are generally of good quality.

Exploratory borings completed at the site by others indicate that there is good correlation between the seismic refraction models and the boring log data.

Earth Dynamics LLC has completed numerous seismic refraction studies in Portland and surrounding areas. In many cases it is observed that the minimum velocity of un-weathered and fractured basalt is greater than approximately 5,000 feet per second (ft/sec). Weathered, fractured and/or residual/decomposed basalt typically has a seismic velocity range of 3,000 to 5,000 ft/s. Soils and silts and other unconsolidated sediments typically have a seismic velocity less than 3,000 ft/s.

The interpreted geologic contacts are shown with dashed black lines on the seismic models in Appendix A. Question marks along the interpreted contact indicate that the contact in these areas is less certain. Material with a seismic velocity in the range of 1,000 – 5,000 ft/s is interpreted to be silty sand. Material with a seismic velocity greater than 5,000 ft/s is likely to be basalt bedrock.

The modeled elevation of the top of bedrock varies significantly along the length of Profile S1. From approximately S1-0' to S1-100' the model indicates that basalt may be at an elevation of -100 feet. The top of the basalt then dips steeply to the south. However, this area is near the edge of the model and the interpreted shallow elevation and the steep dip may be a modelling artifact. From S1-300' to S1-1000' the modelled basalt contact rises from an elevation of approximately -320' to -120'. From S1-1000' to S1-2140' the basalt contact rises more gradually from elevation -120 to -50 feet.

4.2 – Electrical Resistivity

The data quality for the electrical resistivity profiles acquired at this site is very good. Very few data points were removed during the inversion process due to negative and anomalous values. The RMS error between the data and model fit for the profiles is less than ten percent.

The two-dimensional models for the resistivity profiles are contained in Appendix B. The profiles are annotated with interpreted contacts and possible lithologic units. The contacts are based on steep gradients in the modelled resistivity profiles.

Both resistivity models suggest that basalt bedrock is present at an elevation of -100 to -150 feet in the southern portion of the profiles. The top of rock appears to be deeper than elevation -200 ft for the northern portion of each profile. The penetration depth of the electrical resistivity models is limited to approximately elevation -200 ft.

4.3 – Summary

The seismic refraction and electrical resistivity models both indicate that basalt may be present at elevation 100' to 150' at the southern portions of the profiles. The depth to the top of the basalt increases toward the north.

5.0 - Limitations

The inversion of seismic refraction and electrical resistivity data does not produce unique models. Theoretically, there are an infinite number of models that will fit the data as well as the models presented in this report. Further, many geologic materials have similar seismic velocity and electrical resistivity. We have presented models and interpretations which we believe to be the best fit given the geology and known conditions at the site. However, no warranty is made or intended by this report or by oral or written presentation of this work. Earth Dynamics LLC accepts no responsibility for damages because of decisions made or actions taken based upon this report.

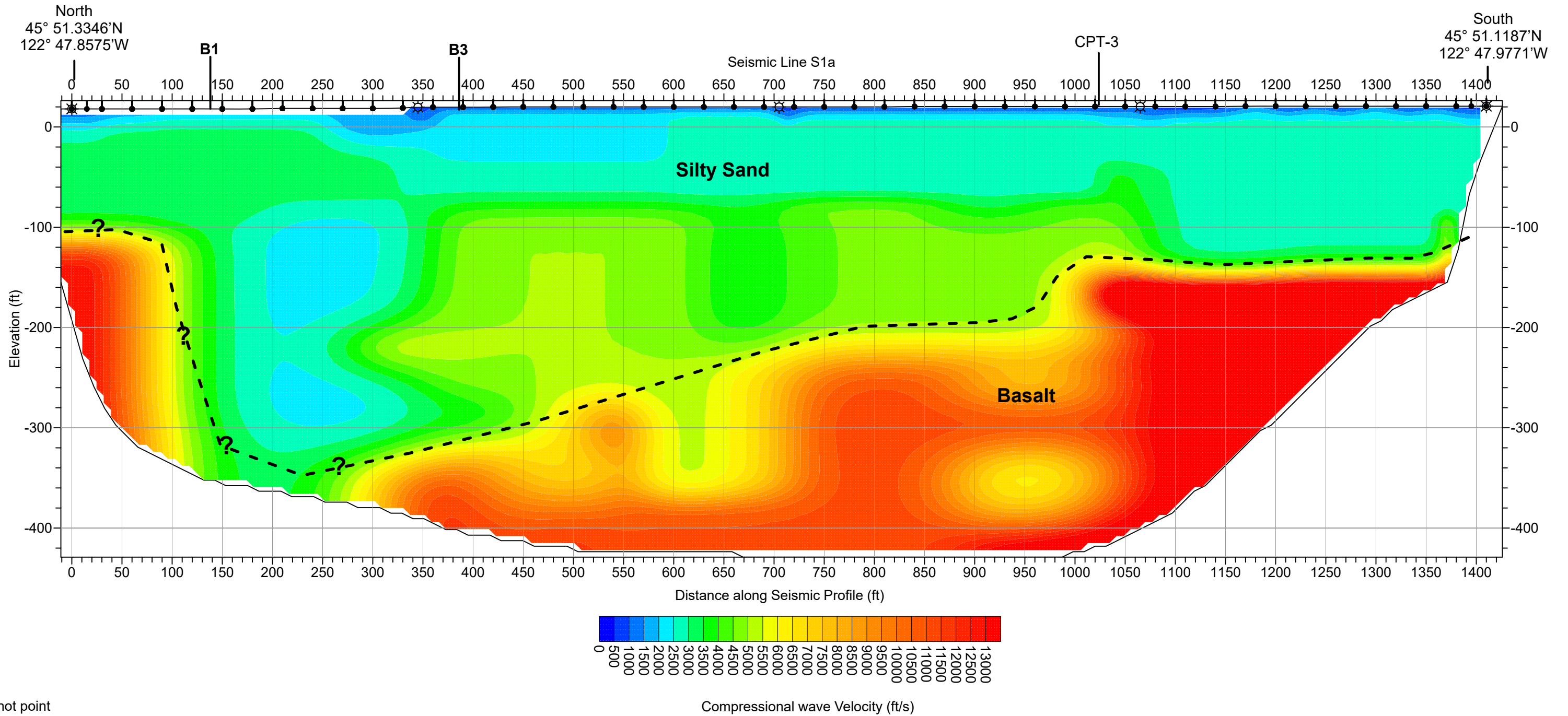
RESPECTFULLY SUBMITTED
EARTH DYNAMICS LLC



Daniel Lauer, M.S.
Partner - Senior Geophysicist


APPENDIX A

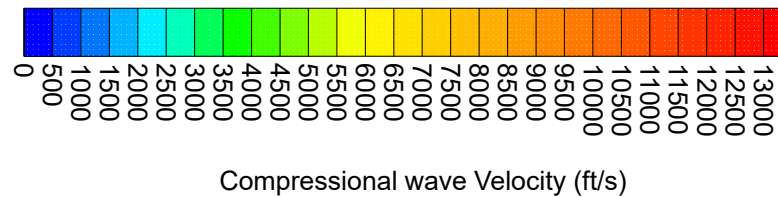
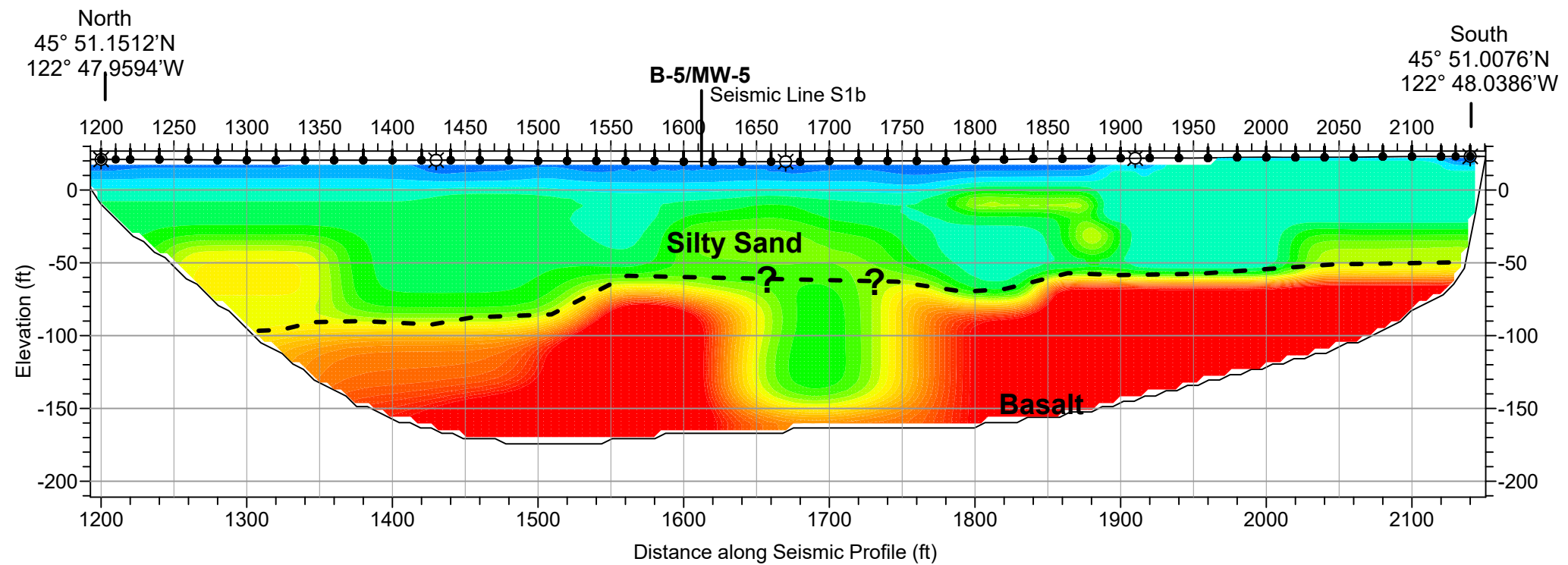
Seismic Refraction Profile Models



- ☼ Shot point
- Geophone


Horizontal Scale: 1" = 100'
 Vertical Scale: 1" = 100'
 Elevations surveyed with level and rod and tied to GPS elevation (S1-0' = 3,228.4').
 Horizontal Positions surveyed with Trimble GeoXH 6000 GPS Receiver (Differentially Corrected)

 EARTH DYNAMICS LLC 2284 NW Thurman St. Portland, OR 97210 (503) 227-7659 www.earthdyn.com	St. Helens Water Treatment Plant St. Helens, Oregon Seismic Refraction Profile S1a - SeisOpt2D Model		
	Job #: 23207	Date: May 2023	Figure: A1



- ☼ Shot point
- Geophone

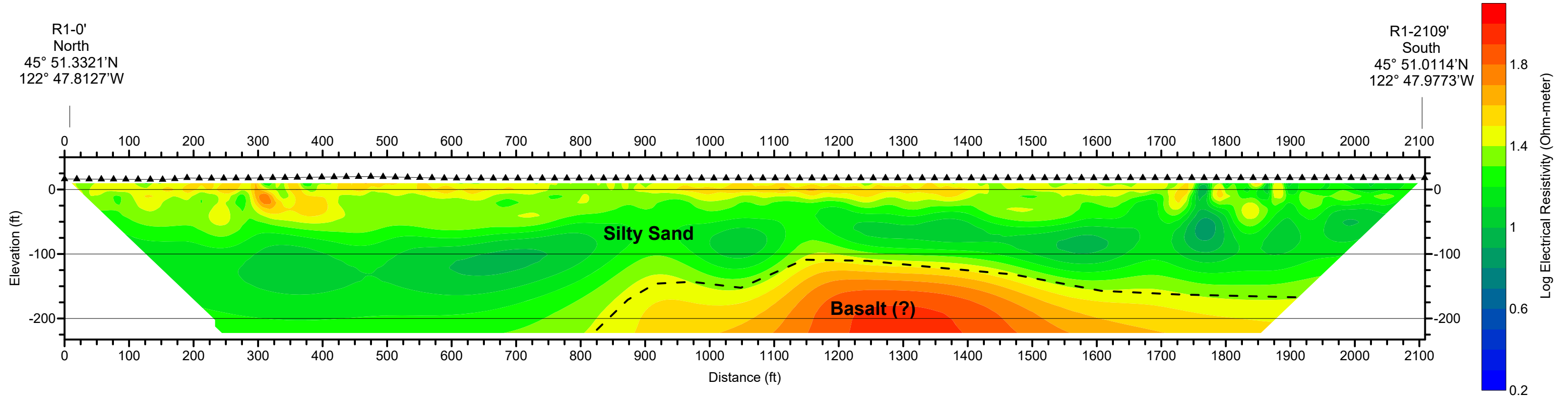
Horizontal Scale: 1" = 100'
 Vertical Scale: 1" = 100'
 Elevations surveyed with level and rod and tied to GPS elevation (S1-0' = 3,228.4').
 Horizontal Positions surveyed with Trimble GeoXH 6000 GPS Receiver (Differentially Corrected)

 EARTH DYNAMICS LLC 2284 NW Thurman St. Portland, OR 97210 (503) 227-7659 www.earthdyn.com	St. Helens Water Treatment Plant St. Helens, Oregon Seismic Refraction Profile S1b - SeisOpt2D Model	
	Job #: 23207	Date: May 2023

APPENDIX B

Resistivity Profile Models

Profile R1



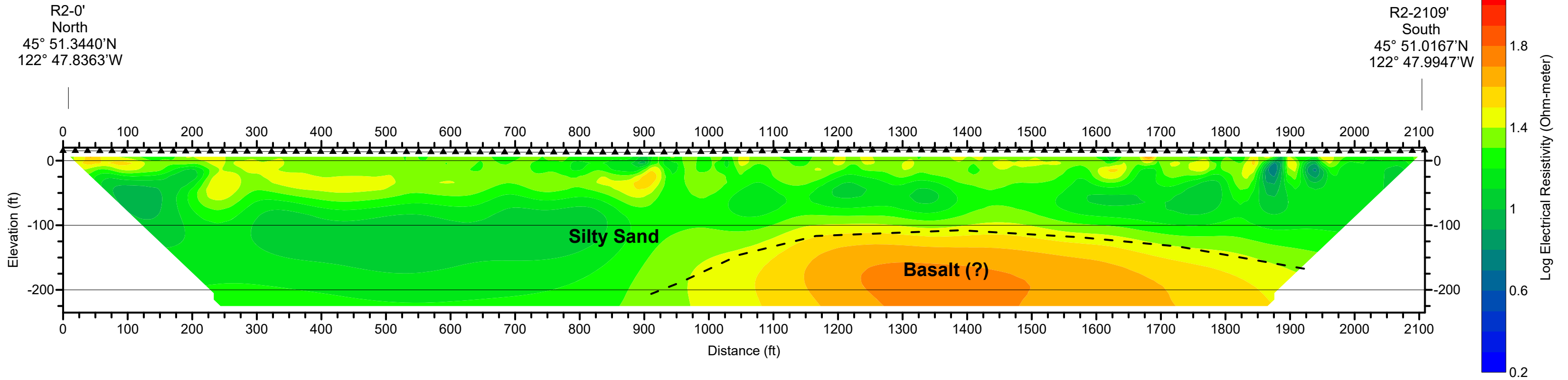
▲ Electrode Location

Scale 1" = 150'

Horizontal Positions determined with a tape measure. Relative Elevations surveyed with level and rod.
 Profile endpoints surveyed with Trimble GeoXH 6000 GPS Receiver
 Elevations surveyed with Rod and Level. Elevation tied to Reported GPS Elevation at R1-0' = 16.4'.

