



Data Summary Report

Site Investigation for the Kosmos Mill Oil Cleanup Kosmos Flats Area

Prepared for
Tacoma Power,
Tacoma Public Utilities

February 19, 2021
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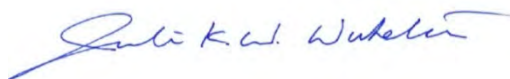
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1.0 INTRODUCTION

This Data Summary Report (DSR) details the site investigation and describes emergency independent remedial actions (IRA) conducted in association with the petroleum seep(s) observed in the area of the former Kosmos Mill (Site) in Morton, Washington. The Site is located approximately 7.3 miles southeast of Morton, Washington and is accessible off State Route 12 via Kosmos Road, followed by Champion Haul Road (Figure 1).

A seep of Bunker C oil was discovered along the bank of Rainey Creek near the Site (Figure 2). Tacoma Power immediately began investigations and implemented measures to mitigate risks to human and environmental health once the seep was discovered. The Site currently includes parts of the former Kosmos Lumber Mill and the bank of Rainey Creek as shown as the area of potential effect (APE) in Figure 2. The following is a detailed summary of events at the Site:

Seep Discovery:

- April 2019 – The first seep was discovered and reported to the Washington State Department of Ecology (Ecology). On April 26, 2019, Ecology spills response staff received a report (Environmental Report Tracking System no. 688792) of “black oily liquid” coming out of the hill slope and into Rainey Creek. Ecology completed a site visit on April 27, 2019 and confirmed the presence of a black oily liquid seeping from the bank and layered in sediment along Rainey Creek, a tributary to Riffe Lake. Sampling of the seep material indicated the presence of Bunker C-range petroleum hydrocarbons (Bunker C). The laboratory analytical report for the seep sample (Bank#2) provided by Ecology is included in Appendix A.
- May 2019 – Ecology requested periodic visual inspections of the Site by Tacoma Power. The water levels in Riffe Lake and Rainey Creek rose above the petroleum seep elevation. A Rainey Creek water quality sample result showed no evidence of Bunker C oil near the seep. The laboratory report for the water quality sample (Rainey Creek) provided by Tacoma Power is included Appendix A.

Remedial Investigation Begins:

- July 2019 – Tacoma Power selected Hart Crowser as the environmental consultants to conduct a remedial investigation and feasibility study (RI/FS) for this project.

Tacoma Power updated the Kosmos Town and Mill site form (45LE529) and requested concurrence from the Department of Archaeology and Historic Preservation (DAHP) that the Site be not be eligible for inclusion in the National Register of Historic Places. Tacoma Power received agreement from DAHP in September 2019, after the cultural resources survey was completed (see September 2019 bullet below).

- August 2019 – During a pre-investigation Site visit in August, material observed with tar-like consistency and petroleum-like odor was discovered in the upland area (labeled as “oil boils” in Figure 2). Tacoma Power collected a sample from the northern oil boil for chemical analysis and confirmed it contained petroleum in the oil range. The laboratory report for the oil boil sample (Kosmos-Upland) is included in Appendix A.
- September 2019 – Tacoma Power’s archeological consulting firm, Willamette Cultural Resource Associates, Ltd. (WCRA), completed an archeological survey of the proposed Site for permitting the APE. The APE was identified based on the archeological survey. Hart Crowser reviewed Tacoma Power’s historical documents and completed an online records review of Ecology’s documents and environmental database site assessment reports.

Sheen and Additional Seeps Discovered:

- October 2019 – Water elevations of Riffe Lake and Rainey Creek decreased, and a sheen was observed in the creek. Tacoma Power immediately deployed Best Management Practices (BMPs) within the creek and along the bank and shoreline to prevent additional petroleum-impacted material from entering the creek. BMPs included oil-adsorbing pom poms, sweeps, pads, and booms in addition to plastic sheeting covering along the bank.

Tacoma Power collected a sample of the seep material and the results confirmed the presence of petroleum (oil and diesel) and polycyclic aromatic hydrocarbons (PAHs) in the sample. The laboratory analytical report for the seep sample (Kosmos Seep) is also included in Appendix A.

- November 2019 – Tacoma Power declared an emergency in order to quickly implement an IRA to address the exposed seeps before the water levels in Riffe Lake rose and inundated the seep areas.

Additional petroleum-like seeps were observed along Rainey Creek’s bank, south of the original seep and at a lower elevation, near the toe of the creek bank (Figure 2).

Site Investigation and Emergency Independent Remedial Action:

- November 2019 – A geophysical survey was conducted in advance of preparing the Remedial Investigation Work Plan (Hart Crowser 2019), which was completed on December 6, 2019. The geophysical survey included the use of ground penetrating radar (GPR) and a time-domain electromagnetic (EM61) system.

Anderson Environmental Contractors (AEC), mobilized their equipment on-site in preparation for the emergency IRA and cap installation activities. Since excavators were on-site, three test pit explorations were conducted prior to the work plan being finalized (Figure 3). One exploration was just north of the ravine to assess potential petroleum-impacted soil and two were towards the south APE boundary to assess soil conditions for construction dewatering purposes.

- December 2019 – The APE was expanded, a protective engineered cap was designed, the bank was excavated for the cap installation (which included excavation of impacted material), the cap was

installed, and the Site's work plan was completed and implemented. The work plan included conducting test pits, drilling borings, collecting soil samples, and collecting grab groundwater samples from boreholes.

- For the APE expansion, all newly proposed areas where soil would be disturbed was archaeologically surveyed. WCRA prepared a memorandum for Tacoma Power stating that the planned areas in the newly proposed APE were all within the historic Kosmos Mill Site, which was determined to be ineligible for listing on the NRHP. No new feature areas were observed and WCRA recommended Tacoma Power utilize their Inadvertent Discovery Plan and spot check sub-surface profile exposures moving forward.
 - Hart Crowser designed the protective engineered cap to be placed on the bank to help reduce the potential for petroleum to discharge to Rainey Creek.
 - After the cap design was completed, AEC, under the direction of Tacoma Power, excavated the bank and installed the cap. As part of the cap construction effort, water quality samples were collected at the request of Tacoma Power for their water quality permit with Ecology as required under their 401 Water Quality Certification for the Cowlitz Project. After the excavation for the cap area, soil samples were collected along the bank and creek bed to characterize soil that was remaining in-place. All excavated petroleum-impacted soil was stockpiled on-site for future disposal, which was completed in February 2020.
 - While the creek bank was being excavated, test pit and drilling explorations were performed in general accordance with the work plan. Soil samples and grab groundwater samples were collected, selected for chemical analysis, and submitted to the laboratory.
 - Excavation activities were completed on December 18, 2019, and Tacoma Power continued the surface water sampling and analysis from December 19, 2019 through March 3, 2020.
- January 2020 – Ecology issues a potential liable person (PLP) status letter to Tacoma Power dated January 7, 2020, pursuant to RCW 70.105D.040(2) and WAC 173-340-500. Based on this change, the RI/FS was placed on hold to follow the Agreed Order process.
- February 2020 – As part of the emergency IRA and in conformance with Tacoma Power's Water Quality Protection Plan (WQPP, provided in Appendix D), approximately 186,200 gallons of rainwater that was impacted by the oil seeps during the construction of the cap was pumped into holding treatment tanks and then disposed of at City of Morton's, PRS Group's, and City of Tacoma's wastewater treatment facilities. Additionally, approximately 10,956 tons of impacted soil previously excavated and stockpiled as part of the emergency IRA was disposed of off-site at the Cowlitz County Headquarters Landfill and Hillsboro Landfill. After the stockpile removal, the emergency IRA was completed as of February 7, 2020.
- March/April 2020 – In March, Tacoma Power observed sheen on ponded water where the former petroleum-impacted stockpile was located and collected ponded water samples. The sheen was likely a result of some residual material from the former stockpile. Tacoma Power conducted routine follow-up

inspections and observed the ponded water dissipating. The area was seeded in April 2020 to promote vegetation growth and stabilize the Site.

- Summer 2020 – Tacoma Power observed that the vegetation struggled to establish in the stockpile area, especially in the areas of ponded water. This water remained late into the summer. The area was monitored by Tacoma Power and they have developed a plan to further stabilize the area.

The investigation effort to-date is summarized in this DSR, which presents the results of the Site investigation activities including soil and grab groundwater sampling. Surface water and soil samples collected as part of the emergency IRA are also included in this report.

1.1 Purpose and Objectives of the Site Investigation

The purpose of the Site investigation was to characterize the nature and extent of contaminants in soil and groundwater to allow for future risk screening and to support an evaluation of potential cleanup actions that may be appropriate for the Site. The Site investigation objectives included the following:

- Identify contaminants of potential concern (COPCs) at the Site and their associated source(s). The primary COPC is Bunker C oil and other COPCs commonly found with Bunker C were also assessed for their presence (such as other intermediate and/or heavy-fuel oils);
- Determine the nature and extent of Site-related COPCs in environmental media at the Site;
- Identify historical areas and features of interest that could potentially have contributed to the discovered petroleum seep at the Site and evaluate the presence or absence of other potential contamination associated with those identified historical areas and features; and
- Characterize the nature and extent of hazardous substances present in environmental media at concentrations that are above Ecology’s Model Toxics Control Act (MTCA) Method A cleanup levels (CULs).

Surface water characterization was not originally included in the scope of the Site investigation; however, surface water samples were collected as part of the emergency IRA during construction. In addition, the results from the soil characterization and confirmation samples collected during the emergency IRA were also used to assist in characterizing the nature and extent of the contamination. The surface water and additional soil data from the emergency IRA are also discussed in this Site investigation report in order to present the assessment of the whole Site.

2.0 SITE BACKGROUND

Prior to the Site investigation, Hart Crowser reviewed historical reports provided by Tacoma Power and conducted two site visits. Hart Crowser also completed a search of Ecology’s online databases, reviewed environmental data reports, and electronic records for any listed sites within a 1-mile radius of the Site. The Ecology identifications for the Site include:

- Facility/Site ID is 61559576;
- Cleanup Site ID is 9890;
- UST ID is 200555; and
- Cleanup Site Name is Riffe Lake.

The records review indicated a single adjacent location, the former Kosmos townsite, within one-third mile to the northeast of the Site (Figure 1). The former Kosmos townsite was situated in the Rainey Valley, with the majority of the townsite having been located between Frost Creek to the north and Rainey Creek to the south. The townsite was established on a flood plain and experienced similar flood events as the Site.

The townsite and the associated lumber mill were established in 1904. Limited readily available information regarding the historic lumber mill and its operations was reviewed. Topographic maps from 1962 and 1963 show the former mill and a few photos of the operations, which were available from the University of Washington library. The former mill included railroad lines/tracks, several buildings, and a log pond (Figure 2). The City of Tacoma purchased the former Kosmos townsite and lumber mill in the 1960's and the inhabitants were relocated. The land was acquired to create the Riffe Lake reservoir for recreational use and power generation. The lumber mill facility was abandoned and demolished prior to the 1968 completion of Mossyrock Dam. Riffe Lake is currently a component of the power generating system operated by Tacoma Power.

The Site background and description information summarized below are based on Site visits and review of prior environmental data and documents.

2.1 Site Description and Location

The Site is located in Rainey Valley, within the Riffe Lake reservoir referred to as Kosmos Flats. Rainey Creek bounds the Site to the north and west, Champion Haul Road to the east, and Riffe Lake to the south. The Site topography generally slopes to the south towards Riffe Lake, but the local topography near the petroleum seep gradually slopes to the northwest, towards Rainey Creek.

The area commonly known as the Kosmos Flats, is a flat plateau and is referred to in this report as the upland area. This area was formerly the lumber mill and today the building foundations are still identifiable, as well as many of the railroad rails. Metal and concrete debris from the former mill was observed scattered in the upland area. Upstream of the protective cap, a ravine is still present from when the mill was in operation and was observed to contain debris. From the upland area there is a steep, nearly 38-foot drop to the creek edge and referred to in this report as the creek bank area. This slope of the creek bank in some areas exceeds a 1:1 slope and is nearly vertical. The construction of the protective cap excavated and laid back this area to a 3:1 slope. However, the slopes adjacent to the cap remain very steep.

Elevations discussed in this report are on the Tacoma City Light (TCL) datum, which is 3.96 feet below North American Vertical Datum of 1988 (NAVD 88) and when appropriate, both datums are provided. The figures in this report have base maps that are on NAVD 88 datum; however, important elevations are

provided in the figures with elevations in TCL datum such as the current reservoir full-pool operating elevation of 749 feet and the upland area elevation of 758 feet.

During the winter months the water levels in the reservoir drop, typically to elevations within 700 and 720 feet. However, in March of 2019, the reservoir water level decreased to an approximate elevation of 670 feet. The spillway at Mossyrock Dam is at elevation 728.5 feet. Historically, spring rainfall and snowmelt flood the Site up to an elevation of 781.2 feet, which is the maximum design flood. The normal reservoir's full-pool elevation is approximately 778.5 feet (774 feet NAVD 88), which would submerge the Site. However, in recent years the reservoir's full-pool water levels have been maintained at an approximate elevation of 749 feet (753 feet NAVD 88), due to seismic safety concerns with the piers on the spillways. This has allowed the Site to be exposed for extended durations and for vegetation to grow.

The Site's elevation ranges from approximately 718 feet (722 feet NAVD 88) near the petroleum seep area at the toe of Rainey Creek to approximately 758 feet (762 feet NAVD 88) in the upland area at the top of the bank near the old lumber mill foundations. Rainey Creek's bed is at an approximate elevation of 716 feet (720 feet NAVD 88) and the creek's water level was at its lowest during the Site investigation at approximately 719 feet (721 feet NAVD 88). The creek's water level rose during higher flows and then backwatered until the whole Site was fully submerged on February 8, 2020. After about a week, the water receded, and the upland area was visible again.

2.2 Previous Environmental Investigations

Two underground storage tanks (USTs) related to the lumber mill were discovered at the Site in 1992, which were subsequently removed by AIRO Environmental Services. The first UST was a 500-gallon steel tank, located south of the observed seeps and found partially exposed along an earthen bank of Rainey Creek, labeled Site D in Figure 2. It was filled with lake water and did not exhibit a sheen or other indicators for the presence of petroleum products. Sampling results were not detected at or above laboratory reporting limits for polychlorinated biphenyls (PCBs) and total halogens (AIRO 1993).

The second UST, a 5,000-gallon tank, was located below ground level near the remaining mill facility foundations, labeled Site A in Figure 2. The UST contained petroleum product with the presence of halogenated hydrocarbons. Soil containing heavy oil-range petroleum at concentrations exceeding MTCA Method A soil CULs surrounded the 5,000-gallon UST. A total volume of 87 cubic yards of contaminated soil was removed and disposed of at the Kitsap County Landfill (AIRO 1993).

The AIRO 1993 report is provided in Appendix B. The 500-gallon UST lake water sample results are summarized in Table B-1 and the 5,000-gallon UST soil and waste oil sample results are summarized in Table B-2 and B-3, respectively. Sample locations are provided in the AIRO report.

Ten additional USTs were also discovered at the former Kosmos townsite, located approximately one-third of a mile to the northeast of the Site and north of Rainey Creek (Figure 1). Approximately 25,900 tons of contaminated soil was excavated from the townsite, remediated on-site using thermal desorption, and used as backfill for the excavations. Groundwater data collected by DOWL Engineers within the townsite showed that contaminants did not migrate away from the UST perimeter set by the monitoring wells, but

concentrations above MTCA Method A CULs were detected in the suspected central area of the contaminated plume (DOWL 1993). As the Kosmos townsite is located a third of a mile northeast from the area of our Site investigation, the DOWL 1993 report is not included as an appendix to this report.

2.3 Geology and Hydrogeology

2.3.1 Geology

The Site is located along Rainey Creek in the Cowlitz River watershed. During the late Pleistocene, the Cowlitz glacier extended from its source on Mount Rainier, roughly to the town of Salkum, Washington, west of the Site. During this Epoch, the Cowlitz glacier advanced and retreated on at least four distinct occurrences. These glaciations produced three distinct outwash deposits. The earliest deposit was the Wingate Hill outwash followed by the Hayden Creek drift and most recently the Evans Creek outwash.

In the Rainey Creek valley, glacial deposits are represented as the Hayden Creek drift. The Hayden Creek drift is dominantly composed of outwash deposits expressed as poorly graded gravel deposits and localized till deposits. It is also common to find loess deposits up to 3 feet thick in the Hayden Creek formation. The entire Hayden Creek formation is heavily oxidized to depths up to 30 feet.

Soil from borings and test pits conducted by Hart Crowser are generally consistent with expected outwash deposits of the Hayden Creek formation. Commonly, soil in the upland area were composed of sandy silts to silty sands with gravel in the upper 5 to 15 feet and silty gravel with sand and some cobbles to poorly graded coarse sands below 15 feet. Additionally, localized fine-grained organic deposits of silt and clay were found in low lying vegetated areas. Fill was generally encounter between approximately 10 and 35 feet below ground surface (bgs) and contains concrete, wood, and metal debris. The outwash deposits were encountered below the fill. Till-like material was only observed in the bank samples taken on the west side of the creek, opposite of the Site. Based on observations during the emergency IRA construction and from a soil sample collected from the exposed creek bed of Rainey Creek, the creek bed material generally consisted of gray clayey sand with gravel and cobbles. Generally, finer grained soil, such as silts and clays, are less permeable than sands and gravel, and would slow the movement of contaminants through the soil.

2.3.2 Hydrogeology

Groundwater in the upland area was generally encountered from 37 to 47 feet bgs, which is an approximate elevation of 710 to 721 feet (714 to 725 feet NAVD 88). The elevation of Rainey Creek during the time of the investigation was at an approximate elevation of 719 feet (723 feet NAVD 88). Additionally, perched water (groundwater) was encountered 5 to 10 feet bgs in some explorations and seemed to be discontinuous in nature.

In 1992, Site groundwater was encounter during the excavation of Site A at approximately 10 to 11 feet bgs (AIRO 1993). In 1993, the former townsite (located to the northeast of the Site) groundwater was encountered during the assessment at approximately 6 to 11 feet bgs and flowed to the southwest, towards Riffe Lake, and that groundwater varies seasonally (DOWL 1993).

Based on the historical groundwater information and groundwater conditions at the time of the investigation, groundwater levels are inferred to be tied to the reservoir levels as we observed the lowered groundwater levels with lower lake levels and may fluctuate as water is retained and released from the Mossyrock Dam.

3.0 EMERGENCY INDEPENDENT REMEDIAL ACTION

This section briefly describes the effort during the emergency IRA. Details regarding the BMPs, protective cap design, construction effort, and material disposal are described in the emergency IRA completion summary presented in Appendix C. The WQPP, dated December 11, 2019 (Appendix D), provided the BMP and surface water sampling protocols and the surface water quality indicator levels.

As described above, Tacoma Power declared an emergency status for the Site to protect the reservoir while the seep was exposed/accessible and before the water levels were expected to rise above the seeps. Hart Crowser assisted with designing a protective cap for the bank to reduce the potential for petroleum to discharge from the bank into the creek. This emergency IRA included removing soil from the creek bank and sloping back the bank for proper placement of the cap.

During the excavation for cap installation, it was possible to identify additional petroleum-impacted soil at the seep areas and remove the impacted soil as much as possible. However, due to elevated flows in Rainey Creek as precipitation increased and major storm events were predicted, the full extent of contamination along the creek could not be identified before the final construction of the protective cap and before the creek water levels rose above the seep areas. Soil exceeding MTCA Method A CULs was stockpiled separately on-site and eventually hauled off-site for disposal. Approximately 10,956 tons of petroleum-impacted soil was disposed of at Cowlitz County Headquarters Landfill and Hillsboro Landfill. Approximately 186,200 gallons of impacted construction dewatering discharge water was disposed of off-site to the City of Morton's, PRS Group's, and City of Tacoma's wastewater treatment facilities.

The protective cap consisted of placement of clean sand (6-inch layer) followed by a granular Organoclay liner (to adsorb any non-aqueous phase liquids [NAPL] from water [Reactive Core Mat™ with Organoclay® by Cetco]). Another layer of clean sand (8 inches) and a permeable composite geotextile was placed on top of the liner for protection prior to covering with an 18-inch thick layer of large quarry spalls (4-8 inch). The cap liner and quarry spalls were keyed into the existing grade at the toe of the creek. Additional details are provided in Appendix C.

In addition to assisting with the cap design and construction oversight, Hart Crowser representatives also assisted Tacoma Power staff with the creek surface water sampling, soil sampling along the creek bank and creek bed after excavation was completed, and stockpile soil sampling.

4.0 CLEANUP STANDARDS

According to MTCA, the cleanup standards for a particular site have two primary components: chemical-specific CULs and points of compliance (POCs) as described in WAC 173-340-700 through WAC 173-340-760. The CUL is the concentration of a chemical in a specific environmental medium that will not pose

unacceptable risks to human health or the environment. The POC is the location where the CUL must be met. Cleanup standards must also incorporate other state and federal regulatory requirements applicable to the cleanup action and/or its location as appropriate, including the Surface Water Quality Standards as described in WAC 173-201A.

4.1 Cleanup Levels

Soil and groundwater CULs and surface water standards are used to protect human health and the environment. The following CULs and standards were selected to compare the sample analytical results from the Site investigation and emergency IRA.

- **Soil.** MTCA Method A soil CULs for unrestricted land use;
- **Groundwater.** MTCA Method A groundwater CULs; and
- **Surface Water.** Indicator levels provided by Tacoma Power in their WQPP, which was approved by Ecology.

Section 6.0 describes the criteria for selecting the Site contaminants of concern (COCs), media of concern, and proposed Site CULs for the Site COCs.

5.0 SITE INVESTIGATION AND CHARACTERIZATION

5.1 Field Investigation Activities and Observations

The Site investigation was limited to the APE identified by Tacoma Power for cultural resource protection purposes during the Site investigation and emergency IRA (Figure 2). The APE is approximately 12.77 acres and is located directly to the east and southeast of Rainey Creek.

Prior to any ground disturbing activities for the investigation, private and public utility locate services were performed at the Site. AEC was Tacoma Power's general contractor; they performed the test pit explorations (as well as the cap construction). Holt Services, Inc. (Holt) was Hart Crowser's subcontractor and performed the borings and temporary well installations for grab groundwater sampling.

5.1.1 Ground Penetrating Radar

On November 12 and 15, 2019, a GPR survey (including the EM61 survey) was conducted by Global Geophysics LLC around the former foundations and roadways on the Site (associated with historic mill operations) to identify possible source locations for the downgradient petroleum seeps. The survey was conducted when the reservoir elevation was lower than 721 feet (725 feet NAVD 88). Several metal and/or dense object anomalies were identified by the GPR survey and some of the boring and test pit explorations were adjusted/relocated based on these anomalies to evaluate the potential metallic/dense objects and characterize the soil around these potential objects. The GPR survey report is provided in Appendix E.

Multiple pipes were encountered during the exploration effort as described below and identified (in green) on Figure 3. From the GPR survey in Appendix E, Figure E-1 illustrates the GPR anomalies overlaid on the

Site's aerial map. The overlay was approximate; however, there are distinct lines observed on the survey that are close to the pipes encountered during the Site investigation indicating the GPR survey was effective.

5.1.2 Deviations from the Work Plan

In general, there were very few deviations from the proposed work plan. Figure 3 shows the final exploration locations.

Three test pits (TP-1, TP-4, and TP-9) were unable to be completed due to the cap construction activities that were underway at the Site; however, additional observations and samples were obtained on the bank and along the toe of the creek.

Three additional test pit locations (TP-13 through TP-15) were added. Test pit TP-13 was added to characterize soil across the ravine as an asphalt-like material was observed. Test pits TP-14 and TP-15 were added to assist in identifying an area where construction dewatering discharge could be released.

Confirmation soil samples were collected and analyzed as part of the emergency IRA to characterize soil conditions prior to the cap installation. Soil samples UB-1 through UB-3 and LB-1 through LB-3 were collected from shallow surface soil along the slope within the cap excavation limits. Three additional soil samples (Westbank 1 through Westbank 3) were collected on the northwest bank of Rainey Creek, opposite of the petroleum seeps. One additional soil sample (Creekbed 1) was collected in Rainey Creek's creek bed, where AEC diverted flow for construction of the cap. See Figure 3 for sample locations. Samples collected on the slope and within the creek would not have been assessable without the construction activities occurring concurrently.