 EARTH DYNAMICS LLC 2284 NW Thurman St. Portland, OR 97210 (503) 227-7659 Email: DLauer@earthdyn.com	St. Helens Water Treatment Plant St. Helens, Oregon	
	Resistivity Profile R1	
Job #: 23207	Date: May, 2023	Figure: B-1

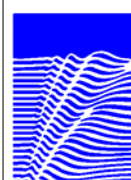
Profile R2



▲ Electrode Location

Scale 1" = 150'

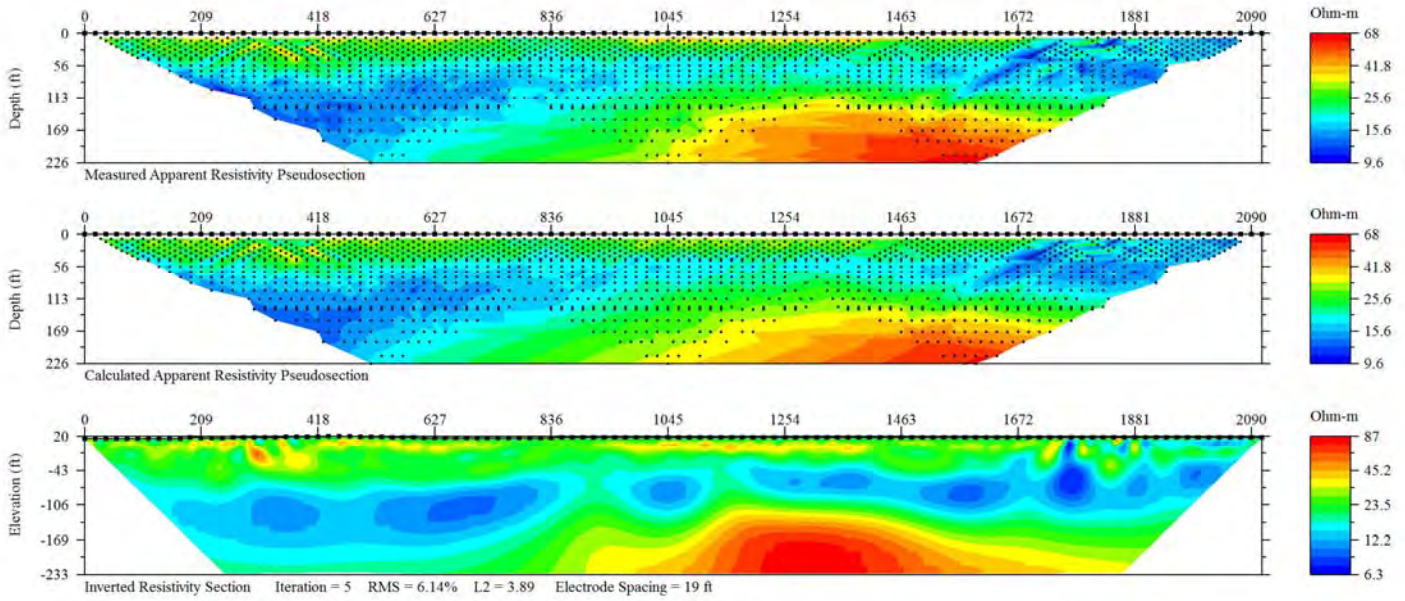
Horizontal Positions determined with a tape measure. Relative Elevations surveyed with level and rod.
 Profile endpoints surveyed with Trimble GeoXH 6000 GPS Receiver
 Elevations surveyed with Rod and Level. Elevation tied to Reported GPS Elevation at R2-0' = 15.3'.

 EARTH DYNAMICS LLC 2284 NW Thurman St. Portland, OR 97210 (503) 227-7659 Email: DLauer@earthdyn.com	St. Helens Water Treatment Plant St. Helens, Oregon	
	Resistivity Profile R2	
Job #: 23207	Date: May, 2023	Figure: B-2

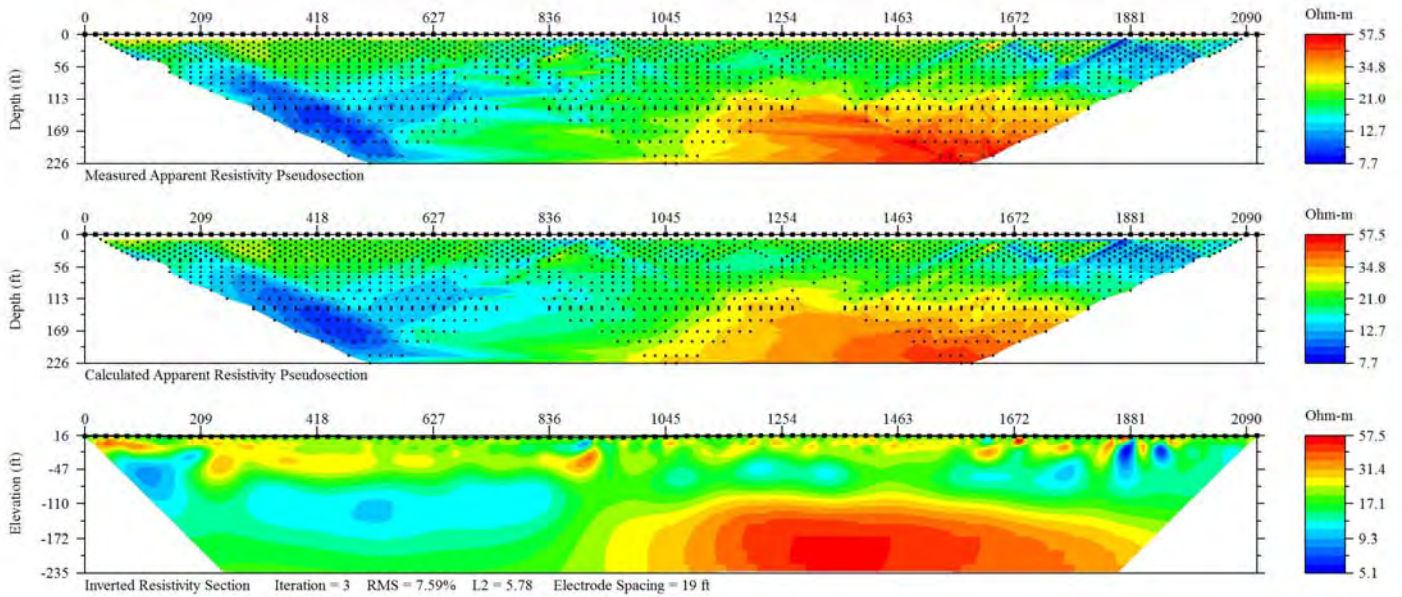
APPENDIX C

Resistivity Data and Model Fit Profiles

R1merged_trial1.stg



R2 merged_trial1.stg



APPENDIX E

Maul Foster & Alongi Boring Logs (2019 and 2023)



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-1

Sheet
1 of 1

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 9.0
Project Location	St. Helens, OR	Northing	
Start/End Date	01/30/2023 to 01/30/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	5.0 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description	
			Sample ID			
1			MFA-B1-20230130-21.9		0.0 to 1.0 feet: LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.	
2		100			1.0 to 3.0 feet: GRAVEL WITH SAND (GW); dark gray to black; 5% fines; 15% sand, fine to coarse; 80% gravel, fine to coarse; compact; wet.	
3					At 2.2 feet: Color change to dark gray to black with slight greenish tint.	
4						3.0 to 5.0 feet: BEDROCK; weathered basalt with reddish brown mottles; refusal at 5.0 feet.
5						

Total Depth = 5.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 21.5 feet. 5. Top of sludge surface elevation of 9.0 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (21.5 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 5.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 5.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



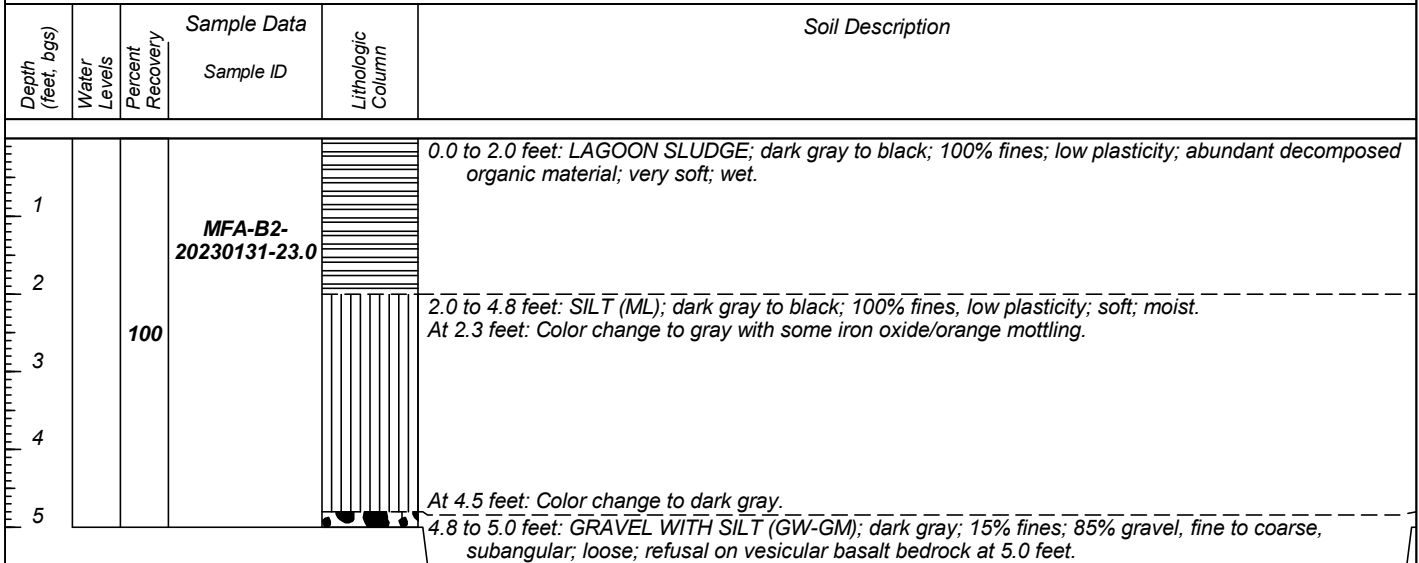
Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-2

Sheet
1 of 1

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 8.5
Project Location	St. Helens, OR	Northing	
Start/End Date	01/31/2023 to 01/31/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	5.0 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		



Total Depth = 5.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 22.0 feet. 5. Top of sludge surface elevation of 8.5 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (22.0 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 5.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 5.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
1 of 6

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 0.5
Project Location	St. Helens, OR	Northing	
Start/End Date	01/31/2023 to 02/01/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	110.0 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data		Lithologic Column	Soil Description	
			Sample ID				
1			MFA-B3-20230131-31.0			0.0 to 2.5 feet: LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.	
2							
3							
4		0				3.0 to 14.5 feet: No recovery.	
5							
6							
7		0					
8							
9							
10							
11							
12		0					
13							
14							
15						14.5 to 17.5 feet: SILT (ML); gray; 100% fines, low plasticity; soft; trace organics, plant matter, and rootlets; moist.	
16							
17		60					
18						17.5 to 19.5 feet: No recovery.	
19							
20		80					19.5 to 23.5 feet: Same as above from 14.5 to 17.5 feet.

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
2 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

21					
22		80			
23					
24					23.5 to 24.5 feet: No recovery.
25					24.5 to 27.5 feet: Same as above from 14.5 to 17.5 feet.
26					
27		60			
28					27.5 to 29.5 feet: No recovery.
29					
30					29.5 to 39.0 feet: Same as above from 14.5 to 17.5 feet.
31					
32		100			
33					
34					
35					
36					
37		90			
38					
39					39.0 to 39.5 feet: No recovery.
40					39.5 to 54.0 feet: Same as above from 14.5 to 17.5 feet.
41		100			
42					

MFA BOREHOLE W/RECON SCREEN WA\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
3 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

43					
44		100			
45					
46					
47		100			
48					
49					
50					
51					
52		90			
53					
54					54.0 to 54.5 feet: No recovery.
55					54.5 to 68.5 feet: Same as above from 14.5 to 17.5 feet.
56					
57		100			
58					
59					
60					
61					
62		100			
63					
64					

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
4 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

65					
66					
67		100			
68					
69					68.5 to 68.7 feet: SAND (SP); dark gray; 100% sand, fine to medium; loose; moist.
70					68.7 to 74.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, fine; loose; trace organics and rootlets, trace medium gravels; moist to wet.
71					
72		90			
73					
74					74.0 to 74.5 feet: No recovery.
75					74.5 to 77.5 feet: Same as above from 68.7 to 74.0 feet.
76					
77		100			
78					77.5 to 79.5 feet: Same as above from 14.5 to 17.5 feet with trace sand.
79					
80					79.5 to 94.5 feet: No recovery. Pushed drill point without collecting soil in order to speed up drilling process.
81					
82		0			
83					
84					
85					
86		0			

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG


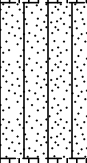
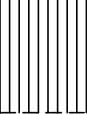

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
5 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

87					
88		0			
89					
90					
91					
92		0			
93					
94					
95					94.5 to 95.0 feet: Same as above from 14.5 to 17.5 feet with trace sand.
96					95.0 to 97.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, fine; loose; moist.
97		90			97.0 to 98.5 feet: Same as above from 14.5 to 17.5 feet.
98					
99					98.5 to 108.5 feet: No recovery. Pushed drill point without collecting soil in order to speed up drilling process.
100					
101					
102		0			
103					
104					
105					
106		0			
107					
108					
109					
110					108.5 to 110.0 feet: Same as above from 14.5 to 17.5 feet.

MFA BOREHOLE WIRECON SCREEN WAGINTGINTWPROJECTSM0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3

Sheet
6 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

110		100			
-----	--	-----	--	--	--

Total Depth = 110.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 30.0 feet. 5. Top of sludge surface elevation of 0.5 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (30.0 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 110.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 110.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3A

Sheet
1 of 2

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 2.5
Project Location	St. Helens, OR	Northing	
Start/End Date	02/06/2023 to 02/06/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	21.5 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Screen Int.	Sample ID	Lithologic Column	Soil Description
0.0 to 1.0					[Hatched pattern]	LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
1.0 to 3.3					[Vertical lines pattern]	SILT (ML); gray; 100% fines, low plasticity; soft; moist.
3.3 to 5.5					[Dotted pattern]	SAND (SP); gray; 100% sand, fine to medium; loose; moist.
5.5 to 6.5					[Blank]	No recovery.
6.5 to 6.8					[Vertical lines pattern]	SILT (ML); gray; 100% fines, low plasticity; trace organics and rootlets; soft; moist.
6.8 to 9.0					[Dotted pattern]	SAND (SP); gray; 100% sand, fine to medium; loose; moist.
9.0 to 10.5					[Vertical lines pattern]	SILT (ML); gray; 100% fines, low plasticity; trace organics and rootlets; soft; moist.
10.5 to 11.5					[Blank]	No recovery.
11.5 to 15.0					[Vertical lines pattern]	Same as above from 9.0 to 10.5 feet.
15.0 to 16.5					[Blank]	No recovery.
16.5 to 20.5					[Vertical lines pattern]	Same as above from 9.0 to 10.5 feet.

100

60

80

70

80

MFA-B3A-20230207-GW-36.0

MFA BOREHOLE W/RECON SCREEN WA\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-3A

Sheet
2 of 2

Depth (feet, bgs)	Water Levels	Percent Recovery	Screen Int.	Sample Data	Lithologic Column	Soil Description
				Sample ID		
21		80				20.5 to 21.5 feet: No recovery.