The last deviations from the work plan were related to the grab groundwater sampling. Limited amount of groundwater was encountered in boring B-2 and with the time constraint of excavating and installing the cap, we were not able to wait for the groundwater to recharge; therefore, a grab groundwater sample was not collected from this location. Additionally, the temporary well in boring B-4 was not purged prior to the collection of grab groundwater sample because of concerns of available groundwater and the boring location was in the active area of cap construction.

5.1.3 Test Pit and Soil Borings Explorations

Between November 26, 2019 and December 9, 2019 twelve test pits (TP-2, TP-3, TP-5 through TP-8, and TP-10 through TP-15) were excavated to depths of 5 to 20 feet in the upland area of the Site (Figure 3). Hart Crowser collected soil samples between 2.5- and 5-foot intervals for soil classification and potential chemical analysis.

Piping and a small 5-gallon drum were encountered in test pit TP-5. The pipes were approximately 2 to 3 inches in diameter and portions of the piping sections were removed, and the remaining in-place pipes were capped with a concrete plug. Residual tar-like material was observed in the small 5-gallon drum, which was also removed. While excavating test pit TP-6, two metal pipes with NAPL and oily water were discovered at approximately 1-foot bgs. The pipes were approximately 1.5 inch in diameter and appeared

to run parallel to the road to the south. One of the pipes in test pit TP-6 was chased (i.e., expanded test pit to observe the length of the pipe) for approximately 50 feet to the west, but the end of the pipe was not found due to time constraints. Other pipes and metal debris were found while excavating test pits TP-2 and TP-15 but did not contain NAPL. All observed pipe locations are shown on Figure 3.

Between December 10 and December 12, 2019, ten sonic borings (B-1 through B-10) were advanced using a mobile rig to depths of 40 to 50 feet in the upland area of the Site (Figure 3). Soil samples were collected at 5-foot intervals and grab groundwater samples were collected from four borings (B-4, B-6, B-7, and B-9).

Soil samples were field screened using sheen tests, visual and olfactory observations, and/or a photoionization detector (PID) to detect volatile organic compounds (VOCs) in the headspace. Headspace detections were noted in samples from borings B-2 and B-4 through B-6 and from test pits TP-5 through 8. Headspace volatiles were detected at concentrations up to 469.1 parts per million (ppm) and were generally observed between depths of 0 and 15 feet bgs. A sheen was noted from borings B-1 through B-6 and B-9 through B-10 and test pits TP-5 through TP-8 and TP-15, generally between depths of 0 and 10 feet bgs. Additionally, a petroleum-like odor was noted from borings B-1, B-2, and B-4 through B-7 and test pits TP-5 through TP-8 and TP-15, generally between depths of 0 and 10 feet bgs. NAPL was not observed in any of the borings. Field screening results are summarized in Table 1 and also shown on the boring and test pit logs in Appendix F.

Two areas were excavated by Tacoma Power and AEC to the south of the investigation area in the former log pond area (Figure 2) to an approximate depth of 18 inches bgs in order to assess soil conditions for construction dewatering purposes, no obvious indicators (visual and olfactory) of petroleum impacts were observed by Tacoma Power staff.

5.1.4 Grab Groundwater Samples

Grab groundwater samples were collected from four boring locations (B-4, B-6, B-7, and B-9) in the upland area of the Site (Figure 3). A 5-foot temporary well screen was set at the bottom of each borehole and groundwater was sampled approximately at the middle of the screened interval (additional details are provided in Appendix F). Due to the high turbidity encountered in the temporary wells, low-flow sampling was not conducted. The low-flow pump was silting up and a more powerful pump was used. Pumping rates were between approximately 0.5 to 1 gallon per minute. Water quality parameters and depth to water were measured prior to groundwater sample collection. No sheen, NAPL, or odor were observed during grab groundwater sampling.

5.1.5 Emergency IRA Soil Samples

As part of the emergency IRA, AEC excavated the creek bank and dredged and graded some creek bed material to temporarily divert part the lowest flows of Rainey Creek away from the work area to construct the slope key. No creek bed material was removed, and the limits of the creek bed were not altered. During this flow diversion, some NAPL was observed in the creek bed directly adjacent to the location of the petroleum seeps on the bank. One soil sample (Creekbed 1) was collected from the exposed creek bed. Three additional soil samples (Westbank 1 through Westbank 3) were collected from the bank opposite to the Site. The soil samples were collected between approximately 1.5 feet bgs and 2 feet bgs and the

excavations were excavated using hand tools and stopped when they hit refusal. A Tacoma Power archeologist was present during the soil sampling to document any cultural resource artifacts; however, no artifacts were observed. After the excavation for the area where the cap was to be installed, six samples (UB-1 through UB-3 and LB-1 through LB-3) were collected at or near the bank's ground surface.

A strong petroleum-like odor and staining were noted from Creekbed 1 and a slight sheen was observed during field screening of the sample. No odor or sheen was observed from samples Westbank 1 through Westbank 3 on the opposite side of the creek and the soil generally consisted of sand with varying amounts of gravel and cobbles. Moderate to slight petroleum-like odors were observed in bank samples LB-2, LB-6, and UB-1. A slight sheen was also observed in sample LB-2.

5.1.6 Emergency IRA Surface Water Samples

Surface water samples of Rainey Creek were required by Ecology to monitor the effectiveness of the BMPs during excavation activities, in general accordance with the WQPP. Grab surface water samples were collected by Hart Crowser approximately one to two hours after excavation activities began each day. Samples were collected using a pole with a bottle sampler attached and were collected just underneath the water surface. Water sampling locations were added and modified as directed by Ecology throughout the excavation process (see Section 5.4.1 for sample locations, descriptions, and analytical results). After excavation was completed, Tacoma Power performed the surface water sampling and analysis.

5.1.7 Chemical Data Quality Review

Analytical data and the laboratory's internal quality assurance and quality control data were reviewed to assess whether they meet project-specific data quality objectives. This review was performed consistent with accepted EPA procedures for evaluating laboratory analytical data and appropriate laboratory and method-specific guidelines (EPA 2004, 2008). The chemical data review summarizing data evaluation procedures, usability of data, and deviations from specific field data and/or laboratory methods for the investigation data are presented in Appendix G. The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned. Sample results are presented in the following section.

5.2 Soil Sample Chemical Analysis and Results

Under standard chain-of-custody procedures, samples were submitted to Friedman and Bruya, Inc. (a Washington State accredited laboratory) for analyses. A subset of soil samples collected from the Site were analyzed for one or more of the following:

- Gasoline range total petroleum hydrocarbons (TPH-G);
- Diesel range total petroleum hydrocarbons (TPH-D);
- Heavy oil range total petroleum hydrocarbons (TPH-O);
- Benzene, ethylbenzene, toluene, and xylenes (BTEX);
- Polychlorinated biphenyls (PCBs);
- PAHs, including the carcinogenic PAHs (cPAHs);
- Total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver); and
- VOCs.

The selection of samples for analysis was based on observed potential impacts, field screening results, and sample location and depth. Soil sample identifications include the exploration type (“TP” for test pits and “B” for borings), the exploration number, then the sample depth in bgs. The emergency IRA soil sample identifications include location of the sample collected (“UB” refers to the upper bank and “LB” refers to the lower bank). The field screening results and selected chemical analyses are summarized in Table 1. The soil sample analytical results from the explorations and emergency IRA (bank and creek bed samples) are summarized in Tables 2 and 3, respectively. Figures 4 and 5 illustrate TPH and cPAH detections in soil, respectively.

The results were compared with MTCA Method A soil CULs for unrestricted land use. A summary table of samples with exceedances at depth intervals is presented in Table 7. The specific analytical results are also discussed following the table.

Table 7 – Summary of Soil Samples Exceeding CULs

Site Location	Exploration ID (a)	0 to 5 feet bgs	5 to 10 feet bgs	10+feet bgs
Upland Area	B-5	TPH-O	(no recovery)	-- (10 to 15 feet bgs)
	B-6	TPH-D, TPH-O, cPAHs	(b)	-- (30 to 35 feet bgs)
	TP-5	(b), -- (2.5 to 5 feet bgs)	TPH-G	-- (15 to 19 feet bgs)
	TP-6	-- (0 to 5 feet bgs)	TPH-O	-- (10 to 12 feet bgs)
	TP-7	TPH-D, TPH-O	TPH-D, TPH-O, TPH-G	-- (10 to 15 feet bgs)
	TP-12	TPH-O (d)		
	TP-15	TPH-O	-- (4 to 8 feet bgs)	-- (11 to 14 feet bgs)
Creek Bank Area	LB-2	TPH-D, TPH-O, cPAHs		
	Creekbed 1	TPH-D, TPH-O, cPAHs		

Notes:

- Only explorations that contained soil samples that exceeded CULs are listed.
- Field screening observations did not indicate presence of petroleum-impacted soil.
- “--” = Sample was collected and analytical results do not exceed CULs.
- Soil sample was not detected at or above laboratory reporting limits from sample depth 2.5 to 4 feet bgs.

■ TPH-D was detected in seventeen of the seventy-six samples selected for analyses at concentrations of up to 39,000 milligrams per kilogram (mg/kg).

- Six samples (B-6-5, TP-7-2.5, TP-7-7.5, TP-7-10, LB-2, and Creekbed 1) were detected at concentrations exceeding the MTCA Method A CUL of 2,000 mg/kg.

■ TPH-O was detected in fifteen of the seventy-six samples selected for analyses at concentrations up to 26,000 mg/kg.

- Nine samples (B-5-5, B-6-5, TP-6-8, TP-7-2.5, TP-7-7.5, TP-12-2.5, TP-15-4, LB-2, and Creekbed 1) were detected at concentrations exceeding the MTCA Method A CUL of 2,000 mg/kg.

- TPH-G was detected in twelve of the forty-eight samples selected for analyses at concentrations of up to 930 mg/kg.
 - Three samples (TP-5-8, TP-5-10, and TP-7-7.5) were detected at a concentration exceeding the MTCA Method A CUL of 100 mg/kg (when benzene is not present).
- BTEX was not detected at or above laboratory reporting limits in all 18 samples selected for BTEX analysis only.
- PCBs (specifically Aroclor 1254) was detected in one of the ten samples selected for analyses. Sample TP-15-4 had a concentration of 0.049 mg/kg, which is below the MTCA Method A CUL of 1 mg/kg for total PCBs.
- PAHs were detected in eight of the twenty-three samples selected for analyses.
 - Three samples (B-6-5, LB-2, and Creekbed 1) benzo(a)pyrene was detected at concentrations of 0.56, 0.21, and 3 mg/kg, respectively, above the MTCA Method A CUL 0.1 mg/kg. Additionally, these three samples calculated total carcinogenic PAHs toxic equivalents (cPAH TEQ) at concentrations of 0.57, 0.28, and 3.795 mg/kg, respectively, above the MTCA Method A CUL of 0.1 mg/kg.
- Total metals were detected in the twelve soil samples selected for analyses. Detected concentrations did not exceed respective MTCA Method A CULs.
- VOCs were detected in nine of the thirty soil samples selected. It should be noted that benzene was not detected at or above laboratory reporting limits in any of the soil samples.
 - Seven samples (B-5-5, TP-3-8, TP-5-8, TP-6-8, TP-8-15, TP-10-5, and TP-12-2.5) had methylene chloride detections at concentration ranging between 0.51 and 1.1 mg/kg, above the MTCA Method A CUL of 0.02 mg/kg. However, the methylene chloride detections were most likely the result of laboratory cleaning solution as the laboratory confirmed they use it throughout their equipment. The methylene chloride detections were flagged “lc” and will not be included as a COC for the Site.

5.3 Grab Groundwater Sample Chemical Analysis and Results

Grab groundwater samples were collected from four borings (B-4, B-6, B-7, and B-9) through temporary wells installed in the borehole from borings advanced in the upland area. Samples were analyzed by Friedman and Bruya for one or more of the following:

- TPH-G;
- TPH-D;
- TPH-O;
- VOCs;

- PCBs;
- PAHs;
- Total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver); and
- Total suspended solids (TSS).

The grab groundwater sample analytical results are summarized in Table 4 and illustrated in Figure 6. Analytical results were compared to MTCA Method A groundwater CULs and the results are summarized below.

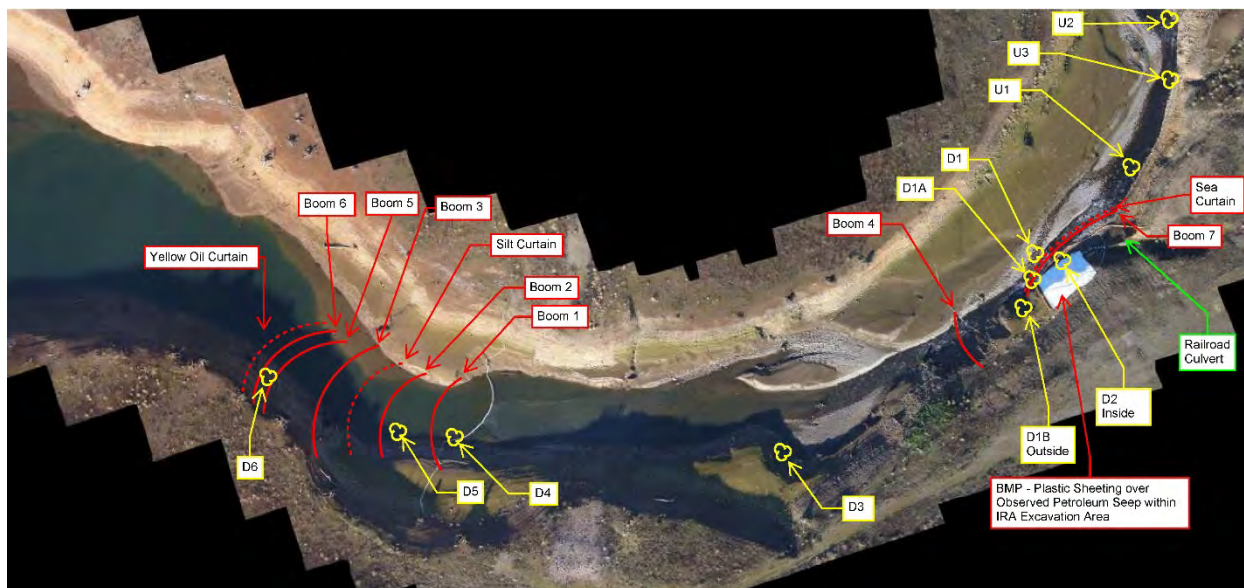
- All grab groundwater samples were analyzed for TPH-D and TPH-O. TPH-D was detected in one sample (B-4-W) at a concentration of 150 micrograms per liter ($\mu\text{g/L}$), below the MTCA Method A CUL of 500 $\mu\text{g/L}$. TPH-O was not detected at or above laboratory reporting limits.
- All samples were analyzed for TPH-G and was not detected at or above laboratory reporting limits.
- All samples were analyzed for VOCs, which were not detected at or above laboratory reporting limits.
- One sample (B-4-W) was analyzed for PCBs, which were not detected at or above laboratory reporting limits.
- All samples were analyzed for PAHs. Three samples (B-4-W, B-6-W, and B-9-W) had detected concentrations of one or more PAHs, but below applicable MTCA Method A CULs.
- Two samples (B-4-W and B-6-W) were analyzed for total metals.
 - Arsenic was detected in both samples at concentrations of 37.6 and 11.6 $\mu\text{g/L}$, respectively, exceeding the MTCA Method A CUL of 5 $\mu\text{g/L}$.
 - Barium was detected in both samples up to a concentration of 2,420 $\mu\text{g/L}$. There is not a MTCA Method A CUL for barium.
 - Cadmium was detected in one sample (B-4-W) at a concentration of 6.22 $\mu\text{g/L}$, exceeding the MTCA Method A CUL of 5 $\mu\text{g/L}$.
 - Lead was detected in both samples. Sample B-4-W had a detected concentration of 128 $\mu\text{g/L}$, exceeding the MTCA Method A CUL of 15 $\mu\text{g/L}$.
 - Mercury, silver, and selenium were not detected at or above laboratory reporting limits.
- One sample (B-4-W) was analyzed for TSS, which was detected at a concentration of 19,000 milligrams per liter (mg/L). The elevated TSS could account for the elevated total metal concentrations.
- Turbidity was measured prior to sampling in locations B-4 and B-6 with turbidity concentration of 1,270 and 2,100 NTUs, respectively. The elevated turbidity could account for the elevated total metal concentrations.

5.4 Surface Water Sample Chemical Analysis and Results

5.4.1 Rainey Creek Surface Water

Surface water samples from Rainey Creek were collected during excavation activities from December 9 to 18, 2019 and collected after excavation was completed from December 19, 2019 to February 4, 2020. The creek samples were collected in the following locations starting upstream of the construction area, at the construction area, and downstream of the construction area (Figure 7):

Figure 7 – BMPs and Creek Sampling Locations



Note: Aerial for BMPs (noted in red) and creek sampling locations (noted in yellow) were provided by Tacoma Power.

- Location U-2 is approximately 300 feet upstream of the excavation area. Location U-2 was sampled once during excavation activities to establish natural background levels of Rainey Creek.
- Location U-3 is approximately 200 feet upstream of the excavation area. Location U-3 was sampled by Tacoma Power after the excavation was completed.
- Location U-1 is approximately 20 feet upstream of the excavation area. Location U-1 was sampled once during excavation activities to establish natural background levels of Rainey Creek.
- Locations D-1A and D-2 are inside the sea curtain at the base of the excavation. Location D-1A was sampled once. Location D-2 was frequently sampled throughout the excavation activities as well as after excavation was completed.
- Location D-1 is within the construction area, outside and towards the center of the sea curtain at the base of the excavation area. Location D-1 was collected four times until it was modified to location D-1B.

- Location D-1B is outside the sea curtain but downstream of the curtain, approximately 10 feet south from D-1. Location D-1B was regularly sampled throughout the remaining excavation activities as well as after excavation was completed.
- Location D-3 is downstream from the excavation area and inside a small boom on the southeast bank of Rainey Creek. Location D-3 was sampled once after a noticeable sheen was observed near the boom during excavation activities.
- Location D-4 (sample ID is Boom 1) is downstream of the excavation area and within Boom 1, which is located two booms upstream of the silt curtain. Location D-4 (sample Boom 1) was frequently sampled throughout the excavation activities, as well as after excavation was completed.
- Location D-5 (sample ID is Boom 2) is downstream of the excavation area and within Boom 2, which is located one booms upstream of the silt curtain). Location D-5 (sample Boom 2) was sampled once during excavation activities to further confirm the effectiveness of the BMPs implemented upstream.
- Location D-6 is downstream of the excavation area and between Booms 5 and 6, which is located two booms downstream of the silt curtain. Surface water at location D-6 was sampled by Tacoma Power after the excavation activities were completed.

Surface water samples collected during construction were analyzed by Friedman and Bruya Inc. (Friedman and Bruya) in Seattle, Washington. Samples collected by Tacoma Power after excavation activities were analyzed by Spectra Laboratories (Spectra), LLC in Tacoma, Washington. The surface water samples were analyzed for one or more of the following:

- pH;
- Turbidity;
- Hardness;
- TPH-D;
- TPH-O;
- TPH-G;
- BTEX;
- Total metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc);
- Hexavalent chromium; and
- Low-level mercury.

Analytical results from surface water sampling during excavation and after excavation activities are summarized in Tables 5 and 6, respectively. The chemical data quality review and laboratory reports of samples submitted during excavation activities to Friedman and Bruya are provided in Appendix G. Additionally, Hart Crowser field measured turbidity with a handheld instrument for the majority of the sampling events during excavation activities. The field instrument was not functioning properly on a several occasions; therefore, turbidity could not be measured during these times.

Per the WQPP, the surface water samples were to be compared to indicator levels that are based on the acute-freshwater toxic substances criteria (WAC 173-201A-240) for metals and the laboratory quantitation limit for petroleum (gasoline, diesel, and heavy oil). Indicator levels for metals were revised in the WQPP based on calculations using Site-specific hardness concentrations.

Rainey Creek surface water samples collected during excavation activities. Samples that exceeded the indicator levels for surface water during construction activities were samples collected inside the sea curtain (D-2) adjacent to the excavation area and just outside of the sea curtain (D-1) at the base of the excavation area, see Figure 7 BMPs and Creek Sampling Locations.

- Sample D-2 (inside the sea curtain at the base of the excavation) exceeded indicator levels for the following constituents:
 - TPH-D on December 11, 14, and 16, 2019, with concentrations up to 1,100 µg/L and above the indicator level of 250 µg/L.
 - Copper on December 11 through 14, 2019, with concentrations up to 19 µg/L and above the indicator level of 7.2 µg/L.
 - Turbidity on December 11 and 13, 2019, with concentrations up to 203 NTU and above the indicator level of 25 NTU.
- Sample D-1 (outside the sea curtain at the base of the excavation) had a zinc concentration of 60 µg/L on December 6, 2019, which slightly exceeded the indicator level of 52.7 µg/L.

The majority of the surface water exceedances were contained within the sea curtain (directly adjacent to the excavation area as illustrated in Figure 7). The subsequent surface water samples from sample location D-1, located outside the sea curtain, and samples collected downstream were below zinc indicator levels. The laboratory reported issues with their equipment when analyzing for low-level hexavalent chromium and was unable to meet the low quantitation limits required in the WQPP; therefore, the laboratory subcontracted the samples to Fremont Analytical of Seattle, Washington. Fremont Analytical was also not able to get low-level quantitation limits for hexavalent chromium. However, the total chromium in all the surface water samples collected did not exceed the hexavalent chromium indicator level of 15 µg/L.

The remaining surface water samples were within indicator levels, confirming that the BMPs used during excavation activities were effective.

Rainey Creek surface water samples collected after excavation activities. Samples that exceeded the surface water indicator levels for copper, zinc, and TPH-O were samples collected inside Boom 6 (D-6), downstream of the cap area and upstream of the cap area (U-3); see Figure 7 BMPs and Creek Sampling Locations.

Creek samples typically contained pH levels lower than the indicator levels; however, these samples were analyzed out of the short hold time of 15 minutes. Turbidity was typically below the indicator level, except for two instances at locations at D-1B and U-3.

5.4.2 Ponded Water – Former Stockpile Area

From December 23, 2019 to March 3, 2020, Tacoma Power collected surface water samples (Stockpile #1, T-1, T-2, SOP 1, and COP 1) from ponded water near and in the former stockpiled area and collected surface water samples (Log Pond #1 and Log Pond #2) from the log pond area (Figure 2). To remove the stockpiles in an expedited manner, Tacoma Power had to maintain a low water level in the area. Due to heavy rains and surface runoff, the volume of water being was increasing in the stockpile area, requiring them to intermittently discharge to the log pond area for infiltration for approximately 8 hours on February 8, 2020. Tacoma Power submitted these samples to Spectra. Sample results are summarized in Table 6 with the creek surface water samples collected after excavation was completed and laboratory reports are provided in Appendix H. Some of the surface water sample results contained concentrations of pH, turbidity, copper, and zinc above indicator levels. Sample SOP 1 collected in March 2020 contained elevated concentrations of TPH-D and TPH-O above indicator levels.

There were no releases of the ponded water tested in March 2020 outside of the stockpile area. The stockpile area was seeded in April 2020 to promote vegetation growth. The vegetation struggled to establish within the stockpile area, especially in the depressed areas where water ponded. In September 2020, Tacoma Power submitted a plan to Ecology that was reviewed and approved to cover the stockpile area with bioretention soil and biofiltration seed. This temporary measure is to further stabilize the stockpile area, fill in the depressed areas to promote drainage, and to promote further vegetation growth.