Total Depth = 21.5 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 28.0 feet. 5. Top of sludge surface elevation of 2.5 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (28.0 feet). 6. ID = identification. 7. bgs = below ground surface.

8. Water level measured inside casing with an electric water level meter after sitting overnight to equilibrate. Lagoon water level elevation (28 feet); Casing height above lagoon water (4.9 feet); Depth of water level below casing (17.60 feet); Groundwater elevation = lagoon level (28 feet) plus PVC casing height above lagoon water level (4.9 feet) minus depth to water from top of casing (17.60 feet) = 15.3 feet

Borehole Completion Details

0.0 to 21.5 feet below lagoon bottom: 2.25-inch borehole.

Reconnaissance Well Completion Details

Temporary polyvinyl chloride well screen set from 6.0 to 10.0 feet below lagoon bottom.

Borehole Abandonment Details

0.0 to 21.5 feet below lagoon bottom: Bentonite chips hydrated with potable water.



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens, OR**
 Start/End Date **02/02/2023 to 02/03/2023**
 Driller/Equipment **Cascade Environmental/Geoprobe 7822 DT**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Macro-core**

Surface Elevation (feet) **Approx. 6.0**
 Northing
 Easting
 Total Depth of Borehole **110.0 feet**
 Outer Hole Diam **2.25 inch**

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data		Soil Description
			Sample ID	Lithologic Column	
0.0 to 2.0					LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
2.0 to 3.5			MFA-B4-20230202-SL-26.5		SILT (ML); dark gray to black; 100% fines, low plasticity; soft; trace organics, plant matter and rootlets; wet.
3.5 to 4.5					SAND (SP); dark gray; 100% sand, fine to medium; loose; wet.
4.0 to 5.0					No recovery.
5.0 to 6.5					Same as above from 3.5 to 4.5 feet.
6.5 to 10.0			100		SILT (ML); gray; 100% fines, low plasticity; soft; trace organics, plant matter, and rootlets; moist.
10.0 to 11.0					
11.0 to 18.5					Same as above from 6.5 to 10.0 feet.
18.5 to 20.0			70		No recovery.

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
2 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

21					20.0 to 23.5 feet: Same as above from 6.5 to 10.0 feet.
22					
23		70			
24					23.5 to 25.0 feet: No recovery.
25					
26					25.0 to 29.0 feet: Same as above from 6.5 to 10.0 feet.
27					
28		80			
29					29.0 to 30.0 feet: No recovery.
30					
31					30.0 to 34.5 feet: Same as above from 6.5 to 10.0 feet.
32					
33		90			
34					
35					34.5 to 35.0 feet: No recovery.
36					35.0 to 39.5 feet: Same as above from 6.5 to 10.0 feet.
37					
38		90			
39					
40					39.5 to 40.0 feet: No recovery.
41					40.0 to 44.5 feet: Same as above from 6.5 to 10.0 feet.
42		90			

MFA BOREHOLE WIRECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
3 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

43					
44		90			
45					44.5 to 45.0 feet: No recovery.
46					45.0 to 64.5 feet: Same as above from 6.5 to 10.0 feet.
47					
48		100			
49					
50					
51					
52					
53		100			
54					
55					
56					
57					
58		100			
59					
60					
61					
62		90			
63					
64					

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
4 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23

65		90			64.5 to 65.0 feet: No recovery.
66					65.0 to 69.5 feet: Same as above from 6.5 to 10.0 feet.
67					
68		90			
69					
70					69.5 to 70.0 feet: No recovery.
71					70.0 to 74.5 feet: Same as above from 6.5 to 10.0 feet.
72					
73		100			
74					At 73.5 to 74.5 feet: Multiple thin sand lenses.
75					74.5 to 75.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, fine to medium; loose; moist.
76					75.0 to 76.5 feet: Same as above from 6.5 to 10.0 feet.
77					76.5 to 76.8 feet: Same as above from 74.5 to 75.0 feet.
78		100			76.8 to 83.5 feet: SILT (ML); gray; 100% fines, low plasticity; soft; moist.
79					
80					
81					
82					
83		70			
84					83.5 to 100.0 feet: No recovery. Pushed drill point without collecting soil in order to speed up drilling process.
85					
86		0			



MAUL FOSTER ALONG

Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
5 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

87					
88		0			
89					
90					
91					
92		0			
93					
94					
95					
96					
97		0			
98					
99					
100					
101					100.0 to 104.0 feet: Same as above from 76.8 to 83.5 feet.
102		90			
103					
104					
105					104.5 to 105.0 feet: No recovery.
106					
107		90			
108					105.0 to 109.5 feet: Same as above from 76.8 to 83.5 feet.

MFA BOREHOLE WIRECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-4

Sheet
6 of 6

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		

110		90			109.5 to 110.0 feet: No recovery.
-----	--	----	--	--	-----------------------------------

Total Depth = 110.0 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 24.5 feet. 5. Top of sludge surface elevation of 6.0 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (24.5 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 110.0 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 110.0 feet below lagoon bottom: Bentonite chips hydrated with potable water.



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-5

Sheet
1 of 2

Project Name	St. Helens Lagoon	Surface Elevation (feet)	Approx. 5.0
Project Location	St. Helens, OR	Northing	
Start/End Date	02/03/2023 to 02/06/2023	Easting	
Driller/Equipment	Cascade Environmental/Geoprobe 7822 DT	Total Depth of Borehole	30.25 feet
Geologist/Engineer	C. Schweitzer	Outer Hole Diam	2.25 inch
Sample Method	Macro-core		

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		
0.0 to 1.5				[Hatched pattern]	LAGOON SLUDGE; dark gray to black; 100% fines; low plasticity; abundant decomposed organic material; very soft; wet.
1.5 to 12.0			MFA-B5-20230203-SL-27.0	[Vertical lines pattern]	SILT (ML); dark gray to black; 100% fines, low plasticity; soft; moist. At 2.5 feet: Color change to gray.
12.0 to 14.0				[Blank]	No recovery.
14.0 to 20.5				[Vertical lines pattern]	SILT (ML); brownish gray; 100% fines, low plasticity; soft; moist. At 19.0 feet: Color change to gray.
20.5 to 30.25				[Vertical lines pattern]	

MFA BOREHOLE W/RECON SCREEN W:\GINT\GINT\PROJECTS\M0830.03.006 ST. HELENS.GPJ 8/31/23

100

60

100

30



Geologic Borehole Log

Project Number
M0830.03.006

Boring Number
MFA B-5

Sheet
2 of 2

Depth (feet, bgs)	Water Levels	Percent Recovery	Sample Data	Lithologic Column	Soil Description
			Sample ID		
21					20.5 to 24.0 feet: No recovery.
22		30			
23					
24					
25					24.0 to 27.0 feet: SILT (ML); gray; 100% fines, low plasticity; soft; moist.
26					At 25.0 feet: Wood piece.
27		60			
28					27.0 to 29.0 feet: No recovery.
29					
30					29.0 to 29.75 feet: GRAVEL WITH SAND (GW); gray; 5% fines; 15% sand, coarse; 80% gravel, fine to coarse, angular; loose; moist.
		90			29.75 to 30.0 feet: BEDROCK; refusal on vesicular basalt pieces.
					30.0 to 30.25 feet: No recovery.

Total Depth = 30.25 feet bgs

NOTES:

1. Depths are relative to feet below top of the sludge at the lagoon bottom. 2. Lagoon water level elevation at time of drilling: 28 feet 3. Barge deck height above the lagoon: 2.5 feet. 4. Depth below deck to top of sludge: 25.5 feet. 5. Top of sludge surface elevation of 5.0 feet calculated as lagoon water level elevation (28 feet) plus barge deck height above water (2.5 feet) minus depth to top of sludge (25.5 feet). 6. ID = identification. 7. bgs = below ground surface.

Borehole Completion Details

0.0 to 30.25 feet below lagoon bottom: 2.25-inch borehole.

Borehole Abandonment Details

0.0 to 30.25 feet below lagoon bottom: Bentonite chips hydrated with potable water.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-1

Sheet
1 of 5

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/10/19 to 7/11/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **100.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1		100		CB				0.0 to 44.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.	
2									
3									
4									
5									
6									
7									
8									
9									
10		100		CB					
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
21			100	CB					
22									
23									
24									
25									
26									
27									
28									
29									
30									
31			100	CB					
32									
33									
34									
35									
36									
37									
38									
39									
40									
41			100	CB					
42									

G:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS - A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
44									
45									44.0 to 45.5 feet: SANDY CLAY WITH GRAVEL (CL); gray; 70% fines, medium plasticity; 20% sand, coarse to very coarse; 10% gravel, very fine to coarse; soft; trace weathered bedrock; some fresh, angular bedrock.
46									45.5 to 50.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.
47									
48									
49									
50			0			CB			50.0 to 60.0 feet: No recovery.
51									
52									
53									
54									
55									
56									
57									
58									
59									
60			100			CB			60.0 to 64.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.
61									
62									
63									
64									64.0 to 71.0 feet: SANDY CLAY WITH GRAVEL (CL); gray with brown mottling; 70% fines, medium plasticity; 20% sand, medium to very coarse, angular; 10% gravel, very fine to coarse, angular; soft; highly weathered insitu basalt bedrock in a fine matrix of weathered material with weathering rinds, slight porosity, slight
65									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
66								intact bedrock.	
67									
68									
69									
70			100			CB			
71									
72								71.0 to 75.0 feet: GRAVELLY CLAY WITH SAND (CL); dark gray when wet; 60% fines; 10% sand, very fine to coarse; 30% gravel, fine to very coarse, angular; soft; trace weathered bedrock; wet.	
73									
74									
75									
76								75.0 to 80.0 feet: Highly vesicular basalt >20%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are open and filled with firm dark gray clay material that encapsulates the bedrock.	
77									
78									
79									
80			100			CB			
81								80.0 to 90.0 feet: Highly vesicular basalt <20%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (high to low angle), joints are closed.	
82									
83									
84									
85									
86									
87									
88									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
89										
90			100	CB					@ 90.0 feet: Becomes less vesicular <10%.	
91										
92										
93										
94										
95									@ 95.0 feet: Becomes less vesicular <5%, and increase in jointing.	
96										
97										
98										
99										
100										

Total Depth = 100.0 feet bgs.

Borehole Details:

0.0 to 80.0 feet bgs: 6-inch borehole.
80.0 to 100.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 5.0 feet bgs: Concrete.
5.0 to 58.0 feet bgs: Bentonite chips hydrated with potable water.
58.0 to 81.5 feet bgs: 12/20 Silica Sand.
81.5 to 100.0 feet bgs: Bentonite chips hydrated with potable water.

Monitoring Well Completion

Well Tag Number: L133559
Flushmount monitoring well.
0.0 to 60.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
60.0 to 80.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
80.0 to 80.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-2

Sheet
1 of 5

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/8/19 to 7/10/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **100.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1		100		CB				0.0 to 62.0 feet: Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.	
2									
3									
4									
5									
6									
7									
8									
9									
10		100		CB					
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINT\WELL LOGS_A.GPJ 10/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
21			100	CB					
22									
23									
24									
25									
26									
27									
28									
29									
30			100	CB					
31									
32									
33									
34									
35									
36									
37									
38									
39									
40			100	CB					
41									
42									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS -A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									

100 CB

100 CB

62.0 to 68.0 feet: SANDY CLAY WITH GRAVEL (CL); gray with brown mottling; 70% fines; 20% sand, medium to very coarse; 10% gravel, very fine to medium, angular; soft; highly weathered insitu bedrock in a fine matrix, with slight porosity; some intact bedrock with weathering rinds.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										@ 66.0 feet: Becomes gray with more intact rock only moderately weathered.
67										
68										
69										
70										
71			100			CB				
72										
73										
74										
75										
76										
77										
78										
79										
80										
81			100			CB				@ 80.0 feet: Becomes less vesicular, <10%.
82										
83										
84										
85										@ 85.0 feet: Becomes less vesicular, <5%, with an increase in joints.
86										
87										
88										

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
89										
90			100	CB						
91										
92										
93										
94										
95										
96										
97										
98										
99										
100										

Total Depth = 100.0 feet bgs.

Borehole Details:

0.0 to 70.0 feet bgs: 6-inch borehole.
70.0 to 100.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 2.0 feet bgs: Concrete.
2.0 to 48.0 feet bgs: Bentonite chips hydrated with potable water.
48.0 to 71.0 feet bgs: 12/20 Silica Sand.
71.0 to 100.0 feet bgs: Bentonite chips hydrated with potable water.

Monitoring Well Completion

Well Tag Number: L133560
Flushmount monitoring well.
0.0 to 50.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
50.0 to 70.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
70.0 to 70.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-3

Sheet
1 of 5

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/17/19 to 7/17/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **100.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1		100		CB				0.0 to 1.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to coarse, angular; loose; no odor; no sheen; moist.	
2								1.0 to 2.0 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
3								2.0 to 5.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
4									
5		100		CB				5.0 to 5.5 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
6								5.5 to 8.0 feet: SANDY CLAYEY GRAVEL (GW); gray; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, fine to coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
7									
8									
9								8.0 to 10.0 feet: GRAVELLY SAND (SW); brown; 0% fines; 80% sand, fine to coarse; 20% gravel, fine to very coarse, angular; loose; trace silt clasts; no odor; no sheen; moist.	
10									
11								10.0 to 15.0 feet: No recovery.	
12									
13									
14									
15		100		CB			21, 11, 15	15.0 to 22.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, fine to medium; 10% gravel, fine to very coarse, angular; loose; trace silt clasts; no odor; no sheen; moist.	
16				SPT					
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPAIR\FIELD WORK\GINTWELL LOGS - A.GPJ 10/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
21									
22									
23									
24									
25			0			CB			
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40			100			CB			
41									
42									

22.0 to 48.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data				Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)				
44										
45										
46										
47										
48										
49										
50		100				CB				
51										
52										
53										
54										
55										
56										
57										
58										
59										
60		100				CB				
61										
62										
63										
64										
65										

48.0 to 75.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, plant matter, and rootlets; no odor; no sheen; moist to wet.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										
67										
68										
69										
70										
71			100			CB				
72										
73										
74										
75										
76										75.0 to 80.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, very fine to fine; 0% gravel; loose; trace organics and wood fragments; no odor; no sheen; wet.
77										
78										
79										
80			100			CB				Basalt with trace vesicles <5%, dark gray when wet, fresh, hard, close non-systematically jointed, randomly oriented (low to high angle), joints are closed.
81										
82										
83										
84										
85										
86										
87										
88										

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data					Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)			
89			100	CB					
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

Total Depth = 100.0 feet bgs.