6.0 NATURE AND EXTENT OF CONTAMINATION

6.1 Potential Contaminant Sources and Release Pathways

- **TPH in Soil.** The source of TPH-D, TPH-O, and TPH-G contamination at the Site has not been fully determined. Based on the history of the Site and results from the Site investigation, the source(s) are likely related to the former Kosmos mill operations and the USTs and its associated piping. Figure 8 illustrates the approximate extent of petroleum-contaminated soil at the Site.
 - Pipes with NAPL were discovered during the cap excavation and while excavating test pit TP-6 and residual tar-like material from a 5-gallon drum in test pit TP-5. The pipes near TP-5 ran perpendicular and parallel to the former road and the pipes near TP-6 ran parallel to the road. The pipe found during cap excavation appeared to be running in the direction of the seep areas. The full extent of the pipe network is currently unknown as is confirmation that the pipes are the source of the petroleum seeps. The locations of the discovered pipes are illustrated in Figures 3 through 6 and Figure 8.
 - During the emergency cap installation, an abandoned culvert and petroleum-like odor was observed in the drainage ravine located directly to the east/northeast of the cap location (Figures 3 through 6 and Figure 8). The drainage ravine may have been used as a dumping ground for the lumber mill as other trash and debris (metal scraps, drums, wood debris, etc.) were observed during construction. Soil samples were not collected in the ravine area due to the

time constraints of installing the protective cap before the water levels in the lake and creek rose above the working area.

- **cPAHs in Soil.** The source of cPAHs is unknown; however, cPAHs can be present in a variety of materials, including petroleum products, and are also formed during the incomplete burning of coal, oil and gas, or other organic substances. The source of cPAHs in soil is likely associated with the former use of the Site as a lumber mill since there is the potential for spills of petroleum products, exhaust from locomotives, or other related sources.
- **Metals in Groundwater.** The source of metals is unknown; however, elevated metal concentrations were not observed in soil samples and the elevated metal concentrations in the grab groundwater samples are likely the result of collecting the sample from temporary wells where elevated TSS and turbidity skewed the metal concentrations. Therefore arsenic, cadmium, chromium, and lead are not considered COCs for groundwater.
- **Metals and TPH-D in Surface Water during Excavation Activities.** The source of the metals (copper and zinc) and TPH-D in the creek's surface water samples is due to the excavation activities for installing the cap during the emergency IRA. The surface water samples collected downstream of the excavation area were within indicator levels confirming that the BMPs were effective.
- **Metals and TPH-O in Surface Water after Excavation Activities.** The source of the metals (copper and zinc) and TPH-O in the creek's surface water samples is possibly due to the increase in precipitation and runoff as excavation activities were completed. A sample (U-3) collected upstream of the cap area had metal and TPH-O concentrations exceeding indicator levels.
- **Metals, TPH-D, and TPH-O Ponded Water in the Upland Area.** The source of the metals (copper and zinc) in the ponded water observed and characterized in the upland area near the stormwater diversion trench (T-1), and by the former stockpiles (SOP 1) and concrete foundations (COP 1) is most likely due to the elevated turbidity in the sample skewing the total metal concentrations high. Both samples exceeded the indicator level. The source of the TPH-D and TPH-O in the ponded water by the former stockpile (SOP 1) is most likely residual petroleum impacts from the former stockpile used during the emergency IRA.

6.1.1 Contaminants of Concern

COCs at the Site include the following:

- Soil: TPH-D, TPH-O, TPH-G, and cPAHs.
- Groundwater: None.
- Surface water: TPH-D, TPH-O, copper, and zinc
- Air: None

6.1.2 Media of Concern

Soil and surface water have been identified as the primary affected mediums at the Site because of the elevated concentrations of the COCs and indicator levels detected in explorations and surface water quality samples.

Groundwater is not a medium of concern due to petroleum and petroleum-related constituents not exceeding MTCA Method A CULs. We ruled out the elevated metal concentrations as a COC due to the samples having elevated TSS and turbidity concentrations that skewed the metal concentrations high.

Based on the concentrations above MTCA Method A soil CULs at depths detected near the surface of the soil, soil vapor is a potential medium of concern. However, vapor intrusion is not a current concern because there are no buildings on the Site, so air is not identified as a medium of concern.

Table 8 below summarizes the proposed Site-specific soil and surface water CULs for the Site COCs.

Table 8 – Proposed Soil CULs and Surface Water Indicator Levels

Contaminant of Concern	Soil CUL (a) in mg/kg	Surface Water Indicator Levels in µg/L
TPH-D	2,000	250 (b)
TPH-O	2,000	250 (b)
TPH-G	100 (c)	250 (b)
cPAHs	0.1	26 (d)
Copper	280 (e)	7.2 (f)
Zinc	6,000 (e)	52.7 (f)

Notes:

- MTCA Method A soil CUL for unrestricted land use.
- There is no surface water standard and the value is laboratory quantitation level per Tacoma Power's WQPP.
- The MTCA Method A CUL is 30 mg/kg when benzene is present; 100 mg/kg when benzene is not detected. Benzene was not detected in soil samples during this Site investigation.
- MTCA Method B surface water CUL (noncancer).
- MTCA soil CUL (protective of groundwater in the vadose zone).
- Surface water quality standard for fresh water with aquatic life (173-201A WAC), corrected for hardness per Tacoma Power's WQPP.

6.2 Contamination Extents

6.2.1 Soil

This section describes the extent of contaminated soil discovered at the Site and is illustrated in Figure 8.

Upland Area. In general, the petroleum-contaminated soil was encountered in the upper 10 feet during the Site investigation in the upland area. The extent to the north of explorations TP-5 and B-6 and to the

south of explorations TP-15 and B-6 are unknown; however, the two areas excavated for dewatering purposes in the log pond area to the south did not exhibit any obvious environmental impacts. The petroleum-contaminated soil (specifically TPH-O) at exploration TP-12 was encountered in the upper 2.5 feet and the sample collected between depths of 2.5 and 4 feet bgs was not detected at or above laboratory reporting limits for TPH-D and TPH-O. Due to the proximity of the 1992 UST removal and cleanup at Site A, this may be residual petroleum encountered from the 1992 UST removal and cleanup at Site A.

Creek Bank Area. Additionally, petroleum-like odors and NAPL were observed in soil during construction of the cap to the northeast, east, and southwest of the seep area; however, the area could not be further investigated due to steep slopes and unstable soils, rising lake and creek water levels, and needing to install the cap in a timely manner.

In the creek bed and lower bank samples (Creekbed 1 and LB-2, respectively), TPH-D, TPH-O, and cPAHs were detected above MTCA Method A CULs. It is unknown how far the petroleum contamination reaches into the creek bed. Samples collected on the west bank were not detected at or above their respective reporting limits.

The COC's vertical extent are described in detail below.

TPH-D. In the upland area, TPH-D was detected in soil above the MTCA Method A CUL at approximately 0 to 5 feet bgs in explorations B-6 and TP-7; and from 5 to 10 feet bgs in exploration TP-7.

- Exploration B-6 exhibited petroleum-like odor and sheen in the upper 5 feet and exceeded for TPH-D (as well as TPH-O). Odor and sheen were not observed below 5 feet, except a sheen was observed from 30 to 35 feet bgs. A sample (B-6-35) was collected at this depth and did not contain detectable TPH-D (or TPH-O) concentrations.
- Exploration TP-7 had four samples collected in the excavation (0 to 2.5 feet, 5 to 7.5 feet, 7.5 to 10 feet, and 10 to 15 feet bgs). The samples collected in the upper 10 feet bgs (TP-7-2.5, TP-7-7.5, and TP-7-10) exceeded the CUL; however, the sample collected from 10 to 15 feet bgs (TP-7-15) had a low-level detection of 230 mg/kg, which is below the MTCA Method A CUL of 2,000 mg/kg.

Based on the analytical data and field screening observations, TPH-D-contaminated soil appears to be confined to the near-surface soil within the upper 10 feet bgs in the upland area.

In the creek bank area, TPH-D was detected above the MTCA Method A CUL in one of the creek bed and one of the lower bank soil samples (Creekbed 1 and LB-2, respectively), indicating that TPH-D is located in the creek bed, but the vertical extent of TPH-D-contaminated soil in the creek and bank areas are unknown.

TPH-O. In the upland area, TPH-O was detected in soil above the MTCA Method A CUL at approximately 0 to 5 feet bgs in explorations B-5, B-6, TP-7, TP-12, and TP-15; and from 5 to 8 feet bgs in explorations TP-6 and TP-7.

- Exploration B-5 exceeded the CUL in the sample collected from 0 to 5 feet bgs (B-5-5); however, the sample collected from 10 to 15 feet bgs (B-5-15) did not contain detectable TPH-O concentrations. There was no sample recovery from 5 to 10 feet bgs.
- Exploration B-6 contained both TPH-D and TPH-O, see above for summary in TPH-D section. Sample B-6-35 (collected from 30 to 35 feet bgs) did not contain detectable TPH-O concentrations.
- Exploration TP-6 exceeded the CUL in the sample collected from 5 to 8 feet bgs (TP-6-8); however, the sample collected from 10 to 12 bgs (TP-6-12) did not contain detectable TPH-O concentrations.
- Exploration TP-7 exceeded the CUL in samples collected from 0 to 2.5 feet and 5 to 7.5 feet bgs (TP-7-2.5 and TP-7-7.5, respectively); however, the sample collected from 7.5 to 10 feet bgs (TP-7-10) contained TPH-O concentration of 1,900 mg/kg, slightly below MTCA Method A CUL of 2,000 mg/kg and the sample collected from 10 to 15 feet bgs (TP-7-15) did not contain detectable TPH-O concentrations.
- Exploration TP-12 exceeded the CUL in the sample collected from 0 to 2.5 feet bgs (TP-12-2.5); however, the sample collected from 2.5 to 4 bgs (TP-12-4) did not contain detectable TPH-O concentrations.
- Exploration TP-15 exceeded the CUL in the sample collected from 0 to 4 feet bgs (TP-15-4); however, the sample collected from 4 to 6 bgs (TP-15-6) did not contain detectable TPH-O concentrations.

Based on the analytical data and field screening observations, TPH-O-contaminated soil appears to be confined to the near-surface soil within the upper 8 feet bgs in the upland area.

In the creek bank area, TPH-O was also detected above the MTCA Method A CUL in the creek bed and lower bank soil samples (Creekbed 1 and LB-2, respectively), indicating that TPH-O is located in the creek bed, but the vertical extent of TPH-O-contaminated soil in the creek and bank areas are unknown.

TPH-G. In the upland area, TPH-G was detected above the MTCA Method A CUL at approximately 5 to 10 feet bgs in explorations TP-5 and TP-7.

- Exploration TP-5 exceeded the CUL in samples collected from 5 to 10 feet bgs (TP-5-8 and TP-5-10); however, the sample collected from 15 to 19 bgs (TP-5-19) did not contain detectable TPH-G concentrations. Field screening observations showed elevated PID detections in samples to a depth of 15 feet bgs.
- Exploration TP-7 exceeded the CUL in the sample collected from 5 to 7.5 feet bgs (TP-7-7.5); however, the sample collected from 10 to 15 bgs (TP-7-15) did not contain detectable TPH-G concentrations. Field screening observations showed elevated PID detections in samples to a depth of 10 feet bgs.

Based on the analytical data and field screening observations, TPH-G-contaminated soil appears to be confined to the near-surface soil within the upper 10 to 15 feet bgs in the upland area.

cPAHs. In the upland area, cPAHs were detected above the MTCA Method A CUL at approximately 0 to 5 feet bgs in exploration B-6.

- Exploration B-6 contained both TPH-D, TPH-O, and cPAHs, see summary in TPH-D section. Sample B-6-35 (collected from 30 to 35 feet bgs) did not contain detectable cPAHs concentrations.

Based on the analytical data and field screening observations, cPAH-contaminated soil appears to be confined to the near-surface soil within the upper 10 to 15 feet bgs in the upland area.

In the creek bank area, cPAHs were detected above the MTCA Method A CUL in the creek bed and lower bank soil samples (Creekbed 1 and LB-2, respectively), indicating that cPAHs are located in the creek bed, but the vertical extent of cPAH-contaminated soil in the creek and bank areas are unknown.

6.2.2 Surface Water

Creek surface water samples were collected during excavation activities and construction of the cap, per Tacoma Power's WQPP. Copper and zinc were found within the sea curtain (directly adjacent to the work area) at concentrations exceeding indicator levels, as well as one instance exceeding for zinc just outside the sea curtain. Metal debris and pipes were encountered during the cap excavation and could be the source of these metals in surface water. However, surface water samples collected downstream and behind additional BMPs were below indicator levels for copper and zinc, indicating the effectiveness of the installed BMPs. Additionally, TPH-D, TPH-O, copper, and zinc were detected in the ponded water sampled by Tacoma Power near the former petroleum-contaminated stockpile. The elevated metals and petroleum could be attributed to impacted material in the former stockpile.

7.0 DATA GAPS

Four data gaps have been identified following review of the Site investigation field and analytical results, as well as reviewing the field and analytical results of the creek bank area during construction and installation of the cap. These data gaps are discussed below, and further investigation of these data gaps would help in the complete understanding of the Site and extent of contamination.

Potential Data Gap 1. Petroleum-contaminated soil was identified in the upland area and on the creek bank and bed. In the upland area, the vertical extent of the petroleum-contaminated soil appears to be within the upper 10 to 15 feet bgs. The horizontal extent in the central area is not defined towards the southwest near TP-15, north and west near TP-5, east of TP-7, and northeast and north of B-6. Also, in the upland area, an isolated area north of the former Site A contained petroleum-contaminated soil from 0 to 2.5 feet bgs (Figure 8). Additional soil sampling and analysis in these areas would identify the horizontal extents in the upland area (including to the east and south of the former Site A cleanup area).

Petroleum-impacted soil was discovered during the cap excavation in the creek bed and along the creek bank south of the installed cap. The extents of these petroleum-impacts are unknown. Based on observations during the installation of the cap, the downstream edge of the cap was terminated at a location that had approximately four feet of clean native material adjacent to the creek edge and a vein of contaminated material appeared to continue to run parallel to the creek. This vein was an area of approximately ten square feet. Investigating the extent of the petroleum-contaminated soil in the creek and creek bank would be extremely difficult due to the steep terrain on the bank south of the cap, the inaccessibility of reaching the opposite (west) creek bank with equipment, and the creek water levels.

Routine inspections and monitoring are currently being conducted by Tacoma Power staff. If the petroleum-impacted material is observed beyond the extent of the installed cap, additional investigations can be considered at that time.

Potential Data Gap 2. During the Site investigation and construction of the cap, multiple pipes were encountered, a couple with observable NAPL. Some of the pipes or pipe segments were removed, but the complete pipe network associated with the former mill was not fully discovered. It is also not known if the pipes remaining contain any residual petroleum product. Therefore, this is considered a potential data gap for future investigations. GPR surveys could be used to further evaluate the extent of the pipe network.

Potential Data Gap 3. An abandoned culvert and petroleum-like odor was observed in the drainage ravine filled with debris and railroad ties to the north/northeast of the cap. Due to time limitations during the cap excavation and installation (with water levels anticipated to rise), the extent of impacts in the drainage ravine could not be further delineated. The upland area on the north side of the ravine could be investigated during future work to further define the extents.

Potential Data Gap 4. Elevated metals were detected in two grab groundwater samples (B-4-W and B-6-W). Since these were collected as grab groundwater samples from a temporary reconnaissance boring, there is the potential that the elevated metals are associated with high turbidity and not necessarily representative of the surrounding groundwater conditions. Field filtering the grab groundwater samples and analyzing for dissolved metals in future investigations may help understand if total metals are a COC in groundwater. Completing this investigation while the reservoir is high, may also provide better results.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Results of soil and groundwater sampling conducted in the upland area at the Site indicate the presence of TPH-D, TPH-O, TPH-G, and cPAHs in soil at concentrations above CULs primarily in near surface soils (approximately in the upper 10 to 15 feet bgs) from the bank where the seeps were located towards the east where piping was encountered around former building foundations and toward the center of the APE. An isolated area at TP-12 (near the former Site A [Figure 8]) was found to contain petroleum-contaminated soil, specifically TPH-O in the upper 2.5 feet bgs. Additionally, TPH-D, TPH-O, and cPAHs were found in soil above CULs in the creek bed and on the creek bank where the protective cap was installed. Surface water samples collected during the earthwork activities for emergency IRA showed elevated TPH-O, TPH-D, copper, and zinc in areas adjacent to the construction area.

We recommend conducting a data-gap investigation to collect additional soil and groundwater samples and conduct another GPR survey for further characterize the extent of contamination at the Site. Figure 8 illustrates the observed and estimated extent of contamination at the Site; an additional investigation will assist in understanding the full extent of contamination. This data-gap investigation would include the following:

- Soil and groundwater sampling in the upland area to the north (near TP-5), north-central area (near B-6), northeast (near TP-12), southeast (near TP-15), and south-central area (near B-6).

- Include copper and zinc analyses for the soil and groundwater samples. Analyzing for these additional metals in soil during future investigations may help understand why these elevated metals are observed in the surface water
 - Include total and dissolved metal analyses for the grab groundwater samples.
- Conduct additional GPR survey, specifically near already known pipes in Figure 8 to identify the extents.

The emergency IRA should be considered when evaluating the recommended next steps at the Site. A substantial protective cap was installed to prevent contaminants from seeping into Rainey Creek. Additionally, a significant amount of impacted material was removed (approximately 10,956 tons). This has greatly improved the overall environmental conditions at the Site. As mentioned above in Potential Data Gap 1, Tacoma Power is conducting routine inspections of the cap. If impacted material is observed beyond the extent of the installed cap, additional investigations can be considered at that time.

Based on these results and observations from the cap installation, Hart Crowser recommends Tacoma Power to continue to monitor the protective cap performance, the upland Kosmos flats area, and Rainey Creek bank over the next year. For the cap performance monitoring, if any additional sheens are observed within Rainey Creek in the proximity of the cap or downstream, BMP measures could be implemented to prevent downstream migration of contaminants. This is especially important following high energy disturbances at the Site, such as big storm events, in which the mechanism of the remedy can be damaged or when the water levels fluctuate at the Site. For example, storm events can expose impacted soil that was capped or erode those that were previously isolated. We understand Tacoma Power is working closely with Ecology's Water Quality Program to maintain the protective cap.

9.0 LIMITATIONS

Work for this project was performed, and this letter report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of Tacoma Power for specific application to the referenced property. This letter report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

Any questions regarding our work and this letter report, the presentation of the information, and the interpretation of the data are welcome and should be referred to the undersigned

10.0 REFERENCES

Agency for Toxic Substances and Disease Registry 1995. Toxicology Profile for Polycyclic Aromatic Hydrocarbons. U.S. Department of Health and Human Services, Atlanta, Georgia.

AIRO 1993. Site Assessment Report, Riffe Lake Reservoir, Former Kosmos Mill Site, Glenoma, WA. Prepared for Tacoma Public Utilities. March 31, 1993.

DOWL 1993. Site Characterization Report and Cleanup Action Plan, Former Kosmos Townsite, Lewis Co., Washington. Prepared for Tacoma Public Utilities. August 27, 1993.

EPA 2004. USEPA contract laboratory program, national functional guidelines for inorganics data review. EPA 540/R-94/013. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. October 2004.

EPA 2008. USEPA contract laboratory program, national functional guidelines for organics data review. EPA 540/R-08/01. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. June 2008.

Hart Crowser 2019. Remedial Investigation Work Plan, Kosmos Mill Oil Cleanup, Kosmos Flats Area. Prepared for Tacoma Public Utilities. December 6, 2019.

Hart Crowser 2020. Draft Emergency Independent Remedial Action Completion Report, Kosmos Mill Oil Cleanup, Kosmos Flats Area. Prepared for Tacoma Public Utilities. June 5, 2020.

Seattle Deposition Reporters 1995. No. C94-5056B Kosmos Site 30(b)(6) Deposition. January 23, 1995.

Washington State Department of Ecology (WSDOE). 2007. Model Toxics Control Act Regulation. Chapter 173-340 WAC. 12 October.

Washington State Department of Ecology (WSDOE). 1999. Natural Background Soil Metals Concentrations in Washington State. Toxics Cleanup Program, Department of Ecology. Publication #94-115. October 1999.

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Table 1 - Summary of Field Screening and Chemical Analysis Sample Selection

Sample ID	Collection Date	Sample Depth Interval Feet	Approximate Elevation interval Feet	PID Reading (ppm)	Odor (a)	Sheen	Matrix	EPA 8260B (VOCs)	EPA 8082A (PCBs)	EPA 8270D (PAHs)	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Metals (b)	Hold	Lab Report No.
B-1-5	12/11/2019	0 to 5	758 to 753	<0.1	SO	SS	S				X		X			912215
B-1-10	12/11/2019	5 to 10	753 to 748	<0.1	NO	NS	S			X			X			912215
B-1-15	12/11/2019	10 to 15	748 to 743	<0.1	NO	NS	S			X			X			912215
B-1-20	12/11/2019	15 to 20	743 to 738	<0.1	NO	NS	S								X	
B-1-25	12/11/2019	20 to 25	738 to 733	<0.1	NO	NS	S								X	
B-1-30	12/11/2019	25 to 30	733 to 728	<0.1	NO	NS	S								X	
B-1-35	12/11/2019	30 to 35	728 to 723	<0.1	NO	NS	S						X			912215
B-1-40	12/11/2019	35 to 40	723 to 718	<0.1	NO	NS	S								X	
B-2-5	12/11/2019	0 to 5	759 to 754	0.6	NO	SS	S	X				X	X			912215
B-2-10	12/11/2019	5 to 10	754 to 749	0.1	NO	NS	S				X		X			912215
B-2-15	12/11/2019	10 to 15	749 to 744	<0.1	NO	NS	S								X	
B-2-20	12/11/2019	15 to 20	744 to 739	<0.1	NO	NS	S			X			X			912215
B-2-25	12/11/2019	20 to 25	739 to 734	<0.1	NO	NS	S								X	
B-2-30	12/11/2019	25 to 30	734 to 729	<0.1	NO	NS	S								X	
B-2-35	12/11/2019	30 to 35	729 to 724	<0.1	NO	NS	S				X		X			912215
B-2-40	12/11/2019	35 to 40	724 to 719	<0.1	NO	SS	S						X			912215
B-2-45	12/11/2019	40 to 45	719 to 714	<0.1	NO	NS	S								X	
B-2-50	12/11/2019	45 to 50	714 to 709	<0.1	NO	NS	S								X	
B-3-5	12/10/2019	0 to 5	760 to 755	<0.1	NO	NS	S								X	
B-3-15	12/10/2019	10 to 15	750 to 745	<0.1	NO	SS	S			X	X		X			912193
B-3-20	12/10/2019	15 to 20	745 to 740	<0.1	NO	NS	S				X		X			912193
B-3-25	12/10/2019	20 to 25	740 to 735	<0.1	NO	NS	S								X	
B-3-30	12/10/2019	25 to 30	735 to 730	<0.1	NO	NS	S								X	
B-3-35	12/10/2019	30 to 35	730 to 725	<0.1	NO	NS	S	X			X		X			912193
B-3-40	12/10/2019	35 to 40	725 to 720	<0.1	NO	NS	S								X	
B-4-5	12/11/2019	0 to 5	760 to 755	0.7	NO	SS	S						X			912215
B-4-15	12/11/2019	10 to 15	750 to 745	113.9	SO	NS	S	X		X		X	X			912215
B-4-20	12/11/2019	15 to 20	745 to 740	<0.1	NO	NS	S								X	
B-4-25	12/11/2019	20 to 25	740 to 735	2.3	SO	NS	S						X			912215
B-4-30	12/11/2019	25 to 30	735 to 730	<0.1	NO	NS	S								X	
B-4-35	12/11/2019	30 to 35	730 to 725	8.3	SO	NS	S	X		X		X	X			912215
B-4-40	12/11/2019	35 to 40	725 to 720	<0.1	NO	NS	S				X		X			912215
B-5-5	12/11/2019	0 to 5	762 to 757	2.5	MO	SS	S	X				X	X			912215
B-5-15	12/11/2019	10 to 15	752 to 747	0.3	NO	NS	S				X		X			912215
B-5-20	12/11/2019	15 to 20	747 to 742	<0.1	NO	NS	S								X	
B-5-25	12/11/2019	20 to 25	742 to 737	<0.1	NO	NS	S								X	
B-5-30	12/11/2019	25 to 30	737 to 732	<0.1	NO	NS	S								X	
B-5-35	12/11/2019	30 to 35	732 to 727	<0.1	NO	NS	S								X	
B-5-40	12/11/2019	35 to 40	727 to 722	<0.1	NO	NS	S								X	
B-6-5	12/12/2019	0 to 5	762 to 757	0.4	SO	SS	S	X		X		X	X			912215
B-6-10	12/12/2019	5 to 10	757 to 752	<0.1	NO	NS	S								X	
B-6-15	12/12/2019	10 to 15	752 to 747	<0.1	NO	NS	S								X	
B-6-20	12/12/2019	15 to 20	747 to 742	<0.1	NO	NS	S								X	
B-6-25	12/12/2019	20 to 25	742 to 737	<0.1	NO	NS	S								X	
B-6-30	12/12/2019	25 to 30	737 to 732	<0.1	NO	NS	S								X	
B-6-35	12/12/2019	30 to 35	732 to 727	0.3	NO	SS	S			X	X		X			912215
B-6-40	12/12/2019	35 to 40	727 to 722	0.1	NO	NS	S				X		X			912215
B-6-45	12/12/2019	40 to 45	722 to 717	<0.1	NO	NS	S								X	
B-7-5	12/12/2019	0 to 5	762 to 757	<0.1	SO	NS	S				X		X			912215
B-7-10	12/12/2019	5 to 10	752 to 747	<0.1	NO	NS	S						X			912215
B-7-15	12/12/2019	10 to 15	747 to 742	<0.1	NO	NS	S								X	
B-7-20	12/12/2019	15 to 20	742 to 737	<0.1	NO	NS	S								X	