Borehole Details:

0.0 to 90.0 feet bgs: 6-inch borehole.
90.0 to 100.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 3.0 feet bgs: Concrete.
3.0 to 5.0 feet bgs: 12/20 Silica Sand.
5.0 to 23.0 feet bgs: Bentonite chips hydrated with potable water.
23.0 to 46.5 feet bgs: 12/20 Silica Sand.
46.5.0 to 70.0 feet bgs: Bentonite chips hydrated with potable water.
70.0 to 100.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133572
Flushmount monitoring well.
0.0 to 25.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
25.0 to 45.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
45.0 to 45.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-4

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/15/19 to 7/15/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **120.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Sample Data					Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)			
1		100		CB				0.0 to 2.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to very coarse, angular; loose; no odor; no sheen; moist.	
2								@ 1.5 feet: Becomes brown.	
3								2.0 to 4.0 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
4									
5		100		CB SH		Shelby tube at 5.0'		4.0 to 8.5 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
6								@ 4.1 feet: Piece of black plastic.	
7									
8									
9								8.5 to 11.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 70% sand, very fine to coarse; 30% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
10									
11									
12								11.0 to 12.0 feet: SANDY CLAYEY GRAVEL (GW); brown; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, very fine to coarse, angular; loose; trace slightly weathered vesicular basalt cobbles; no odor; no sheen; moist.	
13								12.0 to 13.0 feet: SANDY GRAVELLY CLAY (CL); brown fines with gray sand; 50% fines, medium plasticity; 30% sand, very fine to medium; 20% gravel, very fine to medium, angular; very soft; no odor; no sheen; wet.	
14								13.0 to 16.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 80% sand, fine to coarse; 20% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; wet.	
15		100		CB SPT			25, 21, 16		
16								16.0 to 20.0 feet: SANDY GRAVEL WITH CLAY (GW); brown; 10% fines; 40% sand, fine to very coarse; 50% gravel, fine to very coarse, angular; loose; some cobbles; no odor; no sheen; wet.	
17									
18									
19									
20									

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

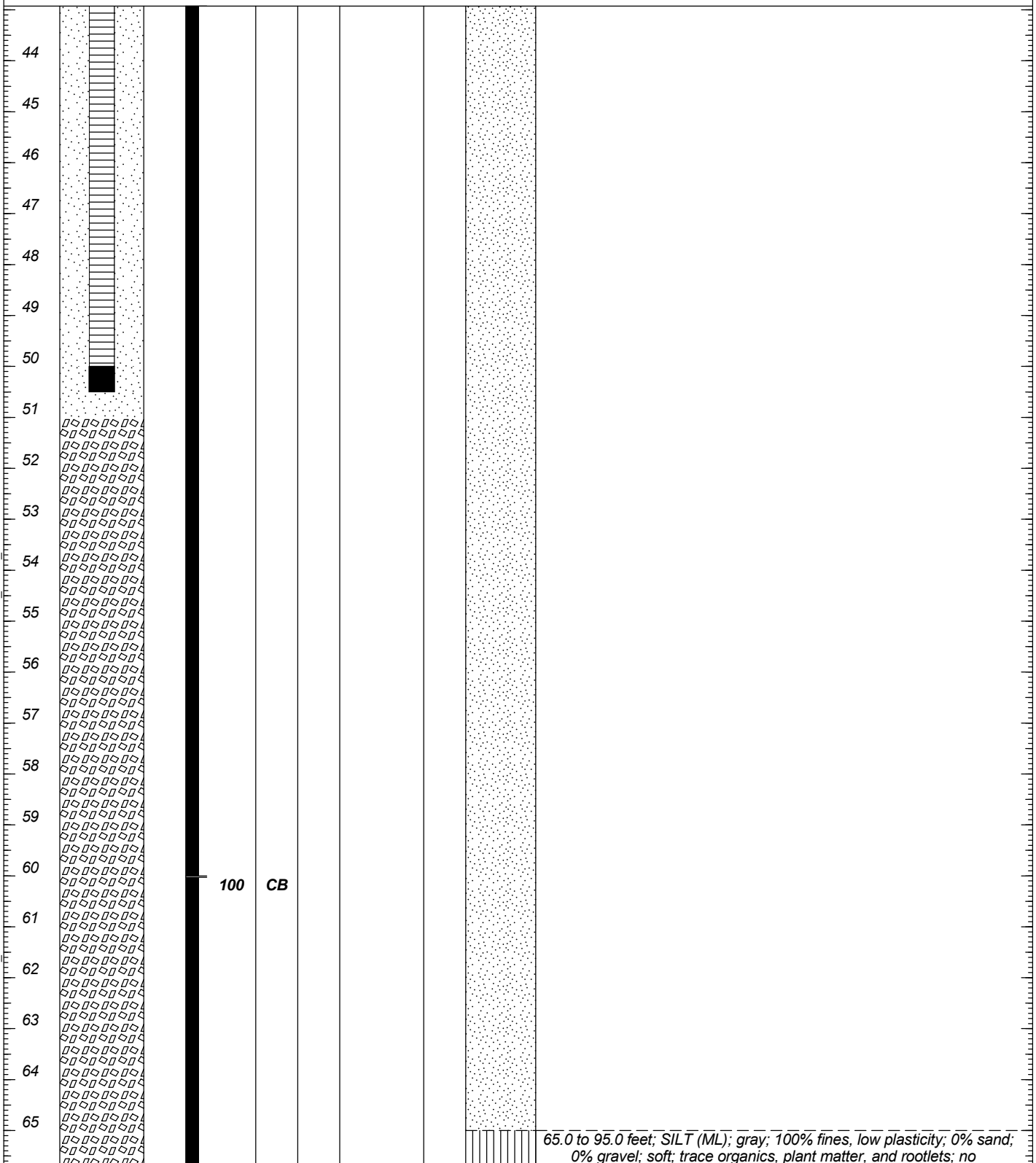
GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL_LOGS_A.GPJ 10/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
21									20.0 to 23.0 feet: SAND WITH GRAVEL (SW); brown; 0% fines; 90% sand, fine to very coarse; 10% gravel, fine to very coarse, angular; loose; no odor; no sheen; wet.
22									
23									23.0 to 65.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.
24									
25			0			CB			
26									
27									
28									
29									
30									
31									
32									
33									
34									
35			0			CB			
36									
37									
38									
39									
40									
41									
42									

L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINT\WELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				



NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
66										odor; no sheen; moist to wet.
67										
68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description	
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6" Lithologic Column		
89		100	CB						
90									
91									
92									
93									
94									
95									95.0 to 105.0 feet; SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, very fine to fine; 0% gravel; loose; trace organics and rootlets; no odor; no sheen; wet.
96									
97									
98									
99									
100		100	CB						
101									
102									
103									
104									
105									105.0 to 113.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, and rootlets; no odor; no sheen; moist.
106									
107									
108									
109									
110									
111		100	CB						
110									
111									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 LAGOON REPURPOSING\FIELD WORK\GINTWELL_LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
112									
113									
114									
115									
116									
117									
118									
119									
120									

113.0 to 120.0 feet: SILTY SAND (SM); gray; 20% fines, low plasticity; 80% sand, very fine to fine; 0% gravel; loose; trace organics and rootlets; no odor; no sheen; moist.

@ 116.0 feet: Becomes only 10% fines.

@ 117.0 feet: wood fragment.

Total Depth = 120.0 feet bgs.

Borehole Details:

0.0 to 90.0 feet bgs: 6-inch borehole.
90.0 to 120.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 2.0 feet bgs: Concrete.
2.0 to 27.0 feet bgs: Bentonite chips hydrated with potable water.
27.0 to 51.0 feet bgs: 12/20 Silica Sand.
51.0.0 to 75.0 feet bgs: Bentonite chips hydrated with potable water.
75.0 to 120.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133571
Flushmount monitoring well.
0.0 to 30.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
30.0 to 50.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
50.0 to 50.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-5

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/16/19 to 7/16/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **120.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1		100		CB				0.0 to 2.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to coarse, angular; loose; no odor; no sheen; moist.	
2									
3								2.0 to 3.0 feet: GRAVELLY CLAY (CL); brown; 80% fines, medium plasticity; 0% sand; 20% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
4								3.0 to 6.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
5		100		CB				@ 5.0 feet: Thin brown silt bed.	
6				SPT			10, 11, 15		
7								6.0 to 9.0 feet: SANDY CLAYEY GRAVEL (GW); gray; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, very fine to coarse, angular; loose; no odor; no sheen; moist.	
8									
9									
10								9.0 to 15.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 80% sand, fine to coarse; 20% gravel, fine to very coarse, angular; loose; trace cobbles; no odor; no sheen; moist.	
11									
12									
13									
14									
15		100		CB				15.0 to 16.0 feet: SANDY GRAVELLY CLAY (CL); brown fines with gray sand and gravel; 50% fines, medium plasticity; 30% sand, very fine to medium; 20% gravel, fine to medium, angular; very soft; no odor; no sheen; wet.	
16								16.0 to 23.0 feet: SAND WITH GRAVEL (SW); gray; 0% fines; 90% sand, fine to medium; 10% gravel, fine to very coarse, angular; loose; no odor; no sheen; wet.	
17									
18									
19									
20									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS -A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									

100 CB SPT

2, 3, 6

0 CB

23.0 to 63.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.

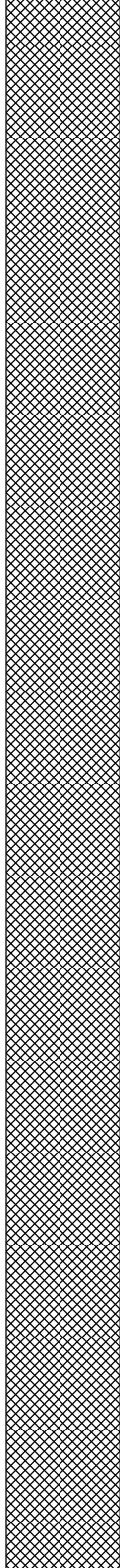
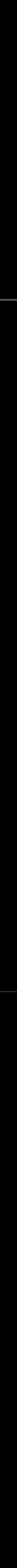
GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60			100			CB			
61									
62									
63									
64									
65									

63.0 to 103.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, plant matter, and rootlets; no odor; no sheen; moist to wet.

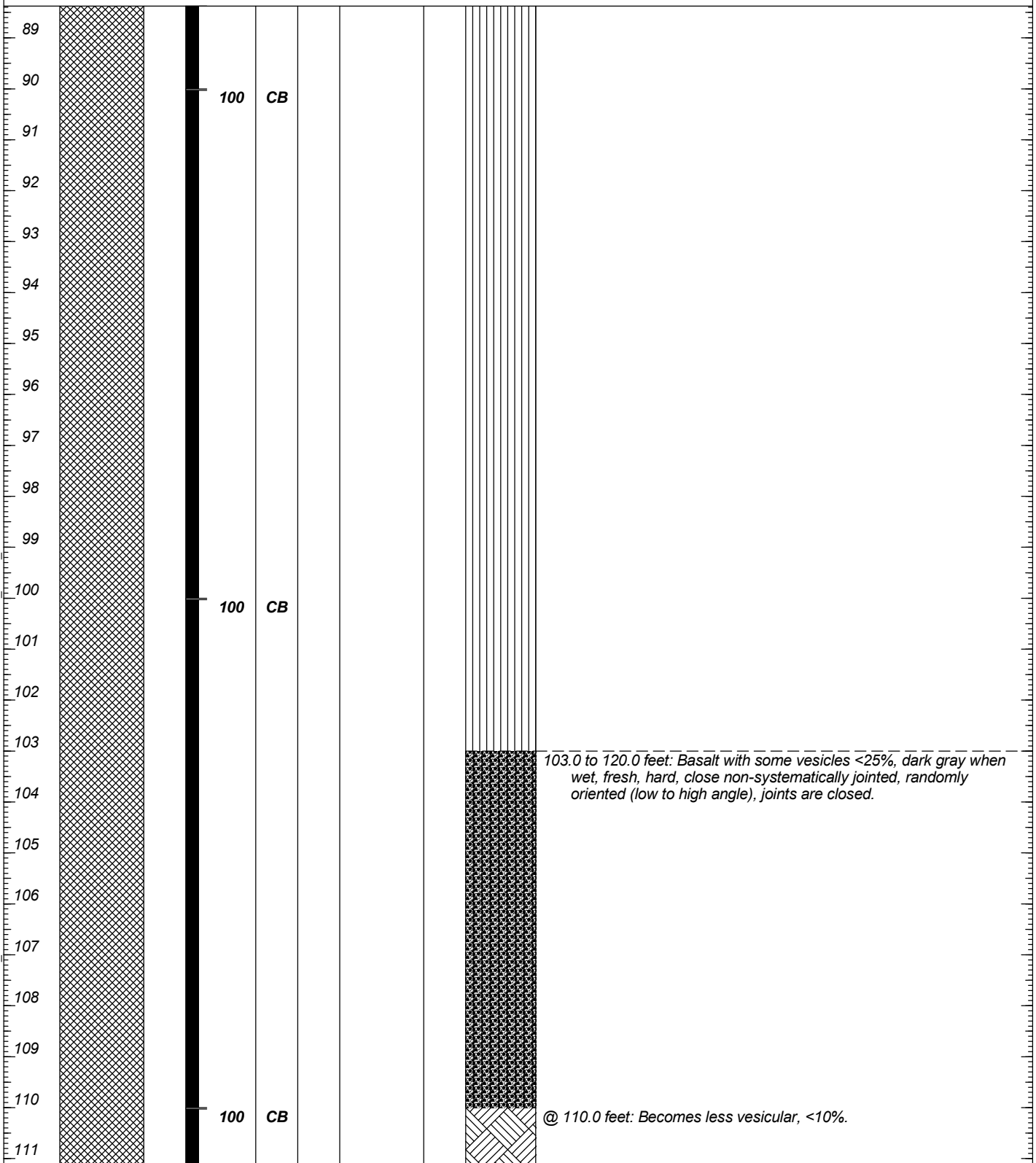
NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description	
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"		Lithologic Column
66									
67									
68									
69									
70				100	CB				
71									
72									
73									
74									
75									
76									
77									
78									
79									
80		100	CB						
81									
82									
83									
84									
85									
86									
87									
88									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	



NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
112										
113										
114										
115										
116										
117										
118										
119										
120										

@ 115.0 feet: Becomes less vesicular, <5%.

Total Depth = 120.0 feet bgs.

Borehole Details:

0.0 to 90.0 feet bgs: 6-inch borehole.
90.0 to 120.0 feet bgs: 4-inch borehole.

Borehole Completion Details:

0.0 to 5.0 feet bgs: Concrete.
5.0 to 27.0 feet bgs: Bentonite chips hydrated with potable water.
27.0 to 51.0 feet bgs: 12/20 Silica Sand.
51.0.0 to 54.0 feet bgs: Bentonite chips hydrated with potable water.
54.0 to 120.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133553
Flushmount monitoring well.
0.0 to 30.0 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.
30.0 to 50.0 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.
50.0 to 50.5 feet bgs: 2-inch-diameter end cap.