Table 1 - Summary of Field Screening and Chemical Analysis Sample Selection

Sample ID	Collection Date	Sample Depth Interval Feet	Approximate Elevation interval Feet	PID Reading (ppm)	Odor (a)	Sheen	Matrix	EPA 8260B (VOCs)	EPA 8082A (PCBs)	EPA 8270D (PAHs)	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Metals (b)	Hold	Lab Report No.
B-7-25	12/12/2019	20 to 25	737 to 732	<0.1	NO	NS	S								X	
B-7-30	12/12/2019	25 to 30	732 to 727	<0.1	NO	NS	S								X	
B-7-35	12/12/2019	30 to 35	727 to 722	<0.1	NO	NS	S								X	
B-7-40	12/12/2019	35 to 40	722 to 717	<0.1	NO	NS	S								X	
B-7-45	12/12/2019	40 to 45	717 to 712	<0.1	NO	NS	S								X	
B-8-5	12/10/2019	0 to 5	761 to 756	<0.1	NO	SS	S						X			912193
B-8-10	12/10/2019	5 to 10	756 to 751	<0.1	NO	SS	S	X				X	X			912193
B-8-15	12/10/2019	10 to 15	751 to 746	<0.1	NO	NS	S								X	
B-8-20	12/10/2019	15 to 20	746 to 741	<0.1	NO	NS	S								X	
B-8-25	12/10/2019	20 to 25	741 to 736	<0.1	NO	NS	S								X	
B-8-30	12/10/2019	25 to 30	736 to 731	<0.1	NO	NS	S								X	
B-8-35	12/10/2019	30 to 35	731 to 726	<0.1	NO	NS	S								X	
B-8-40	12/10/2019	35 to 40	726 to 721	<0.1	NO	NS	S								X	
B-9-5	12/12/2019	0 to 5	761 to 756	<0.1	OO	SS	S						X			912215
B-9-10	12/12/2019	5 to 10	756 to 751	<0.1	NO	SS	S								X	
B-9-15	12/12/2019	10 to 15	751 to 746	<0.1	NO	NS	S						X			912215
B-9-20	12/12/2019	15 to 20	746 to 741	<0.1	NO	NS	S								X	
B-9-25	12/12/2019	20 to 25	741 to 736	<0.1	NO	MS	S						X			912215
B-9-30	12/12/2019	25 to 30	736 to 731	0.1	NO	NS	S								X	
B-9-35	12/12/2019	30 to 35	731 to 726	0.1	NO	NS	S								X	
B-9-40	12/12/2019	35 to 40	726 to 721	0.3	NO	NS	S				X		X			912215
B-10-5	12/10/2019	0 to 5	762 to 757	<0.1	NO	NS	S								X	
B-10-10	12/10/2019	5 to 10	757 to 752	<0.1	NO	NS	S								X	
B-10-15	12/10/2019	10 to 15	752 to 747	<0.1	NO	NS	S								X	
B-10-20	12/10/2019	15 to 20	747 to 742	<0.1	NO	NS	S								X	
B-10-25	12/10/2019	20 to 25	742 to 737	<0.1	NO	NS	S								X	
B-10-30	12/10/2019	25 to 30	737 to 732	<0.1	NO	NS	S						X			912193
B-10-35	12/10/2019	30 to 35	732 to 727	<0.1	NO	SS	S						X			912193
B-10-40	12/10/2019	35 to 40	727 to 722	<0.1	NO	NS	S								X	
TP-2-4	11/26/2019	0 to 4	760 to 756	<0.1	NO	NS	S		X		X	X	X	X		911412
TP-2-8	11/26/2019	4 to 8	756 to 752	<0.1	NO	NS	S				X		X			911412
TP-2-10.5	11/26/2019	8 to 10.5	752 to 749.5	<0.1	NO	NS	S								X	
TP-3-8	12/5/2019	5 to 8	752 to 749	<0.1	NO	NS	S	X	X			X	X			912095
TP-3-12	12/5/2019	8 to 12	749 to 745	<0.1	NO	NS	S				X		X			912095
TP-3-20	12/5/2019	15 to 20	742 to 737	<0.1	NO	NS	S						X			912095
TP-5-2.5	12/5/2020	0 to 2.5	758 to 755.5	<0.1	NO	NS	S								X	
TP-5-5	12/5/2019	2.5 to 5	755.5 to 753	<0.1	NO	NS	S						X			912095
TP-5-8	12/5/2019	5 to 8	753 to 750	400.1	HO	HS	S	X				X	X	X		912095
TP-5-10	12/5/2019	8 to 10	750 to 748	469.1	HO	HS	S	X	X	X		X	X	X		912095
TP-5-12	12/5/2019	10 to 12	748 to 746	21.3	HO	SS	S						X			912095
TP-5-15	12/5/2019	12 to 15	746 to 743	21.6	MO	SS	S						X			912095
TP-5-19	12/5/2019	15 to 19	743 to 739	9.6	SO	NS	S	X	X	X		X	X			912095
TP-6-5	12/6/2019	0 to 5	762 to 757	0.9	SO	SS	S						X			912126
TP-6-8	12/6/2019	5 to 8	757 to 754	3.1	MO	HS	S	X	X			X	X			912126
TP-6-10	12/6/2019	8 to 10	754 to 752	<0.1	NO	NS	S								X	
TP-6-12	12/6/2019	10 to 12	752 to 750	<0.1	NO	SS	S						X			912126
TP-7-2.5	12/6/2019	0 to 2.5	761 to 758.5	18.9	MO	SS	S						X			912126
TP-7-5	12/6/2019	2.5 to 5	758.5 to 756	53.7	MO	HS	S								X	
TP-7-7.5	12/6/2019	5 to 7.5	756 to 753.5	166.3	HO	HS	S	X	X	X		X	X			912126
TP-7-10	12/6/2019	7.5 to 10	753.5 to 751	132.6	HO	HS	S						X			912126
TP-7-15	12/6/2019	10 to 15	751 to 746	6.7	NO	SS	S	X		X		X	X			912126
TP-8-3.5	12/6/2019	0 to 3.5	762 to 758.5	1.3	SO	NS	S						X	X		912126

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Sample ID	Collection Date	Sample Depth Interval Feet	Approximate Elevation interval Feet	PID Reading (ppm)	Odor (a)	Sheen	Matrix	EPA 8260B (VOCs)	EPA 8082A (PCBs)	EPA 8270D (PAHs)	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Metals (b)	Hold	Lab Report No.
TP-8-6	12/6/2019	3.5 to 6	758.5 to 756	8.7	SO	MS	S	X				X	X			912126
TP-8-10.5	12/6/2019	6 to 10.5	756 to 751.5	6	SO	MS	S								X	
TP-8-15	12/6/2019	10.5 to 15	751.5 to 747	0.1	NO	NS	S	X				X	X			912126
TP-10-5	12/9/2019	0 to 5	761 to 756	<0.1	OO	NS	S	X				X	X	X		912147
TP-10-10	12/9/2019	5 to 10	756 to 751	<0.1	NO	NS	S								X	
TP-10-15	12/9/2019	10 to 15	751 to 746	<0.1	NO	NS	S						X			912147
TP-10-18	12/9/2019	15 to 18	746 to 743	<0.1	NO	NS	S						X			912147
TP-11-5	12/9/2019	0 to 5	762 to 757	<0.1	NO	NS	S						X			912147
TP-11-12	12/9/2019	5 to 12	757 to 750	<0.1	NO	NS	S								X	
TP-11-15	12/9/2019	12 to 15	750 to 747	<0.1	NO	NS	S								X	
TP-11-16.5	12/9/2019	15 to 16.5	747 to 744.5	<0.1	NO	NS	S						X			912147
TP-12-2.5	12/9/2019	0 to 2.5	762 to 759.5	<0.1	NO	NS	S	X				X	X	X		912147
TP-12-4	12/9/2019	2.5 to 4	759.5 to 748	<0.1	NO	NS	S						X			912147
TP-13-2.5	11/26/2019	0 to 2.5	737 to 734.5	<0.1	NO	NS	S	X				X	X	X		911412
TP-13-5	11/26/2019	2.5 to 5	734.5 to 732	<0.1	NO	NS	S								X	
TP-13-9	11/26/2019	5 to 9	732 to 728	<0.1	NO	NS	S								X	
TP-14-2.5	11/26/2019	0 to 2.5	761 to 758.5	<0.1	NO	NS	S								X	
TP-14-5	11/26/2019	2.5 to 5	758.5 to 756	<0.1	NO	NS	S								X	
TP-14-10	11/26/2019	5 to 10	756 to 751	<0.1	NO	NS	S	X				X	X			911412
TP-15-4	11/26/2019	0 to 4	760 to 756	<0.1	SO	SS	S		X		X	X	X	X		911412
TP-15-6	11/26/2019	4 to 6	756 to 752	<0.1	SO	SS	S			X		X	X			911412
TP-15-8	11/26/2019	6 to 8	752 to 750	<0.1	SO	SS	S	X	X			X	X			911412
TP-15-11	11/26/2019	8 to 11	750 to 747	<0.1	NO	NS	S								X	
TP-15-14	11/26/2019	11 to 14	747 to 744	<0.1	NO	NS	S			X	X		X			911412
Creekbed 1	12/13/2019	0	723.3 to 723	0.6	HO	SS	S	X		X		X	X			912244
LB-1	12/16/2019	0 to 0.3	723.3 to 723	0.2	NO	NS	S	X		X		X	X			912263
LB-2	12/16/2019	0 to 0.3	723.3 to 723	0.8	MO	SS	S	X		X		X	X			912263
LB-3	12/16/2019	0 to 0.3	723.3 to 723	0.2	SO	NS	S	X		X		X	X			912263
UB-1	12/18/2019	0 to 0.3	750.3 to 750	0.7	SO	NS	S	X		X		X	X			912340
UB-2	12/18/2019	0 to 0.3	750.3 to 750	0.9	NO	NS	S	X		X		X	X			912340
UB-3	12/18/2019	0 to 0.3	750.3 to 750	0.4	NO	NS	S	X		X		X	X			912340
Westbank 1	12/17/2019	0 to 2.25	723.25 to 721	<0.1	NO	NS	S	X		X		X	X	X		912296
Westbank 2	12/17/2019	0 to 2	725 to 723	<0.1	NO	NS	S	X		X		X	X	X		912296
Westbank 3	12/17/2019	0 to 1.5	724.5 to 723	<0.1	NO	NS	S	X		X			X	X		912296
B-4-W	12/11/2019	45 to 50	715 to 710	-	NO	NS	GW	X	X	X		X	X	X		912214
B-6-W	12/12/2019	45 to 50	716 to 711	-	NO	NS	GW	X		X		X	X	X		912214
B-7-W	12/12/2019	45 to 50	716 to 711	-	NO	NS	GW	X		X		X	X			912214
B-9-W	12/12/2019	45 to 50	716 to 711	-	NO	NS	GW	X		X		X	X			912265

Notes:

(a) Odors and sheens indicate petroleum-like characteristics unless otherwise noted with an "OO."

(b) Metals analysis includes As, Ba, Cd, Cr, Pb, Hg, Se, and Ag.

Bold entries have analytical results above MTCA Method A cleanup levels.

- NO = No odor
- SO = Slight odor
- MO = Moderate odor
- HO = Heavy odor
- OO = Organic odor
- NS = No sheen
- SS = Slight sheen
- MS = Moderate sheen
- HS = Heavy Sheen
- S = Soil
- GW = Groundwater

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	B-1-5	B-1-10	B-1-15	B-1-35	B-2-5	B-2-10	B-2-20	B-2-35	B-2-40	B-3-15	B-3-20	B-3-35	B-4-5	B-4-15	B-4-25
Sampling Date	Method A	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/10/2019	12/10/2019	12/10/2019	12/11/2019	12/11/2019	12/11/2019
Sample Depth in feet	Cleanup	0 to 5	5 to 10	10 to 15	30 to 35	0 to 5	5 to 10	15 to 20	30 to 35	35 to 40	10 to 15	15 to 20	30 to 35	0 to 5	10 to 15	20 to 25
Sample Elevation in feet (NAVD 88)	Level ^a	758 to 753	753 to 748	748 to 743	728 to 723	759 to 754	754 to 749	744 to 739	729 to 724	724 to 719	750 to 745	745 to 740	730 to 725	760 to 755	750 to 745	740 to 735
Sample Elevation in feet (TCL)		754 to 749	749 to 744	744 to 739	724 to 719	755 to 750	750 to 745	740 to 735	725 to 720	720 to 715	746 to 741	741 to 736	726 to 721	756 to 751	746 to 741	736 to 731
TPH in mg/kg																
Diesel Range Organics	2000	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Lube Oil	2000	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Gasoline Range Organics	30/100 ^d	5 U				8.7	5 U		5 U		5 U	5 U	5 U		12	
Metals in mg/kg																
Arsenic	20															
Barium																
Cadmium	2															
Chromium	19/2000 ^c															
Lead	250															
Mercury	2															
Selenium																
Silver																
BTEX in mg/kg																
Benzene	0.03	0.02 U					0.02 U		0.02 U		0.02 U	0.02 U	0.02 U			
Ethylbenzene	6	0.02 U					0.02 U		0.02 U		0.02 U	0.02 U	0.02 U			
Toluene	7	0.02 U					0.02 U		0.02 U		0.02 U	0.02 U	0.02 U			
Total Xylenes	9	0.06 U					0.06 U		0.06 U		0.06 U	0.06 U	0.06 U			
PCBs in mg/kg																
PCB-aroclor 1016																
PCB-aroclor 1221																
PCB-aroclor 1232																
PCB-aroclor 1242																
PCB-aroclor 1248																
PCB-aroclor 1254																
PCB-aroclor 1260																
PCB-aroclor 1262																
PCB-aroclor 1268																
Total PCBs	1															
Volatiles in mg/kg																
1,1,1,2-Tetrachloroethane							0.05 U									0.05 U
1,1,1-Trichloroethane	2						0.05 U									0.05 U
1,1,2,2-Tetrachloroethane							0.05 U									0.05 U
1,1,2-Trichloroethane							0.05 U									0.05 U
1,1-Dichloroethane							0.05 U									0.05 U
1,1-Dichloroethene							0.05 U									0.05 U
1,1-Dichloropropene							0.05 U									0.05 U
1,2,3-Trichlorobenzene							0.25 U									0.25 U
1,2,3-Trichloropropane							0.05 U									0.05 U
1,2,4-Trichlorobenzene							0.25 U									0.25 U
1,2,4-Trimethylbenzene							0.05 U									0.05 U
1,2-Dibromo-3-chloropropane							0.5 U									0.5 U
1,2-Dibromoethane							0.05 U									0.05 U
1,2-Dichlorobenzene							0.05 U									0.05 U
1,2-Dichloroethane							0.05 U									0.05 U
1,2-Dichloropropane							0.05 U									0.05 U
1,3,5-Trimethylbenzene							0.05 U									0.05 U
1,3-Dichlorobenzene							0.05 U									0.05 U
1,3-Dichloropropane							0.05 U									0.05 U
1,4-Dichlorobenzene							0.05 U									0.05 U
2,2-Dichloropropane							0.05 U									0.05 U
2-Butanone							0.5 U									0.5 U
2-Chlorotoluene							0.05 U									0.05 U
2-Hexanone							0.5 U									0.5 U
4-Chlorotoluene							0.05 U									0.05 U
Acetone							0.5 U									0.5 U
Benzene	0.03						0.03 U									0.03 U

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	B-1-5	B-1-10	B-1-15	B-1-35	B-2-5	B-2-10	B-2-20	B-2-35	B-2-40	B-3-15	B-3-20	B-3-35	B-4-5	B-4-15	B-4-25
Sampling Date	Method A	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/10/2019	12/10/2019	12/10/2019	12/11/2019	12/11/2019	12/11/2019
Sample Depth in feet	Cleanup	0 to 5	5 to 10	10 to 15	30 to 35	0 to 5	5 to 10	15 to 20	30 to 35	35 to 40	10 to 15	15 to 20	30 to 35	0 to 5	10 to 15	20 to 25
Sample Elevation in feet (NAVD 88)	Level ^a	758 to 753	753 to 748	748 to 743	728 to 723	759 to 754	754 to 749	744 to 739	729 to 724	724 to 719	750 to 745	745 to 740	730 to 725	760 to 755	750 to 745	740 to 735
Sample Elevation in feet (TCL)		754 to 749	749 to 744	744 to 739	724 to 719	755 to 750	750 to 745	740 to 735	725 to 720	720 to 715	746 to 741	741 to 736	726 to 721	756 to 751	746 to 741	736 to 731
Bromobenzene						0.05 U										0.05 U
Bromoform						0.05 U										0.05 U
Bromomethane						0.5 U										0.5 U
Carbon tetrachloride						0.05 U										0.05 U
CFC-11						0.5 U										0.5 U
CFC-12						0.5 U										0.5 U
Chlorobenzene						0.05 U										0.05 U
Chloroethane						0.5 U										0.5 U
Chloroform						0.05 U										0.05 U
Chloromethane						0.5 U										0.5 U
cis-1,2-Dichloroethene						0.05 U										0.05 U
cis-1,3-Dichloropropene						0.05 U										0.05 U
Dibromochloromethane						0.05 U										0.05 U
Dibromomethane						0.05 U										0.05 U
Dichlorobromomethane						0.05 U										0.05 U
Ethylbenzene	6					0.05 U										0.05 U
Hexachlorobutadiene						0.25 U										0.25 U
Hexane						0.25 U										0.25 U
Isopropylbenzene (Cumene)						0.05 U										0.05 U
Methyl isobutyl ketone						0.5 U										0.5 U
Methyl t-butyl ether	0.1					0.05 U										0.05 U
Methylene chloride	0.02					0.5 U										0.5 U
Naphthalene	5					0.05 U										0.05 U
n-Propylbenzene						0.05 U										0.05 U
p-Isopropyltoluene						0.05 U										0.05 U
sec-Butylbenzene						0.05 U										0.05 U
Styrene						0.05 U										0.05 U
tert-Butylbenzene						0.05 U										0.05 U
Tetrachloroethene	0.05					0.025 U									0.025 U	
Toluene	7					0.05 U										0.05 U
trans-1,2-Dichloroethene						0.05 U										0.05 U
trans-1,3-Dichloropropene						0.05 U										0.05 U
Trichloroethene	0.03					0.02 U										0.02 U
Vinyl chloride						0.05 U										0.05 U
m, p-Xylene						0.1 U										0.1 U
o-Xylene						0.05 U										0.05 U
Total Xylenes	9					0.1 U										0.1 U
PAHs in mg/kg																
Acenaphthene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Acenaphthylene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Anthracene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Benz[a]anthracene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Benzo(a)pyrene	0.1		0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Benzo(b)fluoranthene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Benzo(ghi)perylene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Benzo(k)fluoranthene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Chrysene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Dibenzo(a,h)anthracene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Fluoranthene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Fluorene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Indeno(1,2,3-cd)pyrene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Naphthalene	5		0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Phenanthrene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Pyrene			0.01 U	0.01 U				0.01 U				0.01 U				0.01 U
Total cPAHs TEQ	0.1		NC	NC				NC				NC				NC

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	B-4-35	B-4-40	B-5-5	B-5-15	B-6-5	B-6-35	B-6-40	B-7-5	B-7-10	B-8-5	B-8-10	B-9-5	B-9-15	B-9-25	B-9-40
Sampling Date	Method A	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/12/2019	12/12/2019	12/12/2019	12/12/2019	12/12/2019	12/10/2019	12/10/2019	12/12/2019	12/12/2019	12/12/2019	12/12/2019
Sample Depth in feet	Cleanup	30 to 35	35 to 40	0 to 5	10 to 15	0 to 5	30 to 35	35 to 40	0 to 5	5 to 10	0 to 5	5 to 10	0 to 5	10 to 15	20 to 25	35 to 40
Sample Elevation in feet (NAVD 88)	Level ^a	730 to 725	725 to 720	762 to 757	752 to 747	762 to 757	732 to 727	727 to 722	762 to 757	757 to 752	761 to 756	756 to 751	761 to 756	751 to 746	741 to 736	726 to 721
Sample Elevation in feet (TCL)		726 to 721	721 to 716	758 to 753	748 to 743	758 to 753	728 to 723	723 to 718	758 to 753	753 to 748	757 to 752	752 to 747	757 to 752	747 to 742	737 to 732	722 to 717
TPH in mg/kg																
Diesel Range Organics	2000	50 U	50 U	730	50 U	2000	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Lube Oil	2000	250 U	250 U	2800	250 U	5600	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Gasoline Range Organics	30/100 ^d	7.3	5 U	82	5 U	93	5 U	5 U	5 U			5 U				5 U
Metals in mg/kg																
Arsenic	20															
Barium																
Cadmium	2															
Chromium	19/2000 ^c															
Lead	250															
Mercury	2															
Selenium																
Silver																
BTEX in mg/kg																
Benzene	0.03		0.02 U		0.02 U		0.02 U	0.02 U	0.02 U							0.02 U
Ethylbenzene	6		0.02 U		0.02 U		0.02 U	0.02 U	0.02 U							0.02 U
Toluene	7		0.02 U		0.02 U		0.02 U	0.02 U	0.02 U							0.02 U
Total Xylenes	9		0.06 U		0.06 U		0.06 U	0.06 U	0.06 U							0.06 U
PCBs in mg/kg																
PCB-aroclor 1016																
PCB-aroclor 1221																
PCB-aroclor 1232																
PCB-aroclor 1242																
PCB-aroclor 1248																
PCB-aroclor 1254																
PCB-aroclor 1260																
PCB-aroclor 1262																
PCB-aroclor 1268																
Total PCBs	1															
Volatiles in mg/kg																
1,1,1,2-Tetrachloroethane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,1,1-Trichloroethane	2	0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,1,2,2-Tetrachloroethane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,1,2-Trichloroethane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,1-Dichloroethane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,1-Dichloroethene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,1-Dichloropropene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,2,3-Trichlorobenzene		0.25 U		0.25 U		0.25 U		0.25 U				0.25 U				
1,2,3-Trichloropropane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,2,4-Trichlorobenzene		0.25 U		0.25 U		0.25 U		0.25 U				0.25 U				
1,2,4-Trimethylbenzene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,2-Dibromo-3-chloropropane		0.5 U		0.5 U		0.5 U		0.5 U				0.5 U				
1,2-Dibromoethane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,2-Dichlorobenzene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,2-Dichloroethane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,2-Dichloropropane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,3,5-Trimethylbenzene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,3-Dichlorobenzene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,3-Dichloropropane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
1,4-Dichlorobenzene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
2,2-Dichloropropane		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
2-Butanone		0.5 U		0.5 U		0.5 U		0.5 U				0.5 U				
2-Chlorotoluene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
2-Hexanone		0.5 U		0.5 U		0.5 U		0.5 U				0.5 U				
4-Chlorotoluene		0.05 U		0.05 U		0.05 U		0.05 U				0.05 U				
Acetone		0.5 U		0.5 U		0.5 U		0.5 U				0.5 U				
Benzene	0.03	0.03 U		0.03 U		0.03 U		0.03 U				0.03 U				

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	B-4-35	B-4-40	B-5-5	B-5-15	B-6-5	B-6-35	B-6-40	B-7-5	B-7-10	B-8-5	B-8-10	B-9-5	B-9-15	B-9-25	B-9-40
Sampling Date	Method A	12/11/2019	12/11/2019	12/11/2019	12/11/2019	12/12/2019	12/12/2019	12/12/2019	12/12/2019	12/12/2019	12/10/2019	12/10/2019	12/12/2019	12/12/2019	12/12/2019	12/12/2019
Sample Depth in feet	Cleanup	30 to 35	35 to 40	0 to 5	10 to 15	0 to 5	30 to 35	35 to 40	0 to 5	5 to 10	0 to 5	5 to 10	0 to 5	10 to 15	20 to 25	35 to 40
Sample Elevation in feet (NAVD 88)	Level ^a	730 to 725	725 to 720	762 to 757	752 to 747	762 to 757	732 to 727	727 to 722	762 to 757	757 to 752	761 to 756	756 to 751	761 to 756	751 to 746	741 to 736	726 to 721
Sample Elevation in feet (TCL)		726 to 721	721 to 716	758 to 753	748 to 743	758 to 753	728 to 723	723 to 718	758 to 753	753 to 748	757 to 752	752 to 747	757 to 752	747 to 742	737 to 732	722 to 717
Bromobenzene		0.05 U		0.05 U		0.05 U						0.05 U				
Bromoform		0.05 U		0.05 U		0.05 U						0.05 U				
Bromomethane		0.5 U		0.5 U		0.5 U						0.5 U				
Carbon tetrachloride		0.05 U		0.05 U		0.05 U						0.05 U				
CFC-11		0.5 U		0.5 U		0.5 U						0.5 U				
CFC-12		0.5 U		0.5 U		0.5 U						0.5 U				
Chlorobenzene		0.05 U		0.05 U		0.05 U						0.05 U				
Chloroethane		0.5 U		0.5 U		0.5 U						0.5 U				
Chloroform		0.05 U		0.05 U		0.05 U						0.05 U				
Chloromethane		0.5 U		0.5 U		0.5 U						0.5 U				
cis-1,2-Dichloroethene		0.05 U		0.05 U		0.05 U						0.05 U				
cis-1,3-Dichloropropene		0.05 U		0.05 U		0.05 U						0.05 U				
Dibromochloromethane		0.05 U		0.05 U		0.05 U						0.05 U				
Dibromomethane		0.05 U		0.05 U		0.05 U						0.05 U				
Dichlorobromomethane		0.05 U		0.05 U		0.05 U						0.05 U				
Ethylbenzene	6	0.05 U		0.05 U		0.05 U						0.05 U				
Hexachlorobutadiene		0.25 U		0.25 U		0.25 U						0.25 U				
Hexane		0.25 U		0.25 U		0.25 U						0.25 U				
Isopropylbenzene (Cumene)		0.05 U		0.05 U		0.05 U						0.05 U				
Methyl isobutyl ketone		0.5 U		0.5 U		0.5 U						0.5 U				
Methyl t-butyl ether	0.1	0.05 U		0.05 U		0.05 U						0.05 U				
Methylene chloride	0.02	0.5 U		0.51 lc		0.5 U						0.5 U				
Naphthalene	5	0.05 U		0.05 U		0.05 U						0.05 U				
n-Propylbenzene		0.05 U		0.05 U		0.05 U						0.05 U				
p-Isopropyltoluene		0.05 U		0.05 U		0.05 U						0.05 U				
sec-Butylbenzene		0.05 U		0.05 U		0.05 U						0.05 U				
Styrene		0.05 U		0.05 U		0.05 U						0.05 U				
tert-Butylbenzene		0.05 U		0.05 U		0.05 U						0.05 U				
Tetrachloroethene	0.05	0.025 U		0.025 U		0.025 U						0.025 U				
Toluene	7	0.05 U		0.05 U		0.05 U						0.05 U				
trans-1,2-Dichloroethene		0.05 U		0.05 U		0.05 U						0.05 U				
trans-1,3-Dichloropropene		0.05 U		0.05 U		0.05 U						0.05 U				
Trichloroethene	0.03	0.02 U		0.02 U		0.02 U						0.02 U				
Vinyl chloride		0.05 U		0.05 U		0.05 U						0.05 U				
m, p-Xylene		0.1 U		0.1 U		0.1 U						0.1 U				
o-Xylene		0.05 U		0.05 U		0.05 U						0.05 U				
Total Xylenes	9	0.1 U		0.1 U		0.1 U						0.1 U				
PAHs in mg/kg																
Acenaphthene		0.01 U				0.5 U		0.01 U								
Acenaphthylene		0.01 U				0.5 U		0.01 U								
Anthracene		0.01 U				0.5 U		0.01 U								
Benz[a]anthracene		0.01 U				0.5 U		0.01 U								
Benzo(a)pyrene	0.1	0.01 U				0.56		0.01 U								
Benzo(b)fluoranthene		0.01 U				0.5 U		0.01 U								
Benzo(ghi)perylene		0.01 U				0.5 U		0.01 U								
Benzo(k)fluoranthene		0.01 U				0.5 U		0.01 U								
Chrysene		0.01 U				0.97		0.01 U								
Dibenzo(a,h)anthracene		0.01 U				0.5 U		0.01 U								
Fluoranthene		0.01 U				0.5 U		0.01 U								
Fluorene		0.01 U				0.5 U		0.01 U								
Indeno(1,2,3-cd)pyrene		0.01 U				0.5 U		0.01 U								
Naphthalene	5	0.01 U				0.5 U		0.01 U								
Phenanthrene		0.01 U				0.5 U		0.01 U								
Pyrene		0.01 U				1.8		0.01 U								
Total cPAHs TEQ	0.1	NC				0.5697		NC								

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	B-10-30	B-10-35	TP-2-4	TP-2-8	TP-3-8	TP-3-12	TP-3-20	TP-5-5	TP-5-8	TP-5-10	TP-5-12	TP-5-15	TP-5-19	TP-6-5	TP-6-8	
Sampling Date	Method A	12/10/2019	12/10/2019	11/26/2019	11/26/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/6/2019	12/6/2019
Sample Depth in feet	Cleanup	25 to 30	30 to 35	0 to 4	4 to 8	5 to 8	8 to 12	15 to 20	2.5 to 5	5 to 8	8 to 10	10 to 12	12 to 15	15 to 19	0 to 5	5 to 8	
Sample Elevation in feet (NAVD 88)	Level ^a	737 to 732	732 to 727	760 to 756	756 to 752	752 to 749	749 to 745	742 to 737	755.5 to 753	753 to 750	750 to 748	748 to 746	746 to 743	743 to 739	762 to 757	757 to 754	
Sample Elevation in feet (TCL)		733 to 728	728 to 723	756 to 752	752 to 748	748 to 745	745 to 741	738 to 733	751.5 to 749	749 to 746	746 to 744	744 to 742	742 to 739	739 to 735	758 to 753	753 to 750	
TPH in mg/kg																	
Diesel Range Organics	2000	50 U	50 U	50 U	50 U	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	560 J	610 J	50 UJ	50 UJ	50 UJ	520	1300
Lube Oil	2000	250 U	250 U	250 U	250 U	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	650 J	1600 J	250 UJ	250 UJ	250 UJ	1600	3900
Gasoline Range Organics	30/100 ^d			5 U	5 U	5 UJ	5 UJ				160 J	930 J		5 UJ			38
Metals in mg/kg																	
Arsenic	20			1.74		1.02					1.05	1.72					
Barium				102		49.1					104	73.3					
Cadmium	2			1 U		1 U					1 U	1 U					
Chromium	19/2000 ^c			19.7 J		14 J					19.5 J	15.4 J					
Lead	250			3.21		1.96					11	15.8					
Mercury	2			1 U		1 U					1 U	1 U					
Selenium				1 U		1 U					1 U	1 U					
Silver				1 U		1 U					1 U	1 U					
BTEX in mg/kg																	
Benzene	0.03			0.02 U	0.02 U			0.02 UJ									
Ethylbenzene	6			0.02 U	0.02 U			0.02 UJ									
Toluene	7			0.02 U	0.02 U			0.02 UJ									
Total Xylenes	9			0.06 U	0.06 U			0.06 UJ									
PCBs in mg/kg																	
PCB-aroclor 1016												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1221												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1232												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1242												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1248												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1254												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1260												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1262												0.02 U		0.02 U		0.2 U	
PCB-aroclor 1268												0.02 U		0.02 U		0.2 U	
Total PCBs	1											0.02 U		0.02 U		0.2 U	
Volatiles in mg/kg																	
1,1,1,2-Tetrachloroethane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,1,1-Trichloroethane	2							0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,1,2,2-Tetrachloroethane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,1,2-Trichloroethane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,1-Dichloroethane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,1-Dichloroethene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,1-Dichloropropene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,2,3-Trichlorobenzene								0.25 UJ			0.25 UJ	0.25 UJ		0.25 UJ		0.25 U	
1,2,3-Trichloropropane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,2,4-Trichlorobenzene								0.25 UJ			0.25 UJ	0.25 UJ		0.25 UJ		0.25 U	
1,2,4-Trimethylbenzene								0.05 UJ			0.05 UJ	0.061 J		0.05 UJ		0.05 U	
1,2-Dibromo-3-chloropropane								0.5 UJ			0.5 UJ	0.5 UJ		0.5 UJ		0.5 U	
1,2-Dibromoethane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,2-Dichlorobenzene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,2-Dichloroethane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,2-Dichloropropane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,3,5-Trimethylbenzene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,3-Dichlorobenzene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,3-Dichloropropane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
1,4-Dichlorobenzene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
2,2-Dichloropropane								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
2-Butanone								0.5 UJ			0.5 UJ	0.5 UJ		0.5 UJ		0.5 U	
2-Chlorotoluene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
2-Hexanone								0.5 UJ			0.5 UJ	0.5 UJ		0.5 UJ		0.5 U	
4-Chlorotoluene								0.05 UJ			0.05 UJ	0.05 UJ		0.05 UJ		0.05 U	
Acetone								0.5 UJ			0.5 UJ	0.5 UJ		0.5 UJ		0.5 U	
Benzene	0.03							0.03 UJ			0.03 UJ	0.03 UJ		0.03 UJ		0.03 U	

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	B-10-30	B-10-35	TP-2-4	TP-2-8	TP-3-8	TP-3-12	TP-3-20	TP-5-5	TP-5-8	TP-5-10	TP-5-12	TP-5-15	TP-5-19	TP-6-5	TP-6-8
Sampling Date	Method A	12/10/2019	12/10/2019	11/26/2019	11/26/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/5/2019	12/6/2019	12/6/2019
Sample Depth in feet	Cleanup	25 to 30	30 to 35	0 to 4	4 to 8	5 to 8	8 to 12	15 to 20	2.5 to 5	5 to 8	8 to 10	10 to 12	12 to 15	15 to 19	0 to 5	5 to 8
Sample Elevation in feet (NAVD 88)	Level ^a	737 to 732	732 to 727	760 to 756	756 to 752	752 to 749	749 to 745	742 to 737	755.5 to 753	753 to 750	750 to 748	748 to 746	746 to 743	743 to 739	762 to 757	757 to 754
Sample Elevation in feet (TCL)		733 to 728	728 to 723	756 to 752	752 to 748	748 to 745	745 to 741	738 to 733	751.5 to 749	749 to 746	746 to 744	744 to 742	742 to 739	739 to 735	758 to 753	753 to 750
Bromobenzene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Bromoform						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Bromomethane						0.5 UJ				0.5 UJ	0.5 UJ			0.5 UJ		0.5 U
Carbon tetrachloride						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
CFC-11						0.5 UJ				0.5 UJ	0.5 UJ			0.5 UJ		0.5 U
CFC-12						0.5 UJ				0.5 UJ	0.5 UJ			0.5 UJ		0.5 U
Chlorobenzene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Chloroethane						0.5 UJ				0.5 UJ	0.5 UJ			0.5 UJ		0.5 U
Chloroform						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Chloromethane						0.5 UJ				0.5 UJ	0.5 UJ			0.5 UJ		0.5 U
cis-1,2-Dichloroethene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
cis-1,3-Dichloropropene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Dibromochloromethane						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Dibromomethane						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Dichlorobromomethane						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Ethylbenzene	6					0.05 UJ				0.05 UJ	0.11 J			0.05 UJ		0.05 U
Hexachlorobutadiene						0.25 UJ				0.25 UJ	0.25 UJ			0.25 UJ		0.25 U
Hexane						0.25 UJ				0.25 UJ	0.25 J			0.25 UJ		0.25 U
Isopropylbenzene (Cumene)						0.05 UJ				0.05 UJ	0.36 J			0.05 UJ		0.05 U
Methyl isobutyl ketone						0.5 UJ				0.5 UJ	0.5 UJ			0.5 UJ		0.5 U
Methyl t-butyl ether	0.1					0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Methylene chloride	0.02					0.53 lc				0.68 lc	0.5 UJ			0.5 UJ		1.1 lc
Naphthalene	5					0.05 UJ				0.05 UJ	0.079 J			0.05 UJ		0.05 U
n-Propylbenzene						0.05 UJ				0.075 J	0.52 J			0.05 UJ		0.05 U
p-Isopropyltoluene						0.05 UJ				0.05 UJ	0.067 J			0.05 UJ		0.05 U
sec-Butylbenzene						0.05 UJ				0.083 J	0.19 J			0.05 UJ		0.05 U
Styrene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
tert-Butylbenzene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Tetrachloroethene	0.05					0.025 UJ				0.025 UJ	0.025 UJ			0.025 UJ		0.025 U
Toluene	7					0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
trans-1,2-Dichloroethene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
trans-1,3-Dichloropropene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Trichloroethene	0.03					0.02 UJ				0.02 UJ	0.02 UJ			0.02 UJ		0.02 U
Vinyl chloride						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
m, p-Xylene						0.1 UJ				0.1 UJ	0.1 UJ			0.1 UJ		0.1 U
o-Xylene						0.05 UJ				0.05 UJ	0.05 UJ			0.05 UJ		0.05 U
Total Xylenes	9															0.1 U
PAHs in mg/kg																
Acenaphthene											0.02 J			0.01 UJ		
Acenaphthylene											0.01 UJ			0.01 UJ		
Anthracene											0.01 UJ			0.01 UJ		
Benz[a]anthracene											0.01 UJ			0.01 UJ		
Benzo(a)pyrene	0.1										0.01 UJ			0.01 UJ		
Benzo(b)fluoranthene											0.01 UJ			0.01 UJ		
Benzo(ghi)perylene											0.01 UJ			0.01 UJ		
Benzo(k)fluoranthene											0.01 UJ			0.01 UJ		
Chrysene											0.01 UJ			0.01 UJ		
Dibenzo(a,h)anthracene											0.01 UJ			0.01 UJ		
Fluoranthene											0.011			0.01 UJ		
Fluorene											0.064			0.01 UJ		
Indeno(1,2,3-cd)pyrene											0.01 UJ			0.01 UJ		
Naphthalene	5										0.01 UJ			0.01 UJ		
Phenanthrene											0.1 J			0.01 UJ		
Pyrene											0.022 J			0.01 UJ		
Total cPAHs TEQ	0.1										NC			NC		

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	TP-6-12	TP-7-2.5	TP-7-7.5	TP-7-10	TP-7-15	TP-8-3.5	TP-8-6	TP-8-15	TP-10-5	TP-10-15	TP-10-18	TP-11-5	TP-11-16.5	TP-12-2.5	TP-12-4
Sampling Date	Method A	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019
Sample Depth in feet	Cleanup	10 to 12	0 to 2.5	5 to 7.5	7.5 to 10	10 to 15	0 to 3.5	3.5 to 6	10.5 to 15	0 to 5	10 to 15	15 to 18	0 to 5	15 to 16.5	0 to 2.5	2.5 to 4
Sample Elevation in feet (NAVD 88)	Level ^a	752 to 750	761 to 758.5	756 to 753.5	753.5 to 751	751 to 746	762 to 758.5	758.5 to 756	751.5 to 747	761 to 756	751 to 746	746 to 743	762 to 757	747 to 745.5	762 to 759.5	759.5 to 758
Sample Elevation in feet (TCL)		748 to 746	757 to 754.5	752 to 749.5	749.5 to 747	747 to 742	758 to 754.5	754.5 to 752	747.5 to 743	757 to 752	747 to 742	742 to 739	758 to 753	743 to 741.5	758 to 755.5	755.5 to 754
TPH in mg/kg																
Diesel Range Organics	2000	50 U	39000 J	12000	6200	230	78	600	50 U	50 U	50 U	50 U	50 U	50 U	340	50 U
Lube Oil	2000	250 U	26000 J	3100	1900	250 U	570	1500	250 U	250 U	250 U	250 U	250 U	250 U	2100	250 U
Gasoline Range Organics	30/100 ^d			570		5 U	14		5 U	5 U					5 U	
Metals in mg/kg																
Arsenic	20						1.79			1.53					3.73	
Barium							107			72.7					82.4	
Cadmium	2						1 U			1 U					1.33	
Chromium	19/2000 ^c						13.9 J			16.7 J					14.3 J	
Lead	250						12			6.15					85.2	
Mercury	2						1 U			1 U					1 U	
Selenium							1 U			1 U					1 U	
Silver							1 U			1 U					1 U	
BTEX in mg/kg																
Benzene	0.03															
Ethylbenzene	6															
Toluene	7															
Total Xylenes	9															
PCBs in mg/kg																
PCB-aroclor 1016				0.2 U												
PCB-aroclor 1221				0.2 U												
PCB-aroclor 1232				0.2 U												
PCB-aroclor 1242				0.2 U												
PCB-aroclor 1248				0.2 U												
PCB-aroclor 1254				0.2 U												
PCB-aroclor 1260				0.2 U												
PCB-aroclor 1262				0.2 U												
PCB-aroclor 1268				0.2 U												
Total PCBs	1			0.2 U												
Volatiles in mg/kg																
1,1,1,2-Tetrachloroethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,1,1-Trichloroethane	2			0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,1,2,2-Tetrachloroethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,1,2-Trichloroethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,1-Dichloroethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,1-Dichloroethene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,1-Dichloropropene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,2,3-Trichlorobenzene				0.25 U		0.25 U		0.25 U	0.25 U	0.25 U	0.25 U				0.25 U	
1,2,3-Trichloropropane				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				0.25 U		0.25 U		0.25 U	0.25 U	0.25 U	0.25 U				0.25 U	
1,2,4-Trimethylbenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,2-Dibromo-3-chloropropane				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U	0.5 U				0.5 U	
1,2-Dibromoethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,2-Dichlorobenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,2-Dichloroethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,2-Dichloropropane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,3,5-Trimethylbenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,3-Dichlorobenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,3-Dichloropropane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
1,4-Dichlorobenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
2,2-Dichloropropane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
2-Butanone				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U	0.5 U				0.5 U	
2-Chlorotoluene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
2-Hexanone				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U	0.5 U				0.5 U	
4-Chlorotoluene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U				0.05 U	
Acetone				0.5 U		0.5 U		0.51	0.5 U	0.5 U	0.5 U				0.5 U	
Benzene	0.03			0.03 U		0.03 U		0.03 U	0.03 U	0.03 U	0.03 U				0.03 U	

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	TP-6-12	TP-7-2.5	TP-7-7.5	TP-7-10	TP-7-15	TP-8-3.5	TP-8-6	TP-8-15	TP-10-5	TP-10-15	TP-10-18	TP-11-5	TP-11-16.5	TP-12-2.5	TP-12-4
Sampling Date	Method A	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/6/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019	12/9/2019
Sample Depth in feet	Cleanup	10 to 12	0 to 2.5	5 to 7.5	7.5 to 10	10 to 15	0 to 3.5	3.5 to 6	10.5 to 15	0 to 5	10 to 15	15 to 18	0 to 5	15 to 16.5	0 to 2.5	2.5 to 4
Sample Elevation in feet (NAVD 88)	Level ^a	752 to 750	761 to 758.5	756 to 753.5	753.5 to 751	751 to 746	762 to 758.5	758.5 to 756	751.5 to 747	761 to 756	751 to 746	746 to 743	762 to 757	747 to 745.5	762 to 759.5	759.5 to 758
Sample Elevation in feet (TCL)		748 to 746	757 to 754.5	752 to 749.5	749.5 to 747	747 to 742	758 to 754.5	754.5 to 752	747.5 to 743	757 to 752	747 to 742	742 to 739	758 to 753	743 to 741.5	758 to 755.5	755.5 to 754
Bromobenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Bromoform				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Bromomethane				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U						0.5 U
Carbon tetrachloride				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
CFC-11				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U						0.5 U
CFC-12				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U						0.5 U
Chlorobenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Chloroethane				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U						0.5 U
Chloroform				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Chloromethane				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U						0.5 U
cis-1,2-Dichloroethene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
cis-1,3-Dichloropropene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Dibromochloromethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Dibromomethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Dichlorobromomethane				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Ethylbenzene	6			0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Hexachlorobutadiene				0.25 U		0.25 U		0.25 U	0.25 U	0.25 U						0.25 U
Hexane				0.25 U		0.25 U		0.25 U	0.25 U	0.25 U						0.25 U
Isopropylbenzene (Cumene)				0.05 U		0.14		0.05 U	0.05 U	0.05 U						0.05 U
Methyl isobutyl ketone				0.5 U		0.5 U		0.5 U	0.5 U	0.5 U						0.5 U
Methyl t-butyl ether	0.1			0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Methylene chloride	0.02			0.5 U		0.5 U		0.5 U	0.54 lc	0.96 lc						0.71 lc
Naphthalene	5			0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
n-Propylbenzene				0.05 U		0.27		0.05 U	0.05 U	0.05 U						0.05 U
p-Isopropyltoluene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
sec-Butylbenzene				0.05 U		0.15		0.05 U	0.05 U	0.05 U						0.05 U
Styrene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
tert-Butylbenzene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Tetrachloroethene	0.05			0.025 U		0.025 U		0.025 U	0.025 U	0.025 U						0.025 U
Toluene	7			0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
trans-1,2-Dichloroethene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
trans-1,3-Dichloropropene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Trichloroethene	0.03			0.02 U		0.02 U		0.02 U	0.02 U	0.02 U						0.02 U
Vinyl chloride				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
m, p-Xylene				0.1 U		0.1 U		0.1 U	0.1 U	0.1 U						0.1 U
o-Xylene				0.05 U		0.05 U		0.05 U	0.05 U	0.05 U						0.05 U
Total Xylenes	9			0.1 U		0.1 U		0.1 U	0.1 U	0.1 U						0.1 U
PAHs in mg/kg																
Acenaphthene				1.6		0.01 U										
Acenaphthylene				0.5 U		0.01 U										
Anthracene				0.5 U		0.01 U										
Benz[a]anthracene				0.5 U		0.01 U										
Benzo(a)pyrene	0.1			0.5 U		0.01 U										
Benzo(b)fluoranthene				0.5 U		0.01 U										
Benzo(ghi)perylene				0.5 U		0.01 U										
Benzo(k)fluoranthene				0.5 U		0.01 U										
Chrysene				0.5 U		0.01 U										
Dibenzo(a,h)anthracene				0.5 U		0.01 U										
Fluoranthene				0.5 U		0.01 U										
Fluorene				4.4		0.013										
Indeno(1,2,3-cd)pyrene				0.5 U		0.01 U										
Naphthalene	5			0.5 U		0.01 U										
Phenanthrene				5.3		0.041										
Pyrene				0.5 U		0.01 U										
Total cPAHs TEQ	0.1			NC		NC										