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-6

Sheet
1 of 6

Project Name **St. Helens Lagoon**
 Project Location **St. Helens**
 Start/End Date **7/11/19 to 7/12/19**
 Driller/Equipment **Dan Rider/Terra Sonic Incorporated 150 CC**
 Geologist/Engineer **C. Schweitzer**
 Sample Method **Core Barrel: Ten-foot intervals.**

TOC Elevation (feet)
 Surface Elevation (feet)
 Northing
 Easting
 Hole Depth **120.0-feet**
 Outer Hole Diam **6" to 4"-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
1		100		CB				0.0 to 4.0 feet: SANDY GRAVEL (GW); gray; 0% fines; 20% sand; 80% gravel, fine to very coarse, angular; loose; no odor; no sheen; moist.	
2									
3								@ 2.5 feet: Becomes brown.	
4									
5		100		CB SPT			6, 4, 5	4.0 to 5.0 feet: GRAVELLY CLAY (CL); brown; 60% fines, medium plasticity; 0% sand; 40% gravel, very fine to medium, angular; stiff; no odor; no sheen; moist.	
6								5.0 to 6.0 feet: SANDY CLAYEY GRAVEL (GW); brown with dark gray sand and gravel; 20% fines, medium plasticity; 30% sand, medium to coarse; 50% gravel, very fine to coarse, angular; loose; fines in clumps; no odor; no sheen; moist.	
7								6.0 to 10.0 feet: SAND WITH GRAVEL (SW); brown; 0% fines; 90% sand, very fine to coarse; 10% gravel, fine to very coarse, angular; loose; trace cobbles up to 2 inch; no odor; no sheen; moist.	
8									
9									
10									
11								10.0 to 11.0 feet: SILTY GRAVELLY SAND (SM); dark gray; 30% fines, low plasticity; 50% sand, very fine to medium; 20% gravel, fine to medium, angular; loose; trace cobbles up to 3 inch; no odor; no sheen; moist.	
12								11.0 to 20.0 feet: GRAVELLY SAND (SW); gray; 0% fines; 80% sand, fine to very coarse; 20% gravel, fine to very coarse, angular; loose; trace cobbles up to 2 inch; no odor; no sheen; moist.	
13								@ 13.0 feet: Becomes brown, with a thin silt bed.	
14									
15		100		CB SH					
16								@ 16.0 feet: Becomes gray, with a thin silt bed.	
17									
18								@ 18.0 feet: Becomes brown.	
19									
20									

Shelby Tube at 15.0'

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Sample Data			Blows/6"	Lithologic Column	Soil Description
				Collection Method	Number	Name (Type)			
21									20.0 to 55.0 feet: SAND (SP); dark gray; 0% fines; 100% sand, very fine to medium; 0% gravel; very loose; no odor; no sheen; wet.
22									
23									
24									
25									
26			0	CB			1, 2, 5		
27				SPT					
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data					Blows/6"	Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)			
44									
45									
46									
47									
48									
49									
50									
51			100	CB					
52									
53									
54									
55									
56									55.0 to 120.0 feet; SILT (ML); gray; 100% fines, low plasticity; 0% sand; 0% gravel; soft; trace organics, plant matter, and rootlets; trace light interbedded zones of light gray sand; no odor; no sheen; moist to wet.
57									
58									
59									
60			100	CB					
61									
62									
63									
64									
65									

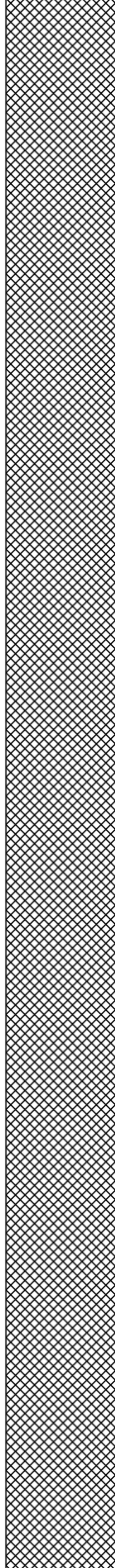
GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\INTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description						
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"		Lithologic Column					
66														
67														
68														
69														
70									100	CB				
71														
72														
73														
74														
75														
76														
77														
78														
79														
80	100	CB												
81														
82														
83														
84														
85														
86														
87														
88														

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04_IGA PHASE 1 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Depth (feet, BGS)	Well Details	Sample Data						Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	
89								
90								
91								
92								
93								
94								
95								
96								
97								
98								
99								
100		100		CB				
101								
102								
103								
104								
105								
106								
107								
108								
109								
110		100		CB				
111								

GBLWC L:\PROJECTS\0830.03 CITY OF ST. HELENS\04 LAGOON REPURPOSING\FIELD WORK\GINTWELL LOGS_A.GPJ 10/18/19

NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

Geologic Borehole Log/Well Construction

Project Number
0830.03.04-02

Well Number
MW-6

Sheet
6 of 6

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Sample Data			Blows/6"	Lithologic Column	Soil Description
					Number	Name (Type)				
112										
113										
114										
115										
116										
117										
118										
119										
120										

Total Depth = 120.0 feet bgs.

Borehole Details:

0.0 to 120.0 feet bgs: 6-inch borehole.

Borehole Completion Details:

0.0 to 3.5 feet bgs: Concrete.

3.5 to 28.0 feet bgs: Bentonite chips hydrated with potable water.

28.0 to 51.0 feet bgs: 12/20 Silica Sand.

51.0 to 120.0 feet bgs: Native soil heave/slough.

Monitoring Well Completion

Well Tag Number: L133558

Flushmount monitoring well.

0.0 to 30.5 feet bgs: 2-inch-diameter, schedule 40, PVC blank riser pipe.

30.5 to 50.5 feet bgs: 2-inch-diameter, schedule 40, 0.010-inch machine slot, pre-pack well screen.

50.5 to 51.0 feet bgs: 2-inch-diameter end cap.

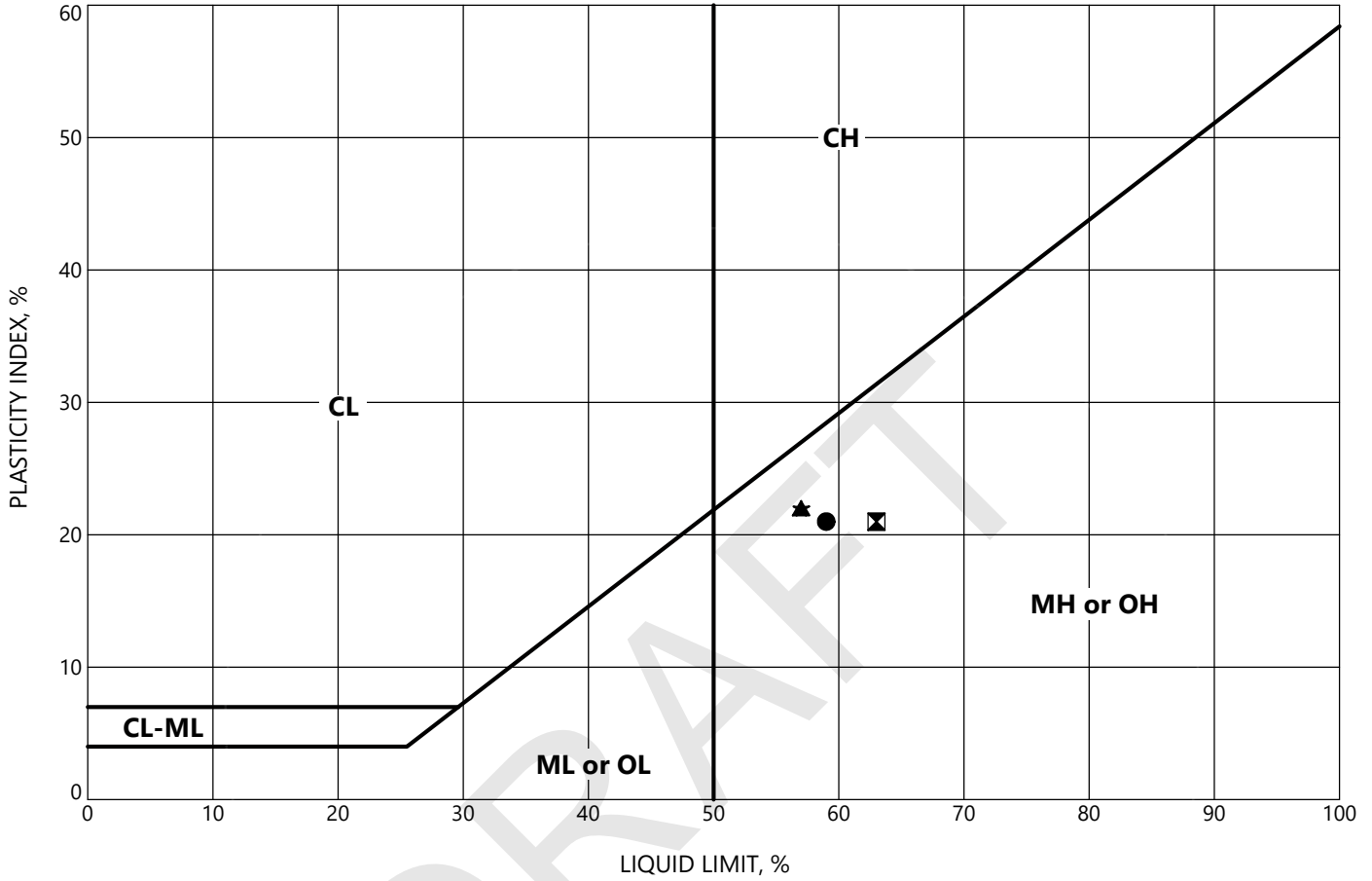
NOTES: 1. bgs = below ground surface. 2. PVC = polyvinyl chloride. 3. CB = Core Barrel. 4. SH = Shelby Tube. 5. SPT = Standard Penetration Test.

APPENDIX F

Maul Foster & Alongi - Atterberg Limits Results (2023)

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



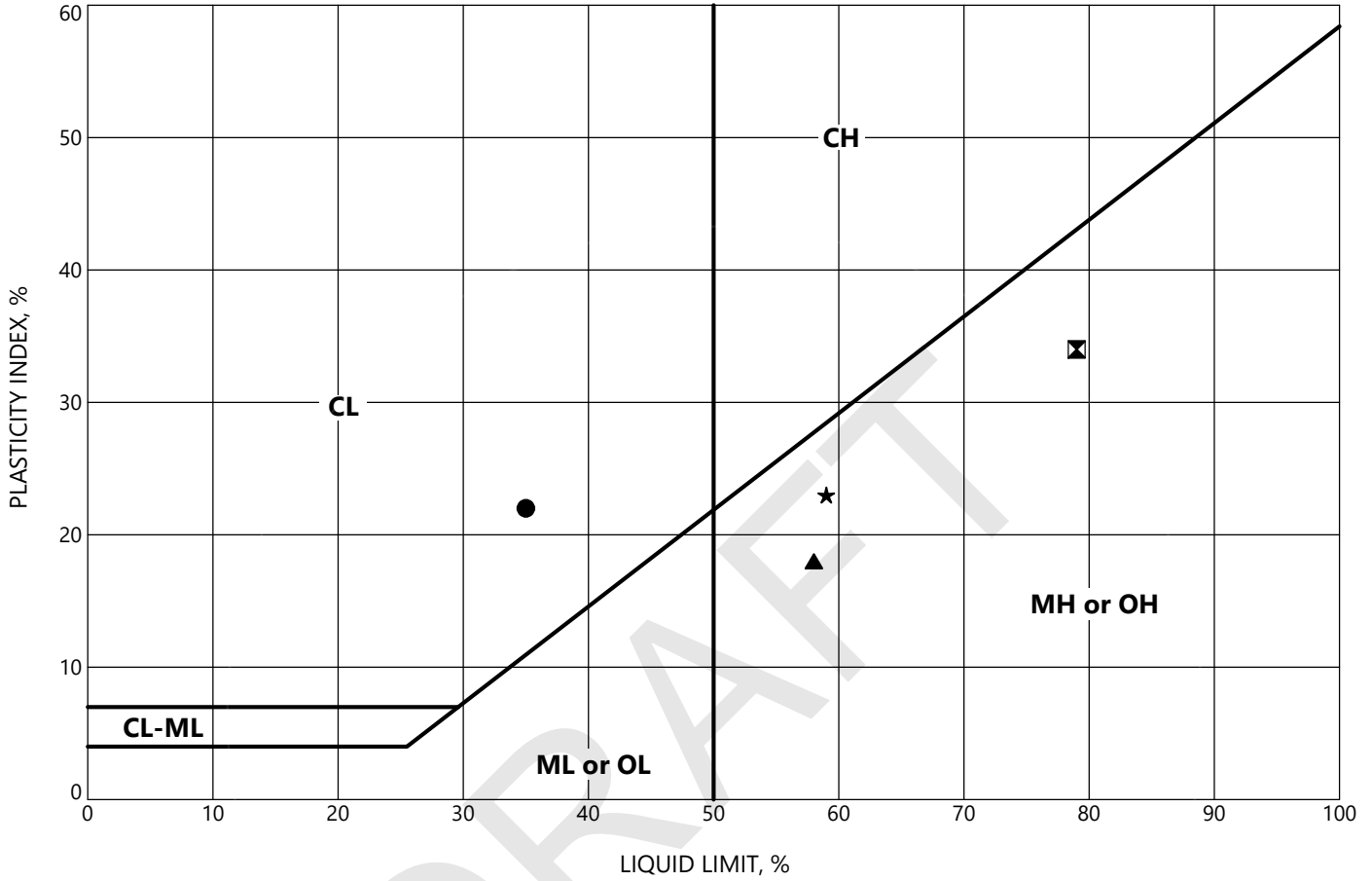
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	MFA B-3A		13.0	MH	59	38	21	59
⊠	MFA B-3		26.5	MH	63	42	21	57
▲	MFA B-3		46.5	MH	57	35	22	54
★	MFA B-3		64.5	MH	57	35	22	52



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



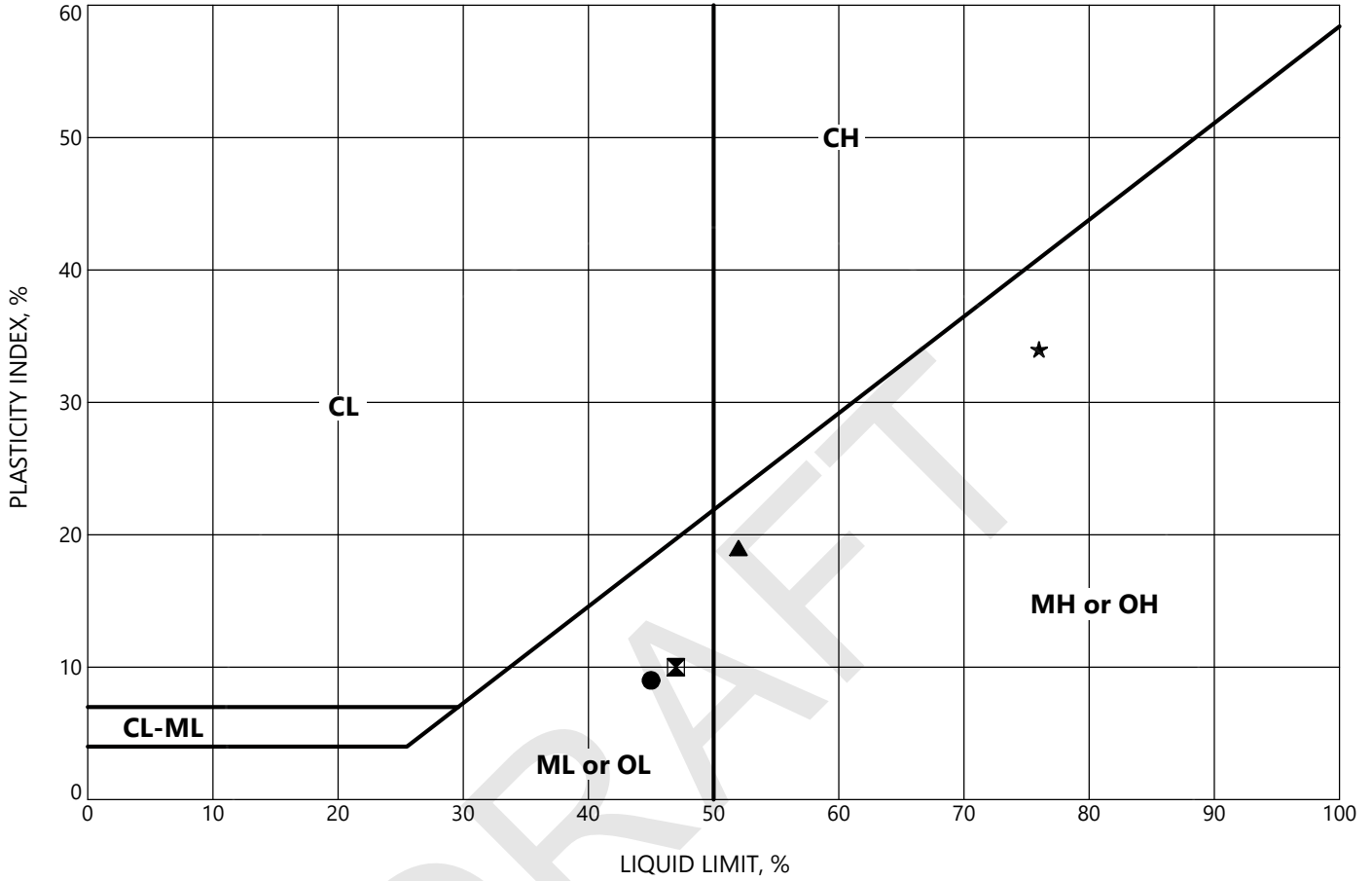
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	MFA B-3		108.5	MH	35	13	22	45
⊠	MFA B-4		17.5	MH	79	45	34	78
▲	MFA B-4		37.5	MH	58	40	18	53
★	MFA B-4		51.0	MH	59	36	23	56