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	TP-13-2.5	TP-14-10	TP-15-4	TP-15-6	TP-15-8	TP-15-14
Sampling Date	Method A	11/26/2019	11/26/2019	11/26/2019	11/26/2019	11/26/2019	11/26/2019
Sample Depth in feet	Cleanup	0 to 2.5	5 to 10	0 to 4	4 to 6	6 to 8	11 to 14
Sample Elevation in feet (NAVD 88)	Level ^a	737 to 734.5	756 to 751	760 to 756	756 to 754	754 to 752	749 to 746
Sample Elevation in feet (TCL)		733 to 730.5	752 to 747	756 to 752	752 to 750	750 to 748	745 to 742
TPH in mg/kg							
Diesel Range Organics	2000	50 U	50 U	210	50 U	50 U	50 U
Lube Oil	2000	250 U	250 U	2500	250 U	250 U	250 U
Gasoline Range Organics	30/100 ^d	5 U	5 U	5 U	5 U	5 U	5 U
Metals in mg/kg							
Arsenic	20	2.67		2.57			
Barium		68.3		84.6			
Cadmium	2	1 U		1 U			
Chromium	19/2000 ^c	16.4 J		13.6 J			
Lead	250	2.94		51			
Mercury	2	1 U		1 U			
Selenium		1 U		1 U			
Silver		1 U		1 U			
BTEX in mg/kg							
Benzene	0.03			0.02 U	0.02 U		0.02 U
Ethylbenzene	6			0.02 U	0.02 U		0.02 U
Toluene	7			0.02 U	0.02 U		0.02 U
Total Xylenes	9			0.06 U	0.06 U		0.06 U
PCBs in mg/kg							
PCB-aroclor 1016				0.02 U		0.02 U	
PCB-aroclor 1221				0.02 U		0.02 U	
PCB-aroclor 1232				0.02 U		0.02 U	
PCB-aroclor 1242				0.02 U		0.02 U	
PCB-aroclor 1248				0.02 U		0.02 U	
PCB-aroclor 1254				0.049		0.02 U	
PCB-aroclor 1260				0.02 U		0.02 U	
PCB-aroclor 1262				0.02 U		0.02 U	
PCB-aroclor 1268				0.02 U		0.02 U	
Total PCBs	1			0.049		0.02 U	
Volatiles in mg/kg							
1,1,1,2-Tetrachloroethane		0.05 U	0.05 U			0.05 U	
1,1,1-Trichloroethane	2	0.05 U	0.05 U			0.05 U	
1,1,2,2-Tetrachloroethane		0.05 U	0.05 U			0.05 U	
1,1,2-Trichloroethane		0.05 U	0.05 U			0.05 U	
1,1-Dichloroethane		0.05 U	0.05 U			0.05 U	
1,1-Dichloroethene		0.05 U	0.05 U			0.05 U	
1,1-Dichloropropene		0.05 U	0.05 U			0.05 U	
1,2,3-Trichlorobenzene		0.25 U	0.25 U			0.25 U	
1,2,3-Trichloropropane		0.05 U	0.05 U			0.05 U	
1,2,4-Trichlorobenzene		0.25 U	0.25 U			0.25 U	
1,2,4-Trimethylbenzene		0.05 U	0.05 U			0.05 U	
1,2-Dibromo-3-chloropropane		0.5 U	0.5 U			0.5 U	
1,2-Dibromoethane		0.05 U	0.05 U			0.05 U	
1,2-Dichlorobenzene		0.05 U	0.05 U			0.05 U	
1,2-Dichloroethane		0.05 U	0.05 U			0.05 U	
1,2-Dichloropropane		0.05 U	0.05 U			0.05 U	
1,3,5-Trimethylbenzene		0.05 U	0.05 U			0.05 U	
1,3-Dichlorobenzene		0.05 U	0.05 U			0.05 U	
1,3-Dichloropropane		0.05 U	0.05 U			0.05 U	
1,4-Dichlorobenzene		0.05 U	0.05 U			0.05 U	
2,2-Dichloropropane		0.05 U	0.05 U			0.05 U	
2-Butanone		0.5 U	0.5 U			0.5 U	
2-Chlorotoluene		0.05 U	0.05 U			0.05 U	
2-Hexanone		0.5 U	0.5 U			0.5 U	
4-Chlorotoluene		0.05 U	0.05 U			0.05 U	
Acetone		0.5 U	0.5 U			0.5 U	
Benzene	0.03	0.03 U	0.03 U			0.03 U	

Table 2 - Analytical Results for Soil Boring and Test Pit Samples

Sample ID	MTCA	TP-13-2.5	TP-14-10	TP-15-4	TP-15-6	TP-15-8	TP-15-14
Sampling Date	Method A	11/26/2019	11/26/2019	11/26/2019	11/26/2019	11/26/2019	11/26/2019
Sample Depth in feet	Cleanup	0 to 2.5	5 to 10	0 to 4	4 to 6	6 to 8	11 to 14
Sample Elevation in feet (NAVD 88)	Level ^a	737 to 734.5	756 to 751	760 to 756	756 to 754	754 to 752	749 to 746
Sample Elevation in feet (TCL)		733 to 730.5	752 to 747	756 to 752	752 to 750	750 to 748	745 to 742
Bromobenzene		0.05 U	0.05 U			0.05 U	
Bromoform		0.05 U	0.05 U			0.05 U	
Bromomethane		0.5 U	0.5 U			0.5 U	
Carbon tetrachloride		0.05 U	0.05 U			0.05 U	
CFC-11		0.5 U	0.5 U			0.5 U	
CFC-12		0.5 U	0.5 U			0.5 U	
Chlorobenzene		0.05 U	0.05 U			0.05 U	
Chloroethane		0.5 U	0.5 U			0.5 U	
Chloroform		0.05 U	0.05 U			0.05 U	
Chloromethane		0.5 U	0.5 U			0.5 U	
cis-1,2-Dichloroethene		0.05 U	0.05 U			0.05 U	
cis-1,3-Dichloropropene		0.05 U	0.05 U			0.05 U	
Dibromochloromethane		0.05 U	0.05 U			0.05 U	
Dibromomethane		0.05 U	0.05 U			0.05 U	
Dichlorobromomethane		0.05 U	0.05 U			0.05 U	
Ethylbenzene	6	0.05 U	0.05 U			0.05 U	
Hexachlorobutadiene		0.25 U	0.25 U			0.25 U	
Hexane		0.25 U	0.25 U			0.25 U	
Isopropylbenzene (Cumene)		0.05 U	0.05 U			0.05 U	
Methyl isobutyl ketone		0.5 U	0.5 U			0.5 U	
Methyl t-butyl ether	0.1	0.05 U	0.05 U			0.05 U	
Methylene chloride	0.02	0.5 U	0.5 U			0.5 U	
Naphthalene	5	0.05 U	0.05 U			0.05 U	
n-Propylbenzene		0.05 U	0.05 U			0.05 U	
p-Isopropyltoluene		0.05 U	0.05 U			0.05 U	
sec-Butylbenzene		0.05 U	0.05 U			0.05 U	
Styrene		0.05 U	0.05 U			0.05 U	
tert-Butylbenzene		0.05 U	0.05 U			0.05 U	
Tetrachloroethene	0.05	0.025 U	0.025 U			0.025 U	
Toluene	7	0.05 U	0.05 U			0.05 U	
trans-1,2-Dichloroethene		0.05 U	0.05 U			0.05 U	
trans-1,3-Dichloropropene		0.05 U	0.05 U			0.05 U	
Trichloroethene	0.03	0.02 U	0.02 U			0.02 U	
Vinyl chloride		0.05 U	0.05 U			0.05 U	
m, p-Xylene		0.1 U	0.1 U			0.1 U	
o-Xylene		0.05 U	0.05 U			0.05 U	
Total Xylenes	9	0.1 U	0.1 U			0.1 U	
PAHs in mg/kg							
Acenaphthene				0.5 UJ			
Acenaphthylene				0.5 UJ			
Anthracene				0.5 UJ			
Benz[a]anthracene				0.5 UJ			
Benzo(a)pyrene	0.1			0.5 UJ			
Benzo(b)fluoranthene				0.5 UJ			
Benzo(ghi)perylene				0.5 UJ			
Benzo(k)fluoranthene				0.5 UJ			
Chrysene				0.5 UJ			
Dibenzo(a,h)anthracene				0.5 UJ			
Fluoranthene				0.5 UJ			
Fluorene				0.5 UJ			
Indeno(1,2,3-cd)pyrene				0.5 UJ			
Naphthalene	5			0.5 UJ			
Phenanthrene				0.5 UJ			
Pyrene				0.5 UJ			
Total cPAHs TEQ	0.1			NC			

U = Not detected at detection limit indicated.
 J = Estimated.
 NC = Not calculated.
 lc = Potential interference with laboratory cleaning solution.
 a. Method A soil cleanup level for unrestricted land use.
 b. 30 mg/kg when benzene is present; 100 when benzene is not detected.
 c. 19 mg/kg as Chromium VI/2000 mg/kg as Chromium III.
 Detected concentrations are bolded.
 Concentrations that exceed cleanup level are shaded.

Table 3 - Analytical Results for Creek Bed and Bank Samples

Sample ID	MTCA	Creekbed 1	LB-1	LB-2	LB-3	UB-1
Sampling Date	Method A	12/13/2019	12/16/2019	12/16/2019	12/16/2019	12/18/2019
Sample Depth in feet	Cleanup	0 to 0.3	0 to 0.3	0 to 0.3	0 to 0.3	0 to 0.3
Sample Elevation in feet (NAVD 88)	Level ^a	721 to 720.7	723 to 722.7	723 to 722.7	723 to 722.7	750 to 749.7
Sample Elevation in feet (TCL)		717 to 716.7	719 to 718.2	719 to 718.2	719 to 718.2	746 to 745.7
TPH in mg/kg						
Diesel Range Organics	2000	6100	50 U	3800	50 U	50 U
Lube Oil	2000	7600	250 U	3700	250 U	250 U
Gasoline Range Organics	30/100 ^b	25 U	5 U	73	5 U	5 U
Metals in mg/kg						
Arsenic	20					
Barium						
Cadmium	2					
Chromium	19/2000 ^c					
Lead	250					
Mercury	2					
Selenium						
Silver						
PCBs in mg/kg						
PCB-aroclor 1016		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1221		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1232		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1242		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1248		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1254		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1260		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1262		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PCB-aroclor 1268		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Total PCBs	1	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Volatiles in mg/kg						
1,1,1,2-Tetrachloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,1-Trichloroethane	2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,2,2-Tetrachloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,2-Trichloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1-Dichloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1-Dichloroethene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1-Dichloropropene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2,3-Trichlorobenzene		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,3-Trichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2,4-Trichlorobenzene		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-Trimethylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dibromo-3-chloropropane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,3,5-Trimethylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,3-Dichlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,3-Dichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,4-Dichlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
2,2-Dichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
2-Butanone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
2-Hexanone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Chlorotoluene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Acetone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	0.03	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Bromobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromoform		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromomethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CFC-11		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CFC-12		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 3 - Analytical Results for Creek Bed and Bank Samples

Sample ID	MTCA	Creekbed 1	LB-1	LB-2	LB-3	UB-1
Sampling Date	Method A	12/13/2019	12/16/2019	12/16/2019	12/16/2019	12/18/2019
Sample Depth in feet	Cleanup	0 to 0.3	0 to 0.3	0 to 0.3	0 to 0.3	0 to 0.3
Sample Elevation in feet (NAVD 88)	Level ^a	721 to 720.7	723 to 722.7	723 to 722.7	723 to 722.7	750 to 749.7
Sample Elevation in feet (TCL)		717 to 716.7	719 to 718.2	719 to 718.2	719 to 718.2	746 to 745.7
Chloroform		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloromethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
cis-1,3-Dichloropropene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dibromochloromethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dibromomethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dichlorobromomethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethylbenzene	6	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Hexachlorobutadiene		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Hexane		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene (Cumene)		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methyl isobutyl ketone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl t-butyl ether	0.1	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methylene chloride	0.02	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Naphthalene	5	0.069	0.05 U	0.05 U	0.05 U	0.05 U
n-Propylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
p-Isopropyltoluene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
sec-Butylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Styrene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
tert-Butylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Tetrachloroethene	0.05	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Toluene	7	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,3-Dichloropropene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Trichloroethene	0.03	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Vinyl chloride		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
m, p-Xylene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
o-Xylene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Total Xylenes	9	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PAHs in mg/kg						
Acenaphthene		3.4	0.01 U	0.48	0.05 U	0.05 U
Acenaphthylene		1 U	0.01 U	0.05 U	0.05 U	0.05 U
Anthracene		5.2	0.01 U	0.78	0.05 U	0.05 U
Benz[a]anthracene		5.9	0.01 U	0.51	0.05 U	0.05 U
Benzo(a)pyrene	0.1	3	0.01 U	0.21	0.05 U	0.05 U
Benzo(b)fluoranthene		1.1	0.01 U	0.11	0.05 U	0.05 U
Benzo(ghi)perylene		1 U	0.01 U	0.05 U	0.05 U	0.05 U
Benzo(k)fluoranthene		1 U	0.01 U	0.05 U	0.05 U	0.05 U
Chrysene		9.5	0.01 U	0.83	0.05 U	0.05 U
Dibenzo(a,h)anthracene		1 U	0.01 U	0.05 U	0.05 U	0.05 U
Fluoranthene		2.2	0.01 U	0.23	0.05 U	0.05 U
Fluorene		5.7	0.01 U	0.79	0.05 U	0.05 U
Indeno(1,2,3-cd)pyrene		1 U	0.01 U	0.05 U	0.05 U	0.05 U
Naphthalene	5	1 U	0.01 U	0.05 U	0.05 U	0.05 U
Phenanthrene		19	0.01 U	2.8	0.05 U	0.05 U
Pyrene		19	0.01 U	1.9	0.05 U	0.05 U
Total cPAHs TEQ	0.1	3.795	NC	0.2803	NC	NC

Table 3 - Analytical Results for Creek Bed and Bank Samples

Sample ID	MTCA	UB-2	UB-3	Westbank 1	Westbank 2	Westbank 3
Sampling Date	Method A	12/18/2019	12/18/2019	12/17/2019	12/17/2019	12/17/2019
Sample Depth in feet	Cleanup	0 to 0.3	0 to 0.3	0 to 2.3	0 to 2	0 to 1.5
Sample Elevation in feet (NAVD 88)	Level ^a	750 to 749.7	750 to 749.7	725 to 722.7	724 to 722	724 to 722.5
Sample Elevation in feet (TCL)		746 to 745.7	746 to 745.7	721 to 718.7	720 to 718	720 to 718.5
TPH in mg/kg						
Diesel Range Organics	2000	50 U	90	50 U	50 U	50 U
Lube Oil	2000	250 U	250 U	250 U	250 U	250 U
Gasoline Range Organics	30/100 ^b	12	5 U	5 U	5 U	5 U
Metals in mg/kg						
Arsenic	20			1.29	2.63	1.51
Barium				28.3	80	58.7
Cadmium	2			1 U	1 U	1 U
Chromium	19/2000 ^c			7.85 J	17.1 J	11.7 J
Lead	250			1.93	3.83	2.41
Mercury	2			1 U	1 U	1 U
Selenium				1 U	1 U	1 U
Silver				1 U	1 U	1 U
PCBs in mg/kg						
PCB-aroclor 1016		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1221		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1232		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1242		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1248		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1254		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1260		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1262		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
PCB-aroclor 1268		0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
Total PCBs	1	0.02 U	0.02 U	0.02 U	0.2 U	0.2 U
Volatiles in mg/kg						
1,1,1,2-Tetrachloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,1-Trichloroethane	2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,2,2-Tetrachloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,2-Trichloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1-Dichloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1-Dichloroethene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1-Dichloropropene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2,3-Trichlorobenzene		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,3-Trichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2,4-Trichlorobenzene		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2,4-Trimethylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dibromo-3-chloropropane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,3,5-Trimethylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,3-Dichlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,3-Dichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,4-Dichlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
2,2-Dichloropropane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
2-Butanone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
2-Hexanone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Chlorotoluene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Acetone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	0.03	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Bromobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromoform		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromomethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CFC-11		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CFC-12		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 3 - Analytical Results for Creek Bed and Bank Samples

Sample ID	MTCA	UB-2	UB-3	Westbank 1	Westbank 2	Westbank 3
Sampling Date	Method A	12/18/2019	12/18/2019	12/17/2019	12/17/2019	12/17/2019
Sample Depth in feet	Cleanup	0 to 0.3	0 to 0.3	0 to 2.3	0 to 2	0 to 1.5
Sample Elevation in feet (NAVD 88)	Level ^a	750 to 749.7	750 to 749.7	725 to 722.7	724 to 722	724 to 722.5
Sample Elevation in feet (TCL)		746 to 745.7	746 to 745.7	721 to 718.7	720 to 718	720 to 718.5
Chloroform		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloromethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
cis-1,3-Dichloropropene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dibromochloromethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dibromomethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dichlorobromomethane		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethylbenzene	6	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Hexachlorobutadiene		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Hexane		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene (Cumene)		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methyl isobutyl ketone		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl t-butyl ether	0.1	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methylene chloride	0.02	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Naphthalene	5	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
n-Propylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
p-Isopropyltoluene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
sec-Butylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Styrene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
tert-Butylbenzene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Tetrachloroethene	0.05	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Toluene	7	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,3-Dichloropropene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Trichloroethene	0.03	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Vinyl chloride		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
m, p-Xylene		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
o-Xylene		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Total Xylenes	9	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PAHs in mg/kg						
Acenaphthene		0.01 U	0.051	0.01 U	0.01 U	0.01 U
Acenaphthylene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Anthracene		0.012	0.067	0.01 U	0.01 U	0.01 U
Benz[a]anthracene		0.01 U	0.065	0.01 U	0.01 U	0.01 U
Benzo(a)pyrene	0.1	0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Benzo(b)fluoranthene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Benzo(ghi)perylene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Benzo(k)fluoranthene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Chrysene		0.016	0.077	0.01 U	0.01 U	0.01 U
Dibenzo(a,h)anthracene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Fluoranthene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Fluorene		0.015	0.093	0.01 U	0.01 U	0.01 U
Indeno(1,2,3-cd)pyrene		0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Naphthalene	5	0.01 U	0.05 U	0.01 U	0.01 U	0.01 U
Phenanthrene		0.049	0.28	0.01 U	0.01 U	0.01 U
Pyrene		0.027	0.2	0.01 U	0.01 U	0.01 U
Total cPAHs TEQ	0.1	0.00016	0.00727	NC	NC	NC

U = Not detected at detection limit indicated.

J = Estimated.

a. Method A soil cleanup level for unrestricted land use.

b. 30 mg/kg when benzene is present; 100 when benzene is not detected.

c. 19 mg/kg as Chromium VI/2000 mg/kg as Chromium III.

Detected concentrations are bolded.

Concentrations that exceed cleanup level are shaded.

Table 4 - Analytical Results for Grab Groundwater Samples

Sample ID	MTCA	B-4-W	B-6-W	B-7-W	B-9-W
Sampling Date	Method A	12/11/2019	12/12/2019	12/12/2019	12/12/2019
Depth to Water in feet		38	40.65	37.2	47.1
Field Turbidity in NTU		1270	2103	1182	580
Total Susp. Solids in mg/L		19000			
TPH in µg/L					
Diesel Range Organics	500	150	50 U	50 U	70 U
Lube Oil	800/1000 ^a	350 U	250 U	250 U	350 U
Gasoline Range Organics	500	100 U	100 U	100 U	100 U
Total Metals in µg/L					
Arsenic	5	37	11.6		
Barium		2420 J	242		
Cadmium	5	6.22	1 U		
Chromium	50	334 J	40.8 J		
Lead	15	128 J	8.69		
Mercury	2	1 UJ	1 U		
Selenium		1 U	1 U		
Silver		1 U	1 U		
PCBs in µg/L					
PCB-aroclor 1016		0.1 U			
PCB-aroclor 1221		0.1 U			
PCB-aroclor 1232		0.1 U			
PCB-aroclor 1242		0.1 U			
PCB-aroclor 1248		0.1 U			
PCB-aroclor 1254		0.1 U			
PCB-aroclor 1260		0.1 U			
PCB-aroclor 1262		0.1 U			
PCB-aroclor 1268		0.1 U			
Total PCBs		0.1 U			
Volatiles in µg/L					
1,1,1,2-Tetrachloroethane		1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	1 U
1,1,2-Trichloroethane		1 U	1 U	1 U	1 U
1,1-Dichloroethane		1 U	1 U	1 U	1 U
1,1-Dichloroethene		1 U	1 U	1 U	1 U
1,1-Dichloropropene		1 U	1 U	1 U	1 U
1,2,3-Trichlorobenzene		1 U	1 U	1 U	1 U
1,2,3-Trichloropropane		1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene		1 U	1 U	1 U	1 U
1,2,4-Trimethylbenzene		1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane		10 U	10 U	10 U	10 U
1,2-Dibromoethane	0.01	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene		1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	1 U	1 U	1 U	1 U
1,2-Dichloropropane		1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene		1 U	1 U	1 U	1 U
1,3-Dichlorobenzene		1 U	1 U	1 U	1 U
1,3-Dichloropropane		1 U	1 U	1 U	1 U
1,4-Dichlorobenzene		1 U	1 U	1 U	1 U
2,2-Dichloropropane		1 U	1 U	1 U	1 U
2-Butanone		10 U	10 U	10 U	10 U
2-Chlorotoluene		1 U	1 U	1 U	1 U
2-Hexanone		10 U	10 U	10 U	10 U
4-Chlorotoluene		1 U	1 U	1 U	1 U
Acetone		50 U	50 U	50 U	50 U
Benzene	5	0.35 U	0.35 U	0.35 U	0.35 U
Bromobenzene		1 U	1 U	1 U	1 U
Bromoform		1 U	1 U	1 U	1 U

Table 4 - Analytical Results for Grab Groundwater Samples

Sample ID	MTCA	B-4-W	B-6-W	B-7-W	B-9-W
Sampling Date	Method A	12/11/2019	12/12/2019	12/12/2019	12/12/2019
Depth to Water in feet		38	40.65	37.2	47.1
Bromomethane		1 U	1 U	1 U	1 U
Carbon tetrachloride		1 U	1 U	1 U	1 U
CFC-11		1 U	1 U	1 U	1 U
CFC-12		1 U	1 U	1 U	1 U
Chlorobenzene		1 U	1 U	1 U	1 U
Chloroethane		1 U	1 U	1 U	1 U
Chloroform		1 U	1 U	1 U	1 U
Chloromethane		10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene		1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene		1 U	1 U	1 U	1 U
Dibromochloromethane		1 U	1 U	1 U	1 U
Dibromomethane		1 U	1 U	1 U	1 U
Dichlorobromomethane		1 U	1 U	1 U	1 U
Ethylbenzene	700	1 U	1 U	1 U	1 U
Hexachlorobutadiene		1 U	1 U	1 U	1 U
Hexane		1 U	1 U	1 U	1 U
Isopropylbenzene (Cumene)		1 U	1 U	1 U	1 U
m, p-Xylene		2 U	2 U	2 U	2 U
Methyl isobutyl ketone		10 U	10 U	10 U	10 U
Methyl t-butyl ether	20	1 U	1 U	1 U	1 U
Methylene chloride	5	5 U	5 U	5 U	5 U
Naphthalene		1 U	1 U	1 U	1 U
n-Propylbenzene		1 U	1 U	1 U	1 U
o-Xylene		1 U	1 U	1 U	1 U
p-Isopropyltoluene		1 U	1 U	1 U	1 U
sec-Butylbenzene		1 U	1 U	1 U	1 U
Styrene		1 U	1 U	1 U	1 U
tert-Butylbenzene		1 U	1 U	1 U	1 U
Tetrachloroethene	5	1 U	1 U	1 U	1 U
Toluene	1000	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene		1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene		1 U	1 U	1 U	1 U
Trichloroethene	5	1 U	1 U	1 U	1 U
Vinyl chloride	0.2	0.2 U	0.2 U	0.2 U	0.2 U
PAHs in µg/L					
Acenaphthene		0.04 U	0.04 U	0.04 U	0.04 U
Acenaphthylene		0.04 U	0.04 U	0.04 U	0.04 U
Anthracene		0.04 U	0.04 U	0.04 U	0.04 U
Benz[a]anthracene		0.04 U	0.04 U	0.04 U	0.04 U
Benzo(a)pyrene	0.1	0.04 U	0.04 U	0.04 U	0.04 U
Benzo(b)fluoranthene		0.04 U	0.04 U	0.04 U	0.04 U
Benzo(ghi)perylene		0.04 U	0.04 U	0.04 U	0.04 U
Benzo(k)fluoranthene		0.04 U	0.04 U	0.04 U	0.04 U
Chrysene		0.04 U	0.047	0.04 U	0.04 U
Dibenzo(a,h)anthracene		0.04 U	0.04 U	0.04 U	0.04 U
Fluoranthene		0.071	0.18	0.04 U	0.04 U
Fluorene		0.04 U	0.04 U	0.04 U	0.04 U
Indeno(1,2,3-cd)pyrene		0.04 U	0.04 U	0.04 U	0.04 U
Naphthalene	160	0.4 U	0.4 U	0.4 U	0.4 U
Phenanthrene		0.12	0.19	0.04 U	0.072
Pyrene		0.086	0.23	0.04 U	0.043
Total cPAHs TEQ	0.1	NC	0.00047	NC	NC

U = Not detected at detection limit indicated.