PLASTICITY CHART

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY



	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	MFA B-4		77.5	ML	45	36	9	44
⊠	MFA B-4		101.5	ML	47	37	10	46
▲	MFA B-5		9.5	MH	52	33	19	51
★	MFA B-5		22.5	MH	76	42	34	86



PLASTICITY CHART

APPENDIX G

Shannon and Wilson Exploration Logs (1968 and 1969)

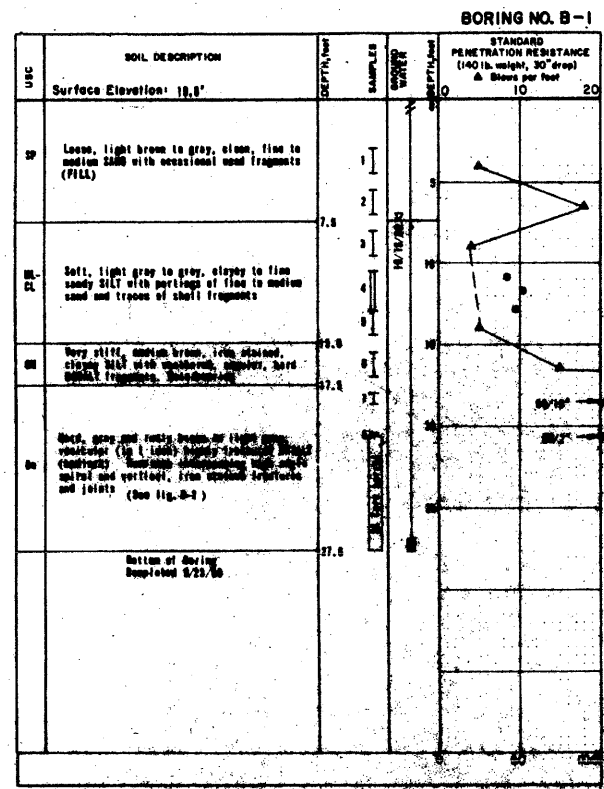


FIG. B-1

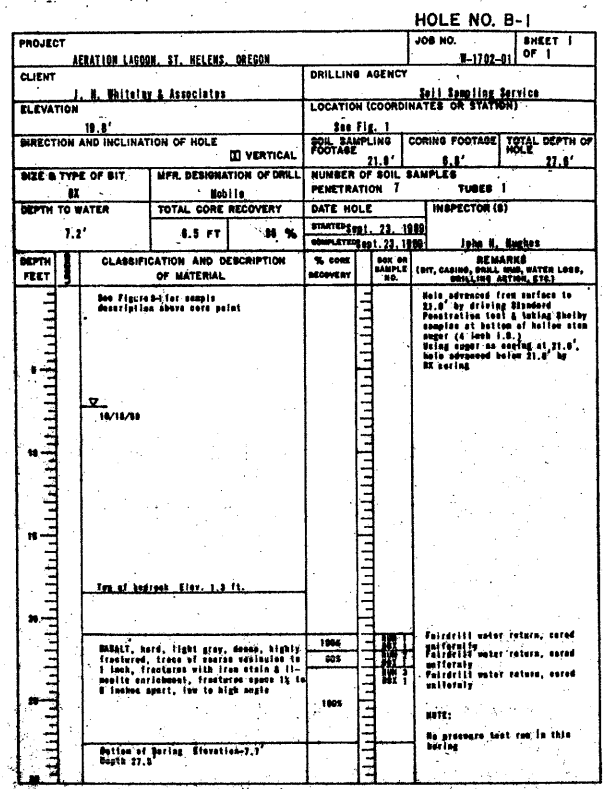


FIG. B-2

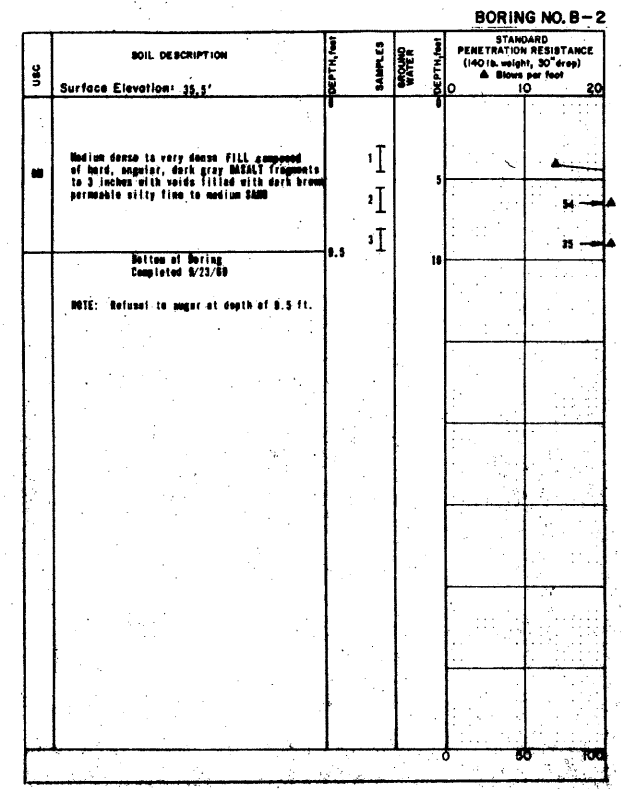


FIG. B-3

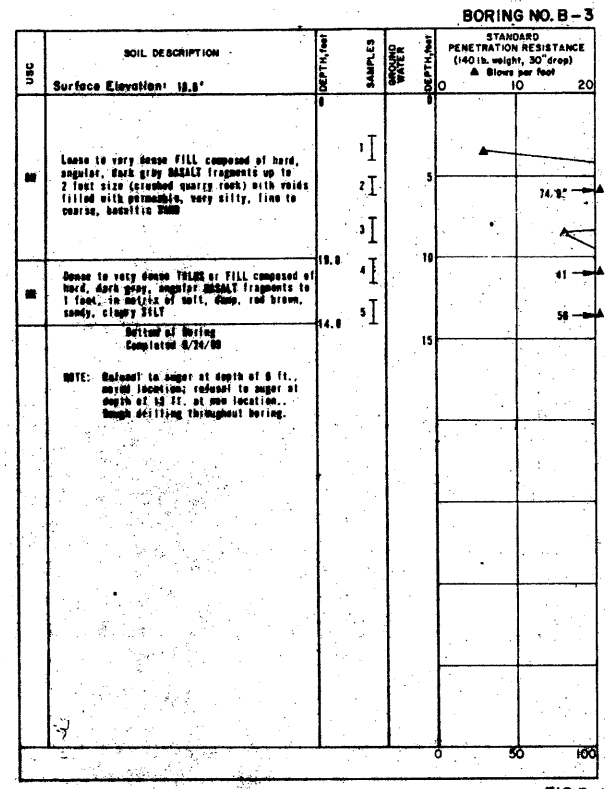


FIG. B-4

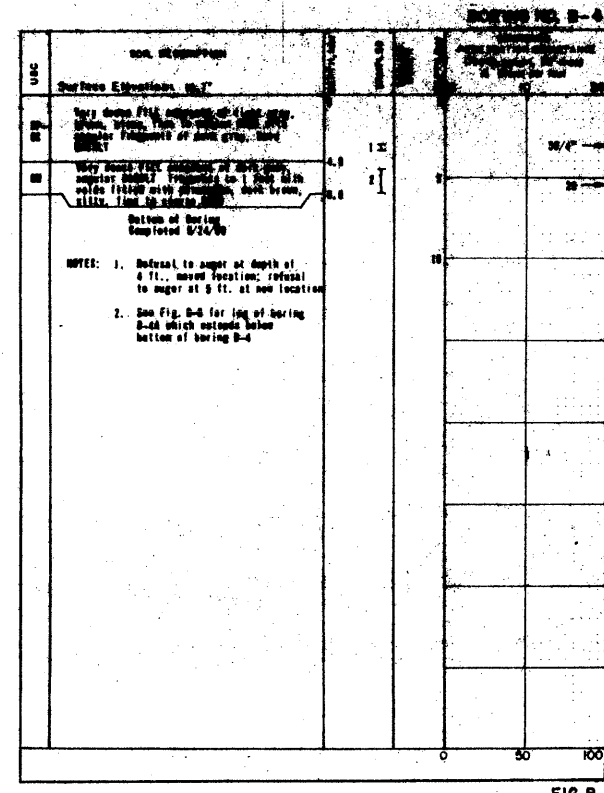


FIG. B-5

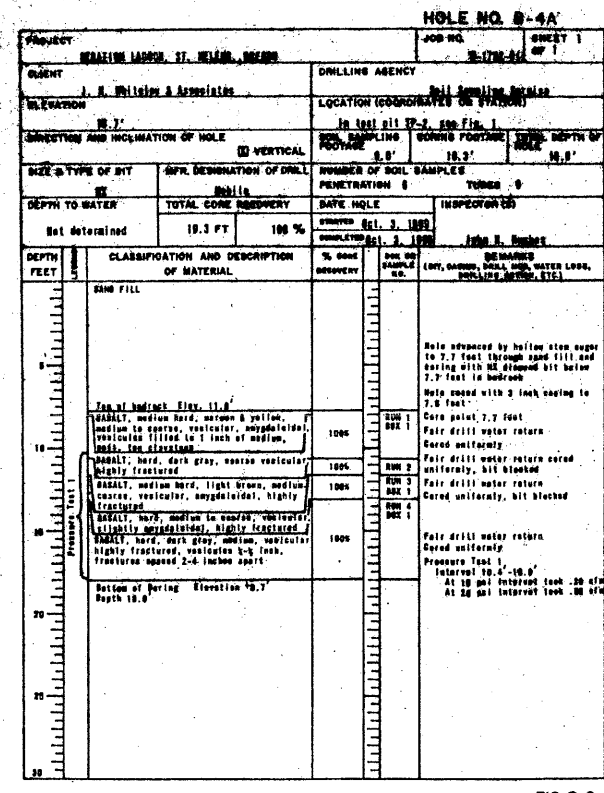


FIG. B-6

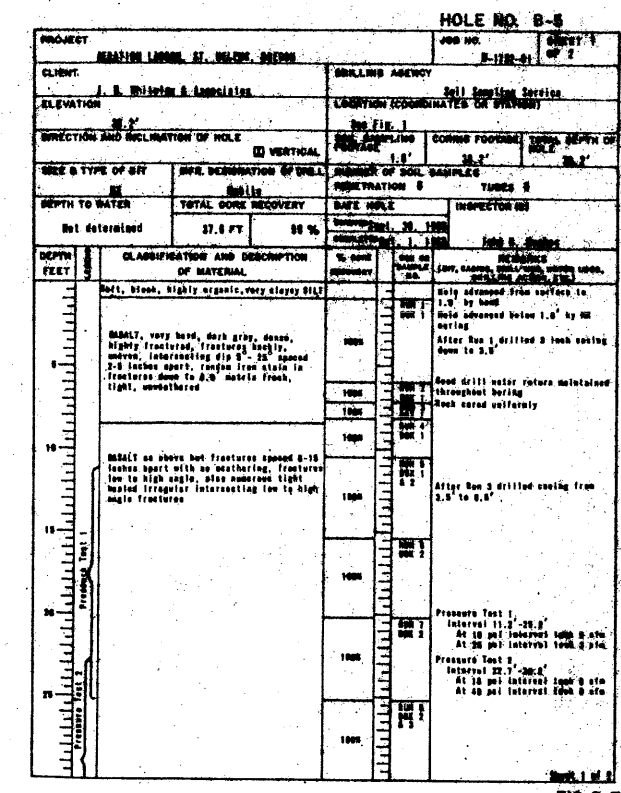


FIG. B-7

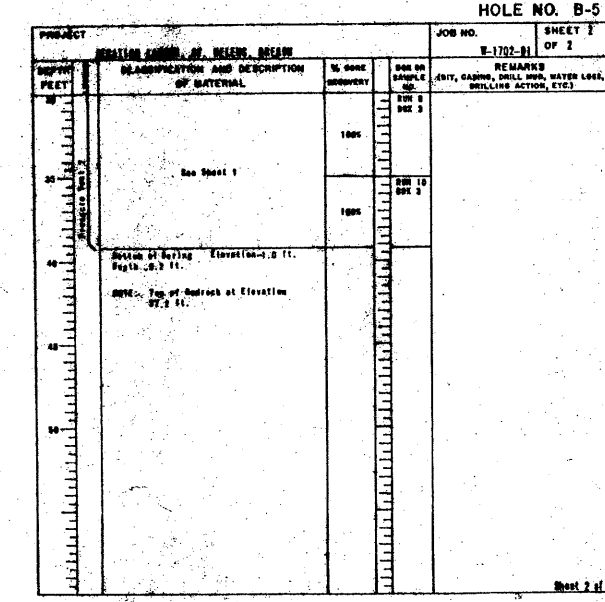


FIG. B-7

NOTE: SOILS INVESTIGATION CONDUCTED BY SHANNON & WILSON

LEGEND
 2.0" O.D. split spoon sampler
 3.0" O.D. split spoon sampler
 * Sample not recovered
 Afterbury limit
 1-Liquid limit
 Natural water content
 Plastic limit
 Impermeable soil
 Water level
 Piezometer tip
 Sampler pushed
 Unified Soil Classification
 % Water content

CITY OF ST. HELENS, OREGON		REVISIONS	
SECONDARY TREATMENT FACILITY		LOG OF BORINGS & TEST PITS	
WHITELY-JACOBSEN & ASSOCIATES CONSULTING ENGINEERS		DRAWN: R.C. CHECKED: SH	
1510 E. OLIVE WAY SEATTLE, 98122		APPROVED: J.H.W. DATE: 3-16-70	
SA 3-747 WASHINGTON		SHEET NO. C-5	