J = Estimated.

Concentrations that exceed cleanup level are shaded.

Detected concentrations are bolded.

a. 800 when benzene present/1000 without benzene.

Table 5 - Analytical Results for Surface Water Samples during Excavation Activities

Sample ID	Indicator	Boom 1	Boom 1	Boom1	Boom1	Boom1	Boom 1	Boom1	Boom1
Sampling Date	Level	12/9/2019	12/10/2019	12/11/2019	12/11/2019	12/12/2019	12/13/2019	12/14/2019	12/16/2019
Lab ID		912148-01	912164-02	912192-03	RE	912213-03	912243-01	912264-02	912264-05
Field Turbidity in NTU	25		1.16	22.2		8.05	13.01	3.28	
pH	6.5 to 8.5	7.8	7.9	7.6		7.6	7.4	7.5	
Turbidity in NTU									
Turbidity	25								
Conventional in mg/L									
Calcium		9.85	10.7	10.7		9.91	7.38	8.54	8.98
Hardness (as CaCO3)		35.1	37.4	38		34.9	26.7	29.6	30.9
Magnesium		2.56	2.59	2.74		2.46	2.02	2	2.06
TPH in µg/L									
Diesel	250	250 U	250 U	250 U		50 U	250 U	250 U	250 U
Lube Oil	250					250 U			
Gasoline	250	100 U	100 U	100 U		100 U	100 U	100 U	100 U
BTEX in µg/L									
Benzene		1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	1 U
Ethylbenzene		1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	1 U
Toluene		1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	1 U
m, p-Xylene					0.4 U				
o-Xylene					0.2 U				
Total Xylenes		3 U	3 U	3 U	0.4 U	3 U	3 U	3 U	3 U
Total BTEX	2	6 U	6 U	6 U	1 U	6 U	6 U	6 U	6 U
Total Metals in µg/L									
Arsenic	360	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	1.5	0.25 U	0.25 U	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U
Chromium	259	1 U	1 U	1 U		1 U	1 U	1 U	1 U
Copper	7.2	2 U	2 U	2 U		2 U	2.8	2 U	2 U
Lead	23.5	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.00094	0.0007 U	0.0017		0.0015	0.0034	0.002 E	0.00085
Nickel	652	0.522	0.5 U	0.683		0.695	0.849	0.5 U	0.51
Zinc	52.7	2.5 U	2.5 U	2.5 U		2.5 U	2.25	2.5 U	2.5 U
Hexavalent Chromium in µg/L									
Chromium, Hexavalent	15	45 U	45 U	45 U		45 U	45 U		45 U

Table 5 - Analytical Results for Surface Water Samples during Excavation Activities

Sample ID	Indicator	Boom1	Boom 2	D-1	D-1	D-1	D-1	D-1A	D-1B
Sampling Date	Level	12/17/2019	12/10/2019	12/5/2019	12/6/2019	12/7/2019	12/8/2019	12/7/2019	12/9/2019
Lab ID		912295-02	912164-01	912095-14	912124-01	912133-01	912133-02	912133-03	912148-02
Field Turbidity in NTU	25	2.05	1.39	0.85		2.17	1.07		
pH	6.5 to 8.5	7.5	7.8	8	7.7	7.8	7.8	7.7	7.5
Turbidity in NTU									
Turbidity	25								
Conventional in mg/L									
Calcium		11.5	10.3	12.6	10.9	9.85	10.3	10.2	9.59
Hardness (as CaCO3)		38.4	36.2	44.3	38.3	34.8	36.2	37	34
Magnesium		2.36	2.54	3.11	2.7	2.47	2.54	2.79	2.45
TPH in µg/L									
Diesel	250	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Lube Oil	250								
Gasoline	250	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
BTEX in µg/L									
Benzene		1 U	1 U		1 U	1 U	1 U	1 U	1 U
Ethylbenzene		1 U	1 U		1 U	1 U	1 U	1 U	1 U
Toluene		1 U	1 U		1 U	1 U	1 U	1 U	1 U
m, p-Xylene									
o-Xylene									
Total Xylenes		3 U	3 U		3 U	3 U	3 U	3 U	3 U
Total BTEX	2	6 U	6 U		6 U	6 U	6 U	6 U	6 U
Total Metals in µg/L									
Arsenic	360	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	1.5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Chromium	259	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Copper	7.2	2 U	2 U	2 U	2 U	2 U	2 U	2.82	2 U
Lead	23.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.0007 U	7E-04 U	0.0007 U	0.00096	0.0016	0.0015	0.0014	0.0012
Nickel	652	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.9	0.5 U
Zinc	52.7	2.5 U	2.5 U	2.5 U	60	2.5 U	2.5 U	2.76	2.5 U
Hexavalent Chromium in µg/L									
Chromium, Hexavalent	15		45 U	45 U		45 U	45 U	45 U	45 U

Table 5 - Analytical Results for Surface Water Samples during Excavation Activities

Sample ID	Indicator	D-1B	D-1B	D-1B	D-1B	D1B	D1B	D1B	D1B
Sampling Date	Level	12/10/2019	12/11/2019	12/11/2019	12/12/2019	12/13/2019	12/14/2019	12/16/2019	12/17/2019
Lab ID		912164-05	912192-01	RE	912213-01	912243-02	912264-01	912264-04	912295-01
Field Turbidity in NTU	25	4.22	14.4		9.41	13.5	1.91		1.35
pH	6.5 to 8.5	7.8	7.4		7.5	7.3	7.5		7.7
Turbidity in NTU									
Turbidity	25								
Conventional in mg/L									
Calcium		10.8	10.8		10.1	7.62	8.46	9.06	13.5
Hardness (as CaCO3)		37.8	38.5		35.3	27.1	29.3	31.3	45
Magnesium		2.64	2.8		2.46	1.96	1.98	2.11	2.74
TPH in µg/L									
Diesel	250	250 U	250 U		72	250 U	250 U	250 U	250 U
Lube Oil	250				250 U				
Gasoline	250	100 U	100 U		100 U	100 U	100 U	100 U	100 U
BTEX in µg/L									
Benzene		1 U	1 U	0.2 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene		1 U	1 U	0.2 U	1 U	1 U	1 U	1 U	1 U
Toluene		1 U	1 U	0.2 U	1 U	1 U	1 U	1 U	1 U
m, p-Xylene				0.4 U					
o-Xylene				0.2 U					
Total Xylenes		3 U	3 U	0.4 U	3 U	3 U	3 U	3 U	3 U
Total BTEX	2	6 U	6 U	1 U	6 U	6 U	6 U	6 U	6 U
Total Metals in µg/L									
Arsenic	360	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	1.5	0.25 U	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Chromium	259	1 U	1 U		1 U	1 U	1 U	1 U	1 U
Copper	7.2	2 U	2 U		2 U	2.41	2 U	2 U	2 U
Lead	23.5	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.0007 U	0.0037		0.00097	0.003	0.0016	0.00077	0.00071
Nickel	652	0.5 U	0.743		0.5 U	0.771	0.5 U	0.5 U	0.5 U
Zinc	52.7	2.5 U	2.5 U		2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Hexavalent Chromium in µg/L									
Chromium, Hexavalent	15	45 U	45 U		45 U	45 U		45 U	

Table 5 - Analytical Results for Surface Water Samples during Excavation Activities

Sample ID	Indicator	D1B	D-2	D-2	D-2	D-2	D-2	D2	D2
Sampling Date	Level	12/18/2019	12/5/2019	12/10/2019	12/11/2019	12/11/2019	12/12/2019	12/13/2019	12/14/2019
Lab ID		912329-01	912095-12	912164-04	912192-02	RE	912213-02	912243-03	912264-03
Field Turbidity in NTU	25		3.77		147		16.31	203	3.28
pH	6.5 to 8.5	7.6	7.7	7.7	7.4		7.6	7.2	7.1
Turbidity in NTU									
Turbidity	25								
Conventional in mg/L									
Calcium		9.75	12.3	11.3	12.7		11.2	9.69	10.9
Hardness (as CaCO3)		34.5	43.4	41.8	48.6		41.8	40.2	42.9
Magnesium		2.46	3.07	3.29	4.11		3.36	3.88	3.82
TPH in µg/L									
Diesel	250	250 U	250 U	250 U	270		150	250 U	1100
Lube Oil	250						250 U		
Gasoline	250	100 U	100 U	100 U	100 U		100 U	100 U	100 U
BTEX in µg/L									
Benzene		1 U		1 U	1 U	0.2 U	1 U	1 U	1 U
Ethylbenzene		1 U		1 U	1 U	0.2 U	1 U	1 U	1 U
Toluene		1 U		1 U	1 U	0.2 U	1 U	1 U	1 U
m, p-Xylene						0.4 U			
o-Xylene						0.2 U			
Total Xylenes		3 U		3 U	3 U	0.4 U	3 U	3 U	3 U
Total BTEX	2	6 U		6 U	6 U	1 U	6 U	6 U	6 U
Total Metals in µg/L									
Arsenic	360	0.5 U	0.5 U	0.5 U	0.722		0.5 U	0.965	0.654
Cadmium	1.5	0.25 U	0.25 U	0.25 U	0.25 U		0.25 U	0.25 U	0.25 U
Chromium	259	1 U	1 U	1.18	3.14		1.69	3.99	2.95
Copper	7.2	4.54	2 U	5.01	13.5		8.16	19	16.2
Lead	23.5	0.541	0.5 U	0.947	1.8		0.726	2.96	1.36
Mercury	2.1	0.0052	0.0007 U	0.0017	0.015		0.0034	0.0038	0.019
Nickel	652	1.3	0.571	1.55	3.3		1.77	3.87	1.92
Zinc	52.7	3.82	2.5 U	12.2	17.9		5.98	29.7	38.4
Hexavalent Chromium in µg/L									
Chromium, Hexavalent	15	45 U	45 U	45 U	45 U		45 U	45 U	

Table 5 - Analytical Results for Surface Water Samples during Excavation Activities

Sample ID	Indicator	D2	D3	U-1	U-2	U-2
Sampling Date	Level	12/16/2019	12/10/2019	12/5/2019	12/11/2019	12/11/2019
Lab ID		912264-06	912164-03	912095-13	912192-04	RE
Field Turbidity in NTU	25		2.81	1.05	2.3	
pH	6.5 to 8.5		7	8	7.7	
Turbidity in NTU						
Turbidity	25					
Conventional in mg/L						
Calcium		11.4	12.9	12.8	10.7	
Hardness (as CaCO3)		43	45.2	44.6	37.5	
Magnesium		3.54	3.15	3.07	2.63	
TPH in µg/L						
Diesel	250	450	250 U	250 U	250 U	
Lube Oil	250					
Gasoline	250	100 U	100 U	100 U	100 U	
BTEX in µg/L						
Benzene		1 U	1 U		1 U	0.2 U
Ethylbenzene		1 U	1 U		1 U	0.2 U
Toluene		1 U	1 U		1 U	0.2 U
m, p-Xylene						0.4 U
o-Xylene						0.2 U
Total Xylenes		3 U	3 U		3 U	0.4 U
Total BTEX	2	6 U	6 U		6 U	1 U
Total Metals in µg/L						
Arsenic	360	0.5 U	0.599	0.5 U	0.5 U	
Cadmium	1.5	0.25 U	0.25 U	0.25 U	0.25 U	
Chromium	259	1 U	1 U	1 U	1 U	
Copper	7.2	4.22	2 U	2 U	2 U	
Lead	23.5	0.5 U	0.5 U	0.5 U	0.5 U	
Mercury	2.1	0.0052	0.0007 U	0.0007 U	0.0007 U	
Nickel	652	0.5 U	0.608	0.527	0.5 U	
Zinc	52.7	47.7	2.5 U	22	2.5 U	
Hexavalent Chromium in µg/L						
Chromium, Hexavalent	15	45 U	45 U	45 U	45 U	

U = Not detected at detection limit indicated.

Concentrations that exceed indicator level or outside the indicator level range are shaded.

Detected concentrations are bolded.

RE = Additional analysis by Friedman & Bruya Inc, Seattle WA.

Table 6 – Analytical Results for Surface Water Samples Sampled by Tacoma Power after Excavation Activities Sheet 1 of 6

Sample ID	Indicator	B1 Boom #1	Boom #1	D1B	D1B	D1B	D1B	D1B
Sampling Date	Level	12/19/2019	12/20/2019	12/19/2019	12/20/2019	12/23/2019	12/26/2019	12/27/2019
Sample Location	Creek	Creek	Creek	Creek	Creek	Creek	Creek	Creek
Riffe Lake Elevation in feet (TCL)	709.93	710.96	709.93	710.96	723.87	728.44	729.10	
pH *	6.5 to 8.5		2.7		5.78	6.07	6.23	5.44
Turbidity in NTU	25		24		51	7	4.3	2.5
TPH in ug/L								
Diesel	250	100 U	50 U	50 U	50 U	50 U	50 U	50 U
Oil	250	500 U	97	50 U	159	50 U	50 U	69.8
Diesel + Oil	250	600 U	147	100 U	209	100 U	100 U	119.8
Gasoline	250	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Metals in ug/L								
Arsenic	360	0.3 U	1	0.3	0.6	0.3 U	0.5	0.3 U
Cadmium	1.5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chromium	259	2.3	2.7	2	3.6	2.7	0.7	0.5 U
Copper	7.2	0.7	3.4	1	7	0.3 U	0.3 U	0.3 U
Lead	23.5	0.5 U	0.5 U	0.5 U	1.4	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.000658	0.0005 U	0.001	0.00848	0.00159	0.00077	0.000618
Nickel	652	0.5 U	1.2	0.5 U	2.2	0.8	0.5 U	0.5 U
Zinc	52.7	0.3	3.3	0.9	14.6	0.3 U	0.3 U	0.3 U
Hexavalent Chromium in mg/L	15		0.01 U		0.01 U	0.01 U	0.01 U	0.01 U
BTEX in ug/L								
Benzene		0.4 UJ		0.4 UJ		0.4 UJ	0.4 U	0.4 U
Ethylbenzene		0.4 UJ		0.4 UJ		0.4 UJ	0.4 U	0.4 U
Toluene		0.4 UJ		0.4 UJ		0.4 UJ	0.4 U	0.4 U
Total Xylenes		0.8 UJ		0.8 UJ		0.8 UJ	0.8 U	0.8 U
Total BTEX	2	2 UJ		2 UJ		2 UJ	2 U	2 U

Table 6 – Analytical Results for Surface Water Samples Sampled by Tacoma Power after Excavation Activities Sheet 2 of 6

Sample ID	Indicator	D1B	D1B	D1B	D1B	D6	D6	D6-Oil Curtain
Sampling Date	Level	12/30/2019	12/31/2019	1/2/2020	1/3/2020	12/26/2019	12/27/2019	12/23/2019
Sample Location	Creek	Creek	Creek	Creek	Creek	Creek	Creek	Creek
Riffe Lake Elevation in feet (TCL)	730.54	730.56	733.88	734.74	728.44	729.10	723.87	
pH *	6.5 to 8.5	5.95	6.29	6.2	6.73	6.12	5.92	5.85
Turbidity in NTU	25	2.3	2.5	7.61	5.87	1.2	1.3	9.7
TPH in ug/L								
Diesel	250	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Oil	250	107	50 U	117	73	59	76	50 U
Diesel + Oil	250	157	100 U	167	123	109	126	100 U
Gasoline	250	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Metals in ug/L								
Arsenic	360	0.3 U	0.3 U	0.5	0.7	0.3 U	0.3 U	0.3 U
Cadmium	1.5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chromium	259	0.5 U	0.5	0.5	0.5 U	0.5 U	0.5 U	2.4
Copper	7.2	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Lead	23.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.000806	0.000871	0.00216	0.00135	0.000788	0.000599	0.0005 U
Nickel	652	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Zinc	52.7	0.3 U	0.3 U	0.9	0.4	0.3 U	0.3 U	0.3 U
Hexavalent Chromium in mg/L	15	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BTEX in ug/L								
Benzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ
Ethylbenzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ
Toluene		0.72	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ
Total Xylenes		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ
Total BTEX	2	2.32	2 U	2 U	2 U	2 U	2 U	2 UJ

Table 6 – Analytical Results for Surface Water Samples Sampled by Tacoma Power after Excavation Activities Sheet 3 of 6

Sample ID	Indicator	D6	D6	D6	D6	D2	D2	D2
Sampling Date	Level	12/30/2019	12/31/2019	1/2/2020	1/3/2020	1/3/2020	1/6/2020	1/13/2020
Sample Location	Creek	Creek	Creek	Creek	Creek	Creek	Creek	Creek
Riffe Lake Elevation in feet (TCL)	730.54	730.56	733.88	734.74	734.74	736.84	741.97	
pH *	6.5 to 8.5	5.86	5.83	6.3	6.5	6.41	6.04	6.48
Turbidity in NTU	25	1.5	1	8.9	6.56	13	16	5.9
TPH in ug/L								
Diesel	250	50 U	50 U	50 U	50 U	50 U	50 U	120
Oil	250	117	318	258	50 U	129	72	50 U
Diesel + Oil	250	167	368	308	100 U	179	122	170
Gasoline	250	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Metals in ug/L								
Arsenic	360	0.3 U	0.3 U	0.5	0.3 U	0.3 U	0.3 U	0.6
Cadmium	1.5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chromium	259	0.5 U	0.5 U	0.6	0.5 U	0.5 U	3.4	1.1
Copper	7.2	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Lead	23.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.0005 U	0.000596	0.00226	0.00152	0.00222	0.00164	0.0005 U
Nickel	652	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.7	0.5 U
Zinc	52.7	0.3 U	0.3 U	1.6	0.3	1.8	4	0.5
Hexavalent Chromium in mg/L	15	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BTEX in ug/L								
Benzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Ethylbenzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Toluene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Total Xylenes		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Total BTEX	2	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Table 6 – Analytical Results for Surface Water Samples Sampled by Tacoma Power after Excavation Activities Sheet 4 of 6

Sample ID	Indicator	D2	U-3	U-3	U-3	U-3	U-3	U-3	Stockpile #1
Sampling Date	Level	1/21/2020	1/27/2020	1/28/2020	1/29/2020	1/31/2020	2/4/2020	12/23/2019	
Sample Location	Creek	Creek	Creek	Creek	Creek	Creek	Creek	Upland Area	
Riffe Lake Elevation in feet (TCL)	734.79	738.45	739.33	740.45	741.36	747.43	723.87		
pH *	6.5 to 8.5	6.09	5.99	6.3	5.84	6.15	6.34	5.42	
Turbidity in NTU	25	4.1	20	22.5	36.5	17.2	13	31	
TPH in ug/L									
Diesel	250	70 U	140	50 U	100 U	100 U	50 U	50 U	
Oil	250	50 U	230	50 U	100 U	100 U	210	269	
Diesel + Oil	250	120	370	100 U	200 U	200 U	260	319	
Gasoline	250	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
Metals in ug/L									
Arsenic	360	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.9	
Cadmium	1.5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
Chromium	259	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.1	
Copper	7.2	0.3 U	1.2	1.3	2.6	1.7	13.3	0.3 U	
Lead	23.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.3	0.5 U	
Mercury	2.1	0.00161	0.00502	0.00574	0.00598	0.00599	0.000536	0.00475	
Nickel	652	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.7	1	
Zinc	52.7	0.3 U	4	0.3 U	1.8	1.6	28.8	5.7	
Hexavalent Chromium in mg/L	15	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
BTEX in ug/L									
Benzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	
Ethylbenzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	
Toluene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	
Total Xylenes		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	
Total BTEX	2	2 U	2 U	2 U	2 U	2 U	2 U	2 UJ	

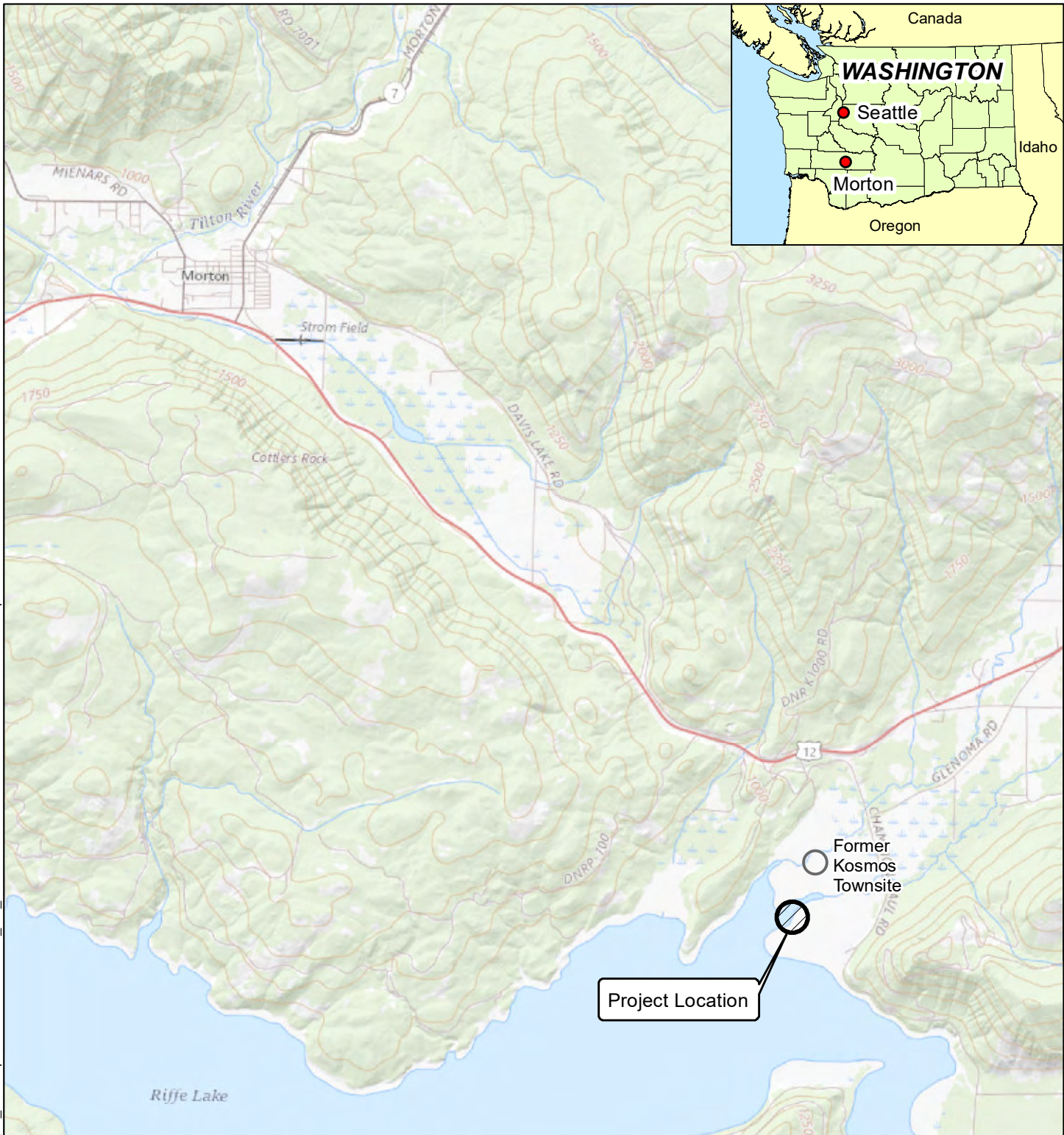
Table 6 – Analytical Results for Surface Water Samples Sampled by Tacoma Power after Excavation Activities Sheet 5 of 6