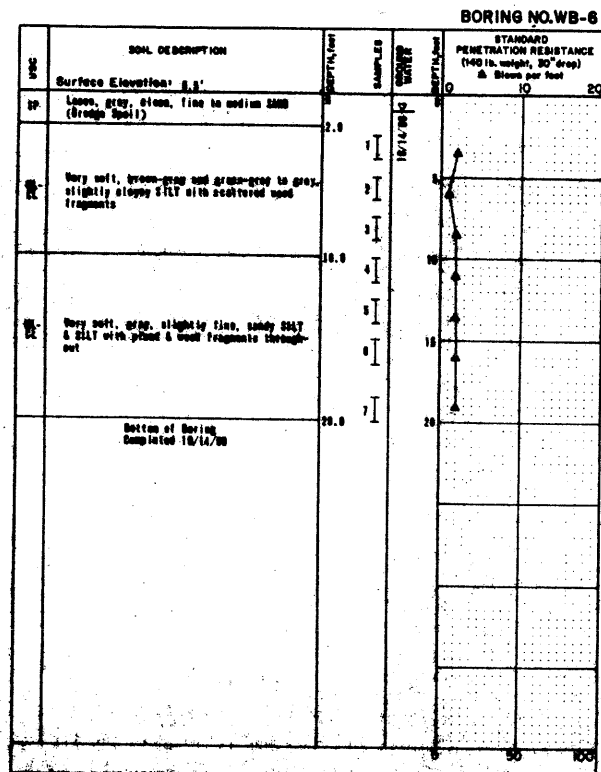


FIG. B-22

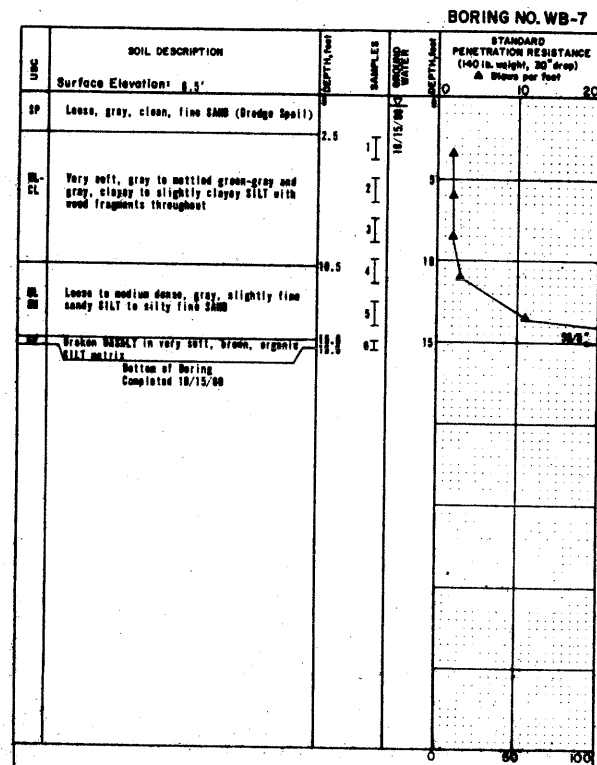


FIG. B-25

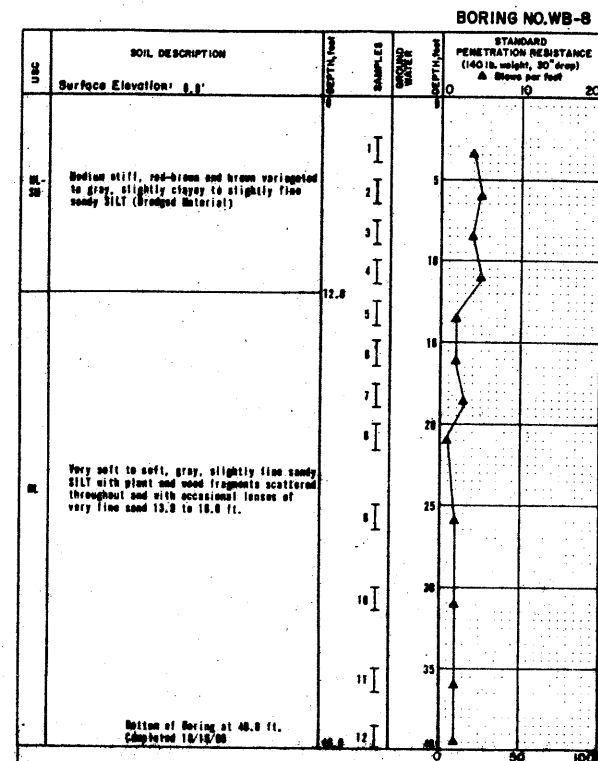


FIG. B-24

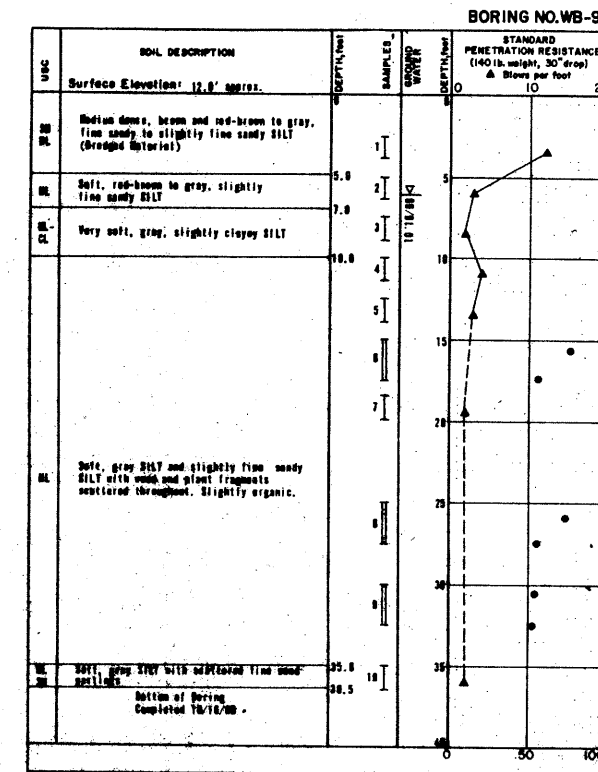


FIG. B-26

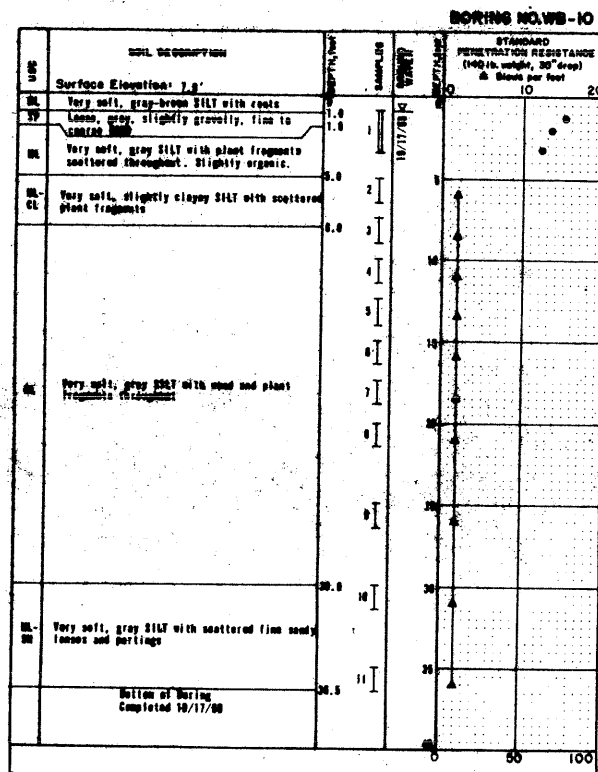


FIG. B-28

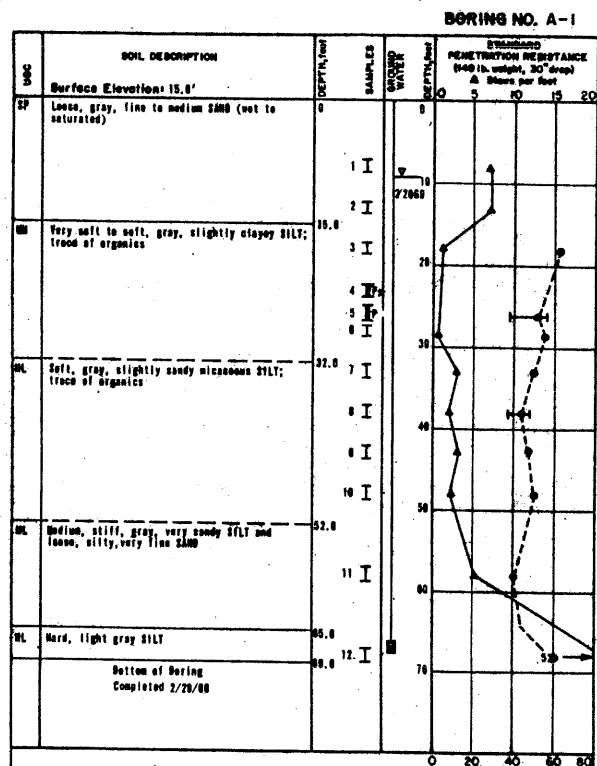


FIG. B-27

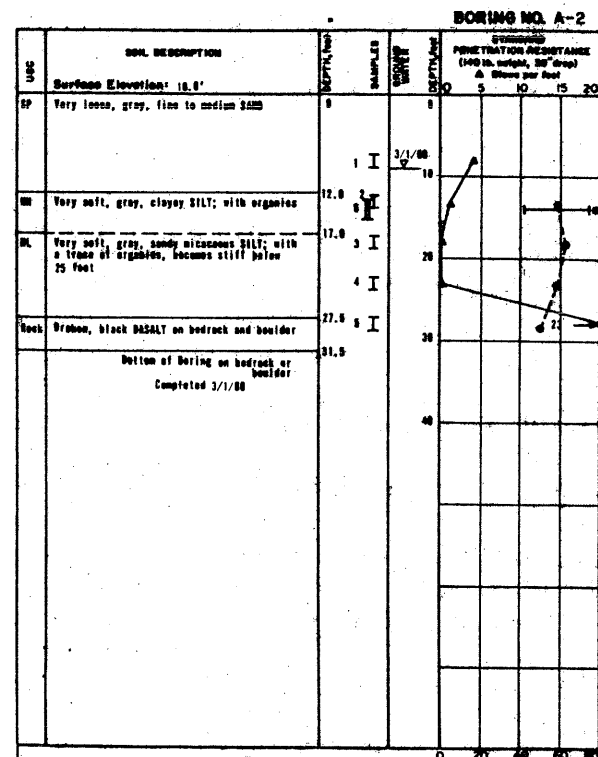


FIG. B-28

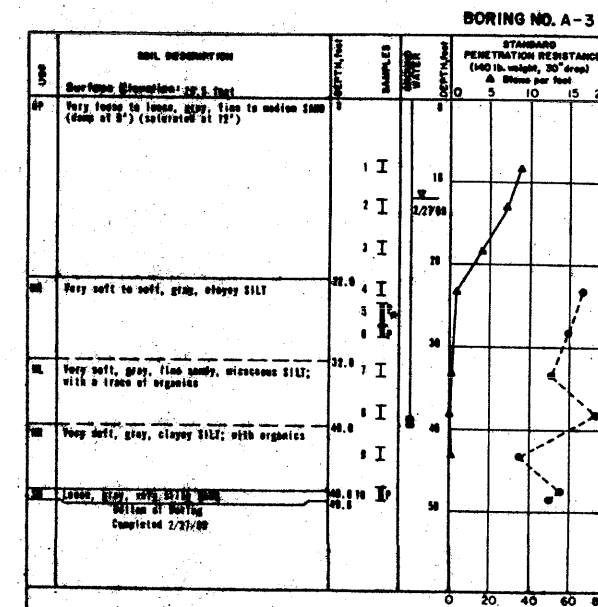


FIG. B-29

NOTE: SOILS INVESTIGATION CONDUCTED BY SHANNON & WILSON

LEGEND

- 1" 6.0" O.D. split spoon sample
- 1" 3.0" O.D. split spoon sample
- Sample not recovered
- Ashberg Hammer
- Water level
- Plastic limit
- Impervious soil
- Water level
- Plastic limit
- Sample not recovered
- Unified Soil Classification
- % Water content

CITY OF ST. HELENS, OREGON		REVISIONS
SECONDARY TREATMENT FACILITY		
LOG OF BORINGS & TEST PITS		
WHEBNEY-JACOBSEN & ASSOCIATES CONSULTING ENGINEERS 1818 E. OLIVE WAY SEATTLE 98122	DRAWN: R.C. CHECKED: SH APPROVED: J.H.W. DATE: 3-16-70	SHEET NO. C-8

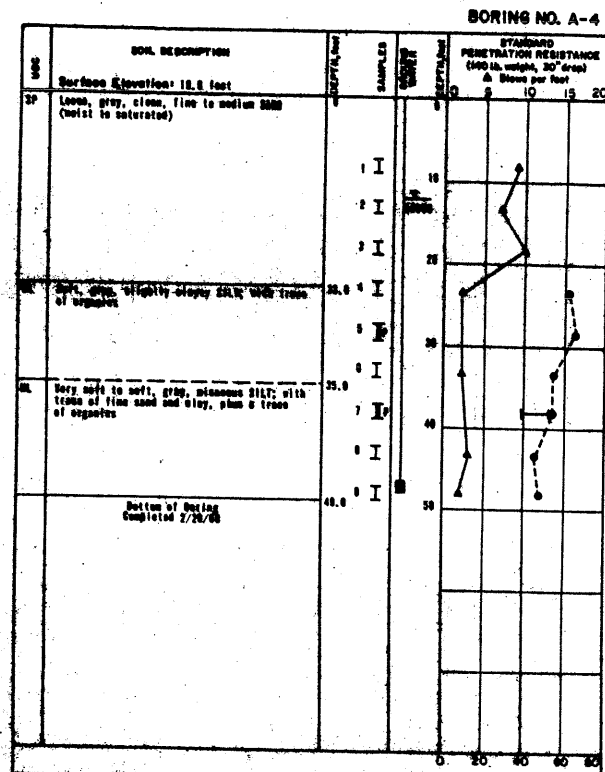


FIG. B-30

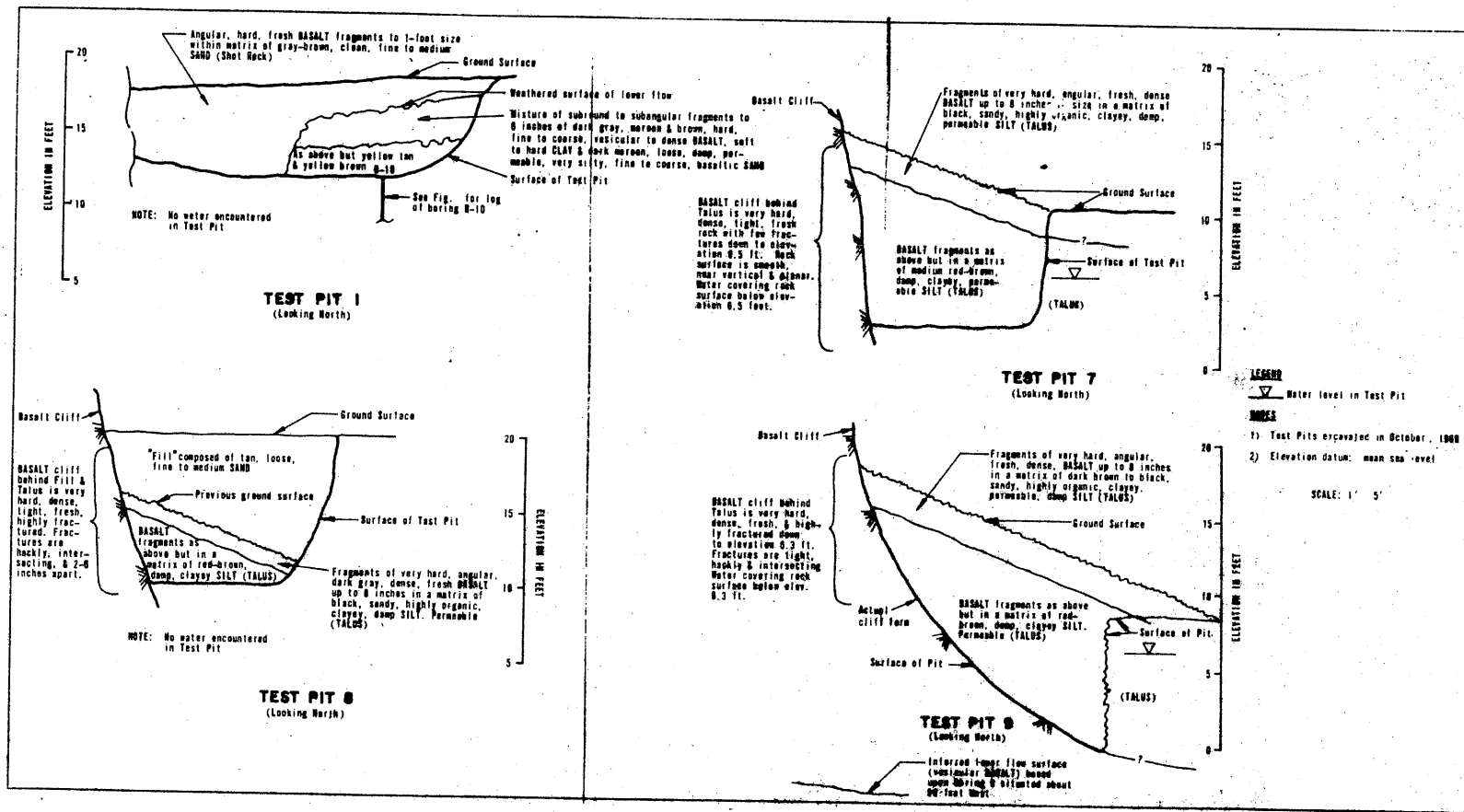


FIG. B-31

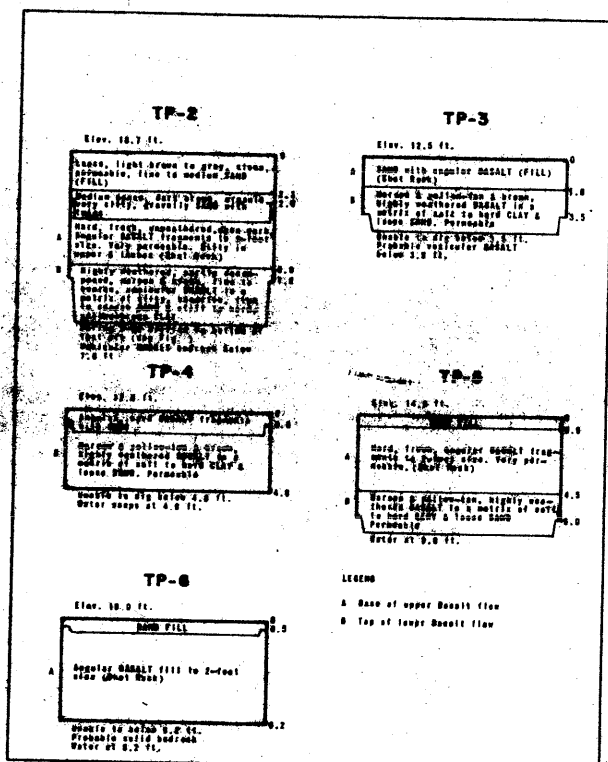
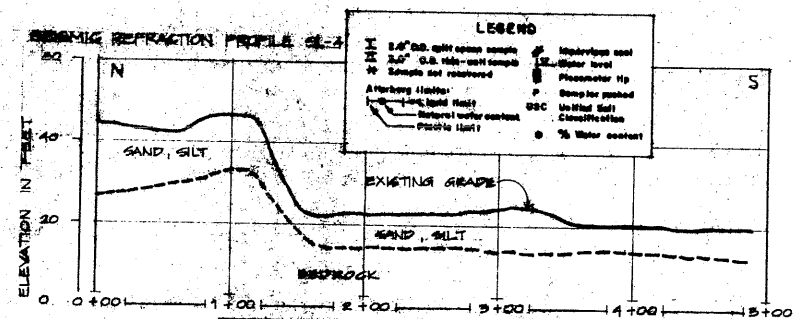
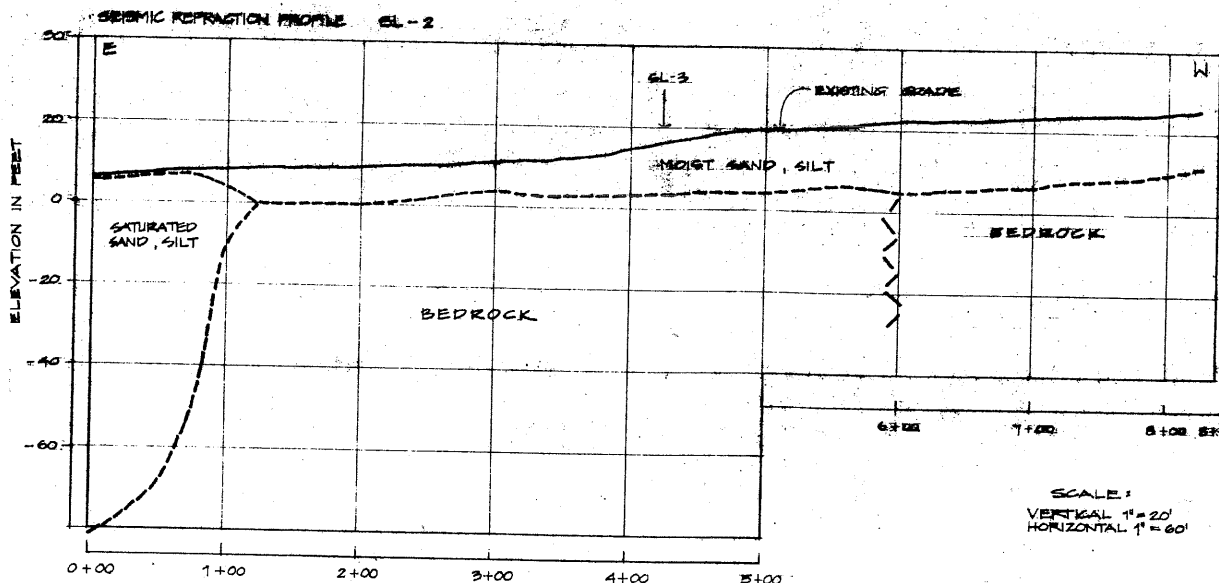
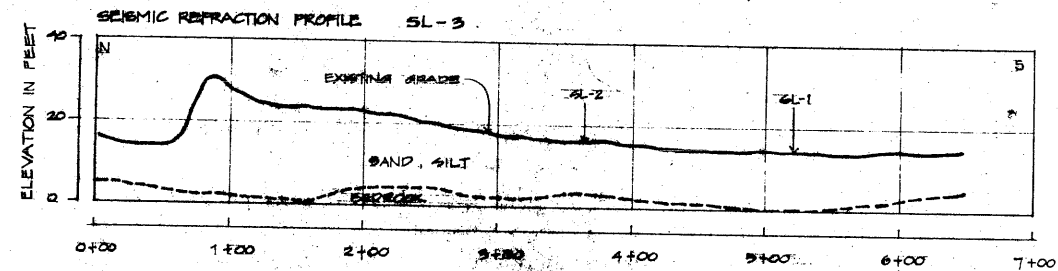
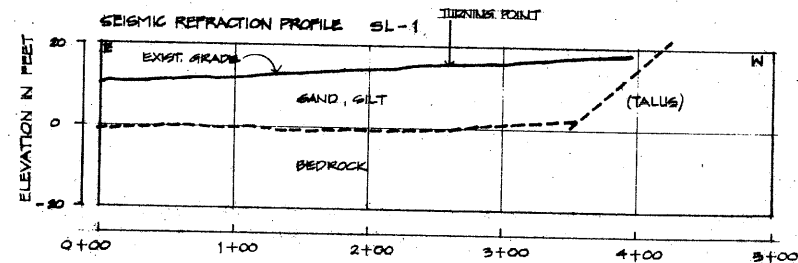


FIG. B-32

NOTE: SOILS INVESTIGATION CONDUCTED BY SHANNON & WILSON



SCALE: VERTICAL 1" = 20' HORIZONTAL 1" = 60'

CITY OF ST. HELENS, OREGON

SECONDARY TREATMENT FACILITY

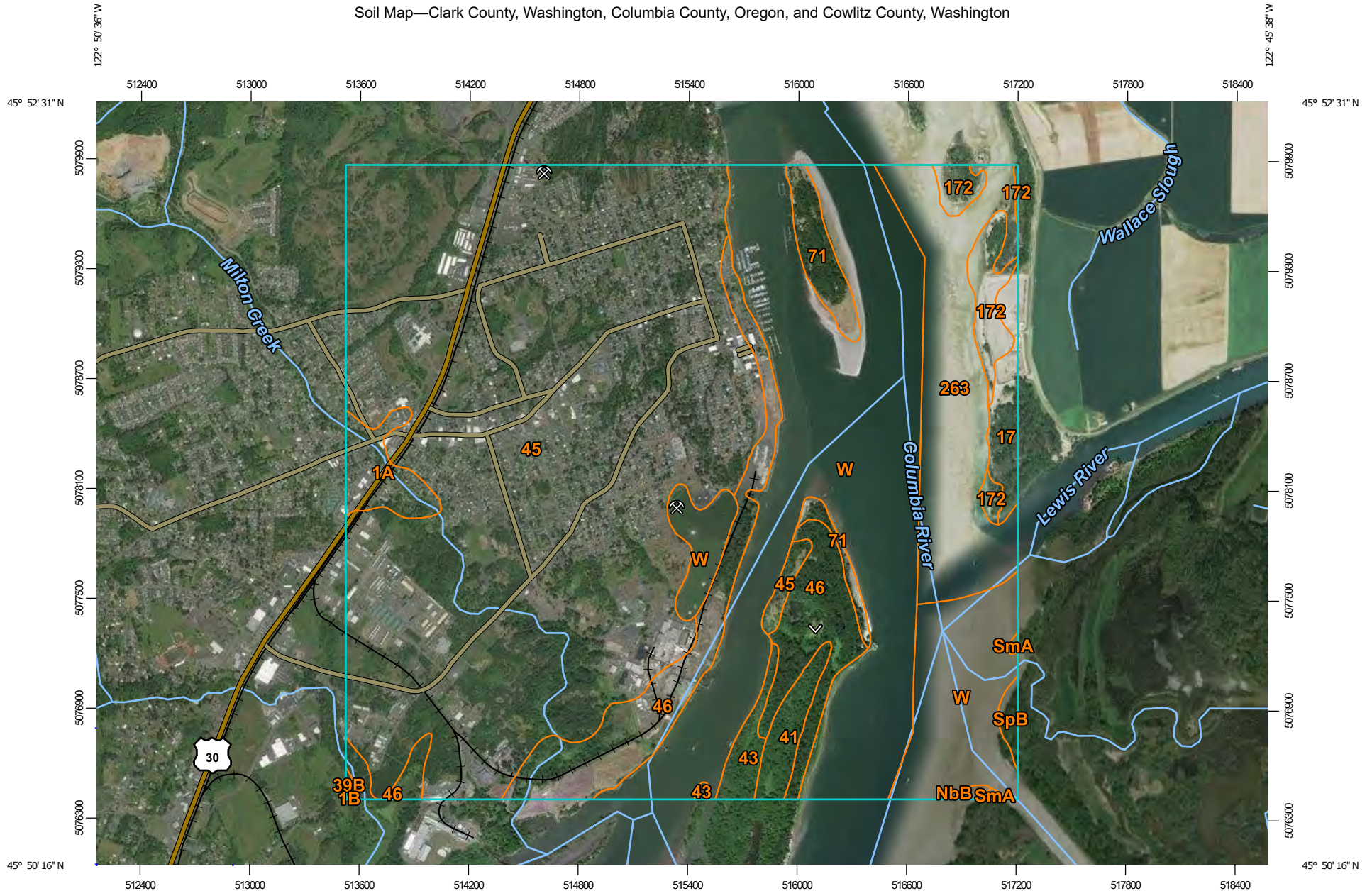
LOG OF BORINGS & TEST PITS

WHITLEY-JACOBSEN & ASSOCIATES CONSULTING ENGINEERS 1518 E. OLIVE WAY SEATTLE, 98122	DRAWN: R. C. CHECKED: SH APPROVED: J.H.W. SA 2-7677 WASHINGTON	SHEET NO. C-9
---	--	-------------------------

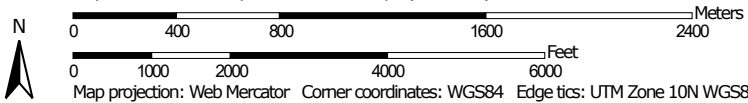
APPENDIX H

U.S. Department of Agriculture Soil Map

Soil Map—Clark County, Washington, Columbia County, Oregon, and Cowlitz County, Washington



Map Scale: 1:29,300 if printed on A landscape (11" x 8.5") sheet.





MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clark County, Washington

Survey Area Data: Version 17, Sep 16, 2019

Soil Survey Area: Columbia County, Oregon

Survey Area Data: Version 16, Sep 10, 2019

Soil Survey Area: Cowlitz County, Washington

Survey Area Data: Version 20, Sep 16, 2019

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 29, 2015—Jun 11, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NbB	Newberg silt loam, 3 to 8 percent slopes	2.4	0.1%
SmA	Sauvie silt loam, 0 to 3 percent slopes	2.3	0.1%
SpB	Sauvie silty clay loam, 0 to 8 percent slopes	8.3	0.3%
W	Water	151.5	4.8%
Subtotals for Soil Survey Area		164.6	5.2%
Totals for Area of Interest		3,165.1	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1A	Aloha silt loam, 0 to 3 percent slopes	45.5	1.4%
1B	Aloha silt loam, 3 to 8 percent slopes	0.1	0.0%
39B	Quafeno loam, 3 to 8 percent slopes	1.3	0.0%
41	Rafton silt loam	32.3	1.0%
43	Rafton-Sauvie-Moag complex	24.9	0.8%
45	Rock outcrop-Xerumbrepts complex, undulating	1,573.0	49.7%
46	Sauvie silt loam	247.9	7.8%
71	Xeropsamments, nearly level	50.3	1.6%
W	Water	702.2	22.2%
Subtotals for Soil Survey Area		2,677.4	84.6%
Totals for Area of Interest		3,165.1	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
17	Caples silty clay loam, 0 to 3 percent slopes	37.8	1.2%
172	Riverwash	55.1	1.7%
263	Water	230.2	7.3%
Subtotals for Soil Survey Area		323.1	10.2%
Totals for Area of Interest		3,165.1	100.0%

APPENDIX I

Geoprofessional Business Association Guidance Document

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org

Copyright 2019 by Geoprofessional Business Association (GBA). Duplication, reproduction, or copying of this document, in whole or in part, by any means whatsoever, is strictly prohibited, except with GBA’s specific written permission. Excerpting, quoting, or otherwise extracting wording from this document is permitted only with the express written permission of GBA, and only for purposes of scholarly research or book review. Only members of GBA may use this document or its wording as a complement to or as an element of a report of any kind. Any other firm, individual, or other entity that so uses this document without being a GBA member could be committing negligent or intentional (fraudulent) misrepresentation.