Sample ID	Indicator	Baker Tank #1	T-1	T-1	T-1	T-1	T-1	T-2
Sampling Date	Level	1/2/2020	1/27/2020	1/28/2020	1/29/2020	1/31/2020	2/4/2020	2/4/2020
Sample Location		Upland Area	Upland Area	Upland Area	Upland Area	Upland Area	Upland Area	Upland Area
Riffe Lake Elevation in feet (TCL)		733.88	738.45	739.33	740.45	741.36	747.43	747.43
pH *	6.5 to 8.5	7.08	5.85	6.23	5.91	6.3	6.14	6.18
Turbidity in NTU	25	150	333	44.6	38.4	15.2	8.1	7.8
TPH in ug/L								
Diesel	250	50 U	50 U	50 U	100 U	100 U	50 U	50 U
Oil	250	124	76	83	100 U	100 U	110	100
Diesel + Oil	250	174	126	133	200 U	200 U	160	150
Gasoline	250	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Metals in ug/L								
Arsenic	360	3.3	0.8	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Cadmium	1.5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chromium	259	2.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Copper	7.2	15.7	12.8	2.5	2.6	1.7	1.9	2.1
Lead	23.5	4.2	4.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury	2.1	0.0211	0.0005 U	0.00843	0.00825	0.00611	0.00293	0.0005 U
Nickel	652	5	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Zinc	52.7	84.2	16.8	0.3 U	0.3 U	0.3 U	0.8	1.3
Hexavalent Chromium in mg/L	15	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
BTEX in ug/L								
Benzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Ethylbenzene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Toluene		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Total Xylenes		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Total BTEX	2	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Table 6 – Analytical Results for Surface Water Samples Sampled by Tacoma Power after Excavation Activities Sheet 6 of 6

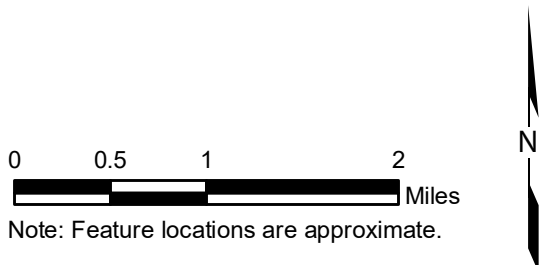
Sample ID	Indicator	Log Pond #1	Log Pond #2	SOP 1	COP 1
Sampling Date	Level	2/8/2020	2/8/2020	3/3/2020	3/3/2020
Sample Location		Log Pond Area	Log Pond Area	Upland Area	Upland Area
Riffe Lake Elevation in feet (TCL)		756.86	756.86	733.45	733.45
pH *	6.5 to 8.5	5.95	6.26	3.87	6.78
Turbidity in NTU	25	25	62	55	135
TPH in ug/L					
Diesel	250	50 U	50 U	3320	100 U
Oil	250	95	50 U	1250	500 U
Diesel + Oil	250	145	100 U	4570	600 U
Gasoline	250	50 U	50 U	50 U	50 U
Metals in ug/L					
Arsenic	360	0.3 U	0.8	2.1	0.9
Cadmium	1.5	0.2 U	0.2 U	0.3	0.3
Chromium	259	0.5 U	0.5 U	6.1	3.3
Copper	7.2	6.1	6.2	7.3	25.6
Lead	23.5	0.5 U	0.9	0.5	8.2
Mercury	2.1	0.009	0.0005 U	0.0005 U	0.0005 U
Nickel	652	0.8	1.7	5.1	4.7
Zinc	52.7	16.3	21.6	70.6	72.5
Hexavalent Chromium in mg/L	15	0.01 U	0.01 U	0.01 U	0.01 U
BTEX in ug/L					
Benzene		0.4 U	0.4 U	0.4 U	0.4 U
Ethylbenzene		0.4 U	0.4 U	0.4 U	0.4 U
Toluene		0.4 U	0.4 U	0.4 U	0.4 U
Total Xylenes		0.8 U	0.8 U	0.8 U	0.8 U
Total BTEX	2	2 U	2 U	2 U	2 U


* = The recommended holding time for pH analysis is only 15 minutes. All samples were received and analyzed past holding time.
 U = Not detected at detection limit indicated.
 J = Estimated value.
 Concentrations that exceed indicator level or outside the indicator level range are shaded.
 Detected concentrations are bolded.



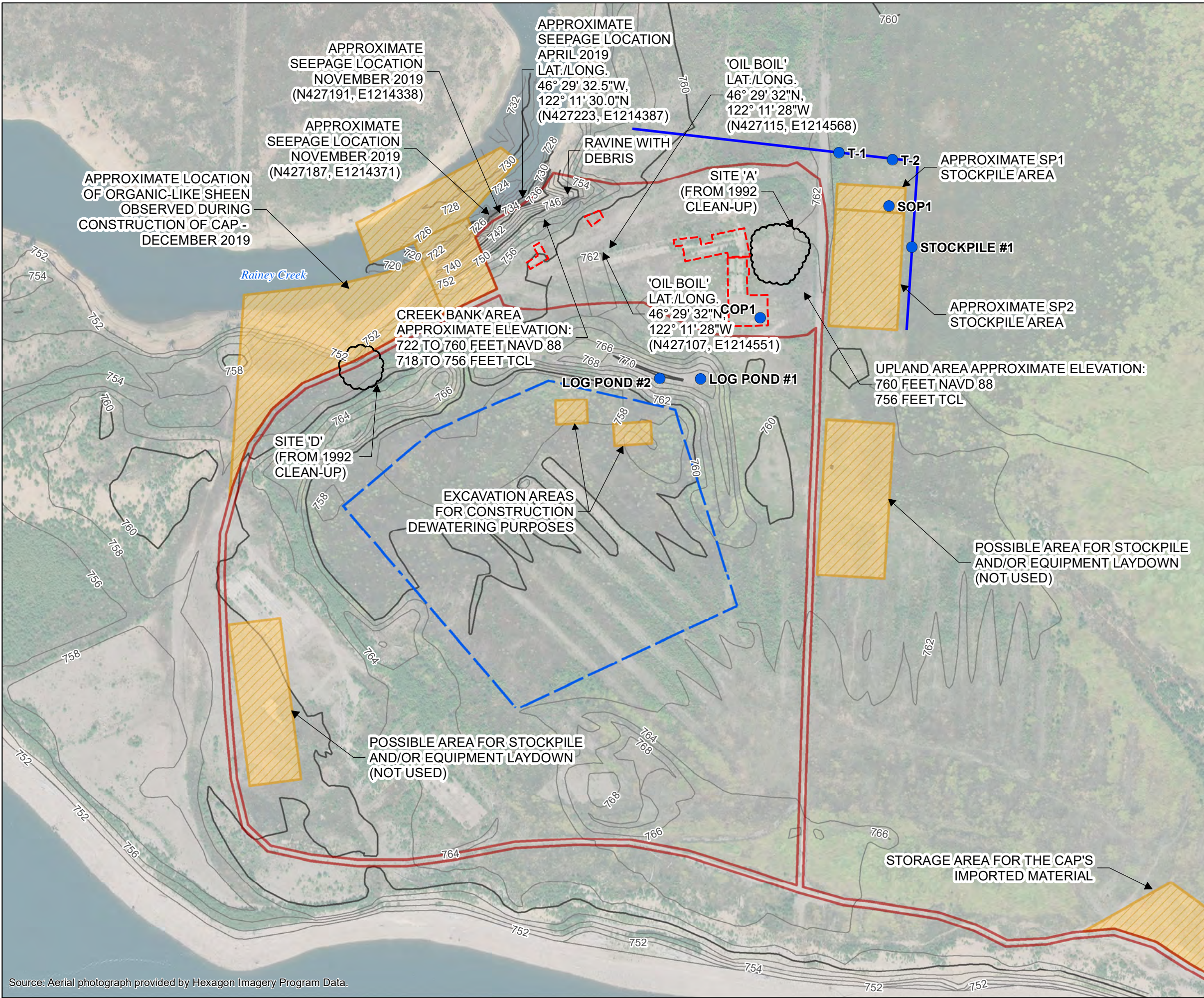
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USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed October 2018.



Kosmos Mill Oil Cleanup Morton, Washington	
Vicinity Map	
19499-00	11/20
 <small>A division of Haley & Aldrich</small>	
Figure 1	

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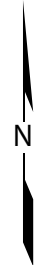


Legend

- Poned Water Sample (2020)
- Surface Water Diversion Trench
- ▨ Expanded APE - December 2019
- ▭ Original APE - October 2019
- Approximate Location of Former Log Pond
- ▭ Old/Abandoned Building Slab

Notes:

1. Elevation contours, aerial photograph, and site features/locations provided by the City of Tacoma Public Utilities.
2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 feet (NAVD 88).
3. Feature locations are approximate.
4. Tacoma City Light (TCL) datum is 3.96 feet below NAVD 88 datum.



Kosmos Mill
Morton, Washington

**Site Features and
Poned Water Sample Locations**

19499-00

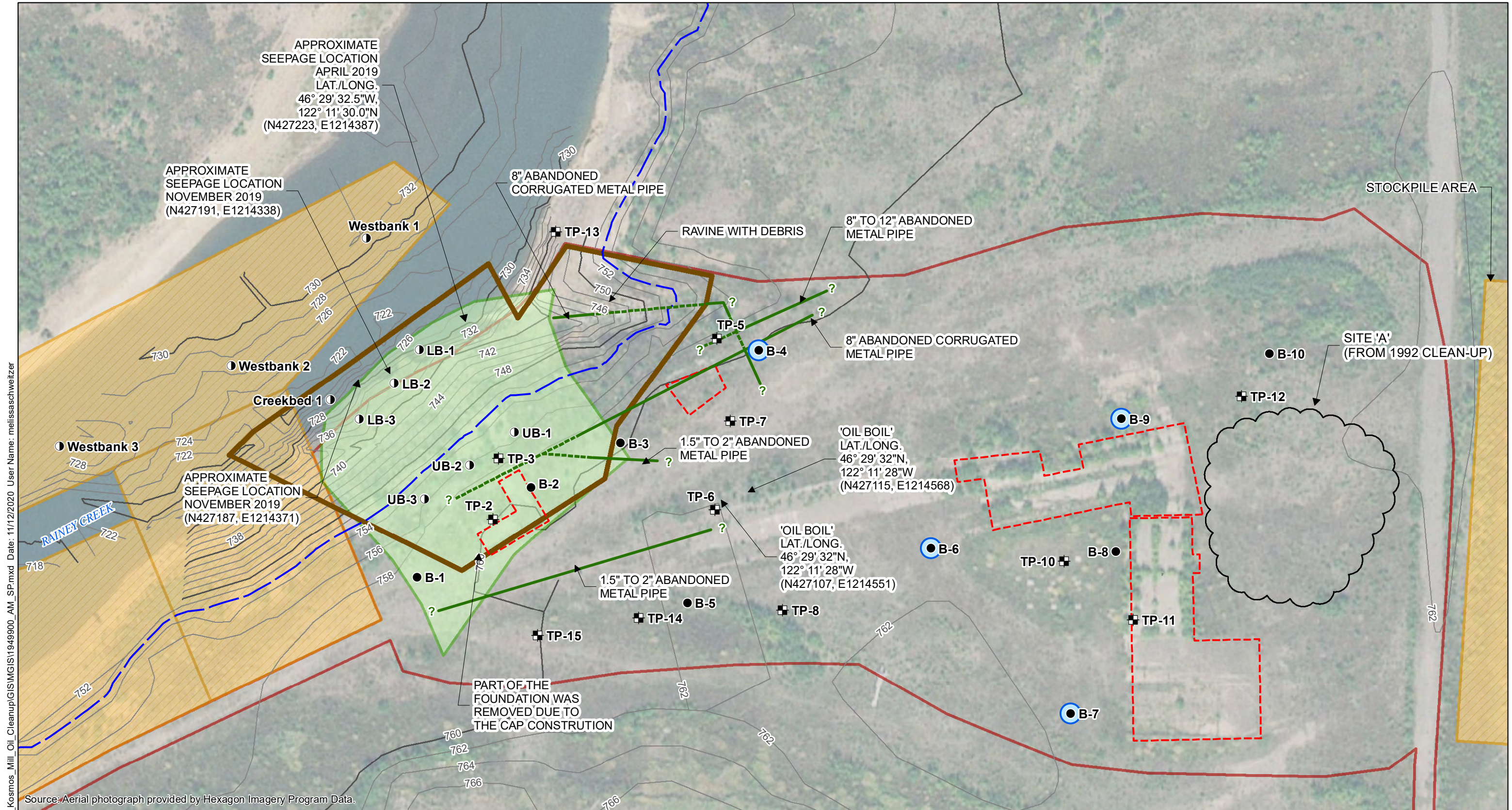
02/21



Figure
2

Source: Aerial photograph provided by Hexagon Imagery Program Data.

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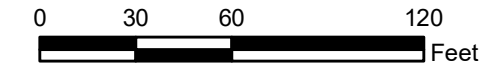
Source: Aerial photograph provided by Hexagon Imagery Program Data.

Legend

- Sonic Boring (2019)
- Soil Sample (2019)
- ⊕ Test Pit (2019)
- Groundwater Sample (2019)
- Current Reservoir's Full-Pool Operating Elevation at 749 Feet TCL (753 Feet NAVD 88)
- Pipe Encountered and Left in Place
- Pipe Encountered and Removed
- ?
- Approximate Area of Protective
- Expanded APE - December
- Approximate Extent of Excavation
- Original APE - October
- Old/Abandoned Building Slab

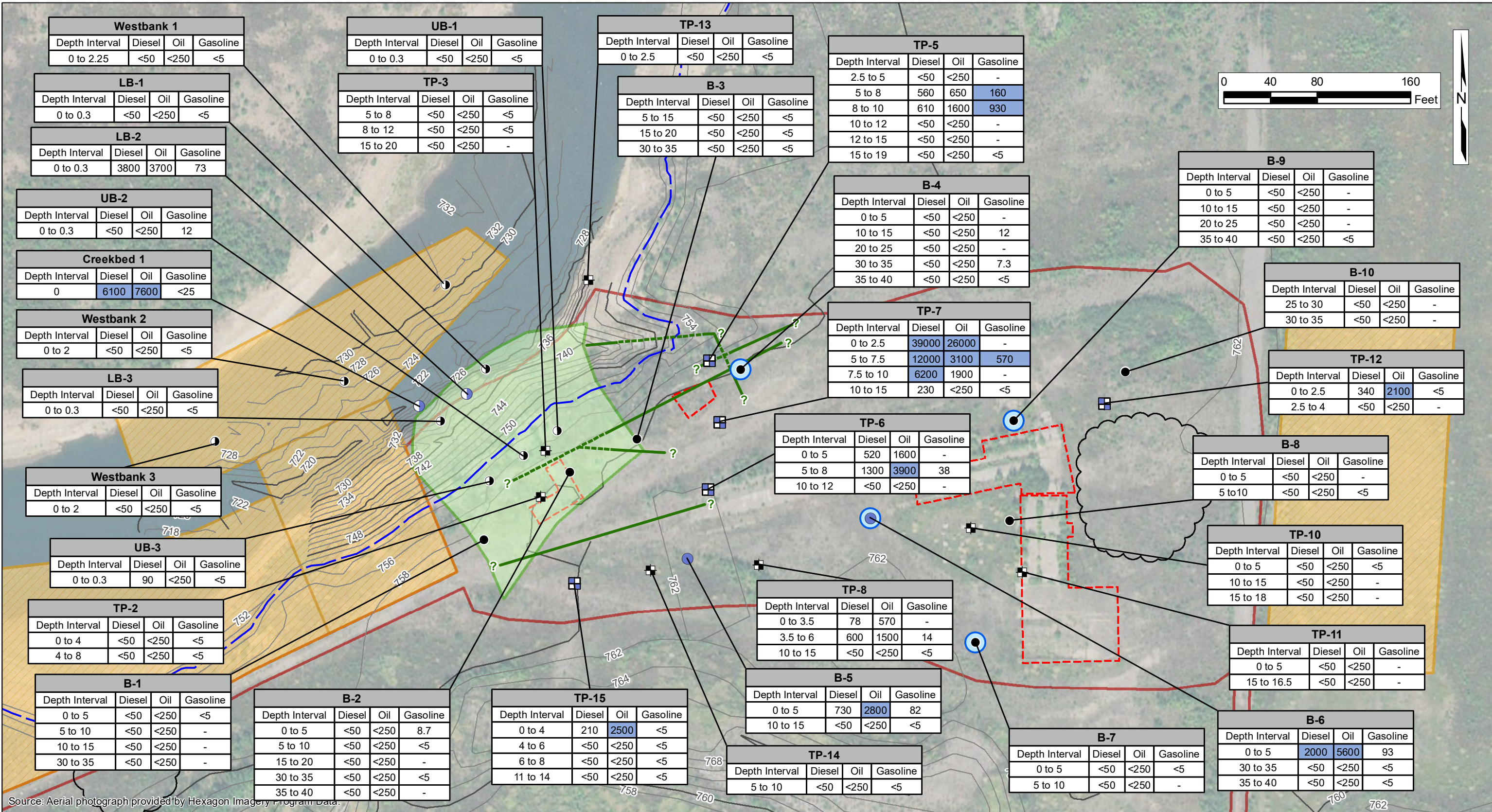
Notes:

1. Elevation contours, aerial photograph, and site features/locations provided by the City of Tacoma Public Utilities.
2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 feet (NAVD 88).
3. Feature locations are approximate.
4. Tacoma City Light (TCL) datum is 3.96 feet below NAVD 88 datum.



Kosmos Mill Morton, Washington	
Site and Exploration Plan	
19499-00	11/20
<small>A division of Haley & Aldrich</small>	
Figure 3	

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Legend

- Sonic Boring (2019)
- Soil Sample (2019)
- ⊠ Test Pit (2019)
- Groundwater Sample (2019)
- Current Reservoir's Full-Pool Operating Elevation at 749 Feet TCL (753 Feet NAVD 88)
- Pipe Encountered and Left in Place
- Pipe Encountered and Removed
- ?

- Approximate Area of Protective
- Expanded APE - December
- Original APE - October
- Old/Abandoned Building Slab

- Notes:**
1. Elevation contours, aerial photograph, and site Features/locations provided by the City of Tacoma Public Utilities.
 2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 feet (NAVD 88).
 3. Feature locations are approximate.
 4. Concentrations are in milligram per kilogram (mg/kg).
 5. Shaded values and symbols are above MTCA Method A Cleanup Levels.
 6. Tacoma City Light (TCL) datum is 3.96 feet below NAVD 88 datum.
 7. Sample depth intervals in feet.

Kosmos Mill
Morton, Washington

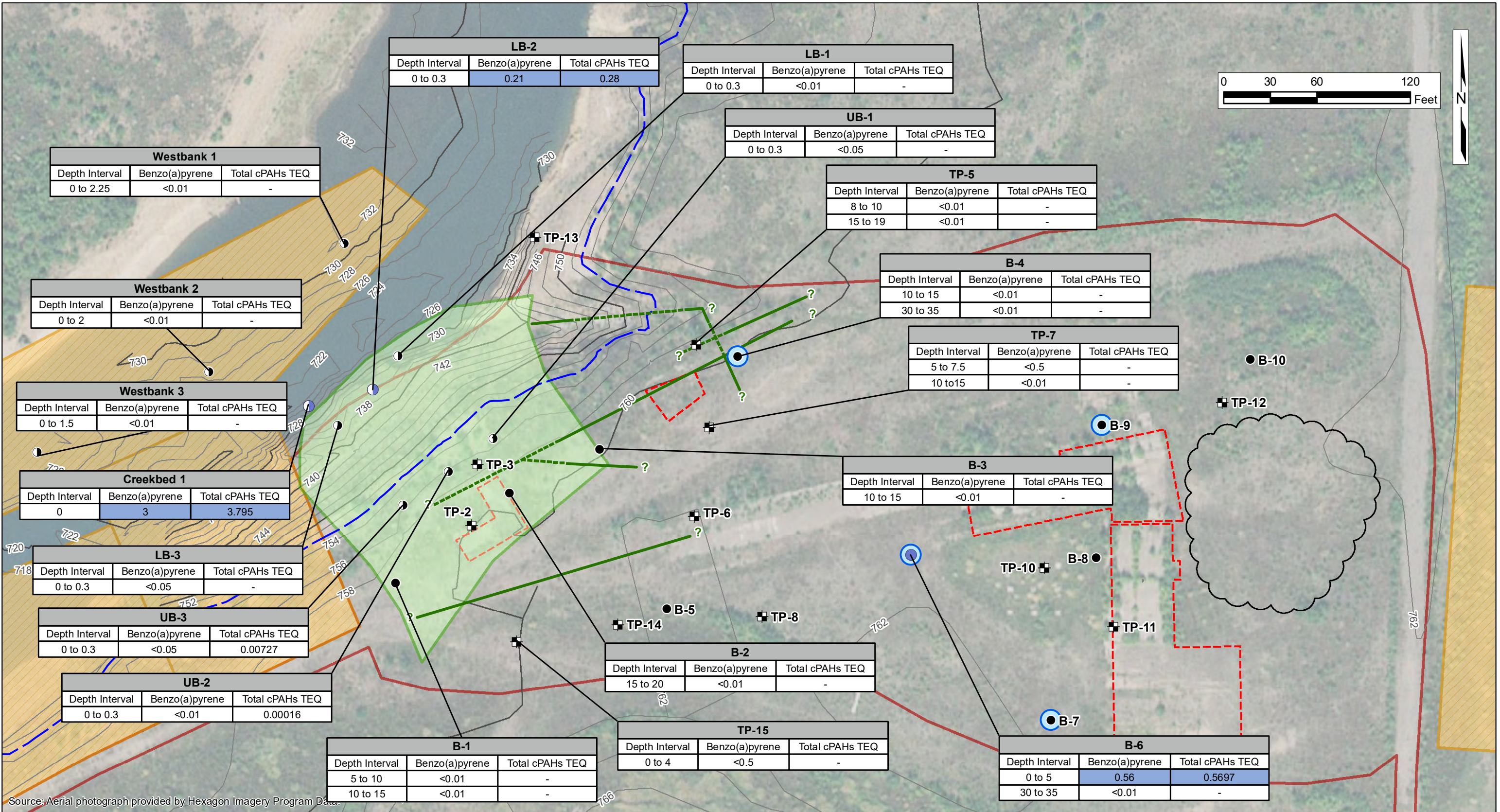
TPH Detections in Soil

19499-00 11/20

HARTCROWSER
A division of Haley & Aldrich

Figure
4

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Legend

- Sonic Boring (2019)
- Soil Sample (2019)
- ⊕ Test Pit (2019)
- Groundwater Sample (2019)
- Current Reservoir's Full-Pool Operating Elevation at 749 Feet TCL (753 Feet NAVD 88)
- Pipe Encountered and Left in Place
- Pipe Encountered and Removed
- ?
- Approximate Area of Protective
- ▨ Expanded APE - December
- ▨ Original APE - October
- ▨ Old/Abandoned Building Slab

Notes:

- Elevation contours, aerial photograph, and site Features/locations provided by the City of Tacoma Public Utilities.
- Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 feet (NAVD 88).
- Feature locations are approximate.
- Concentrations are in milligram per kilogram (mg/kg).
- Shaded values and symbols are above MTCA Method A Cleanup Levels.
- Tacoma City Light (TCL) datum is 3.96 feet below NAVD 88 datum.
- Sample depth intervals in feet.

Kosmos Mill
Morton, Washington

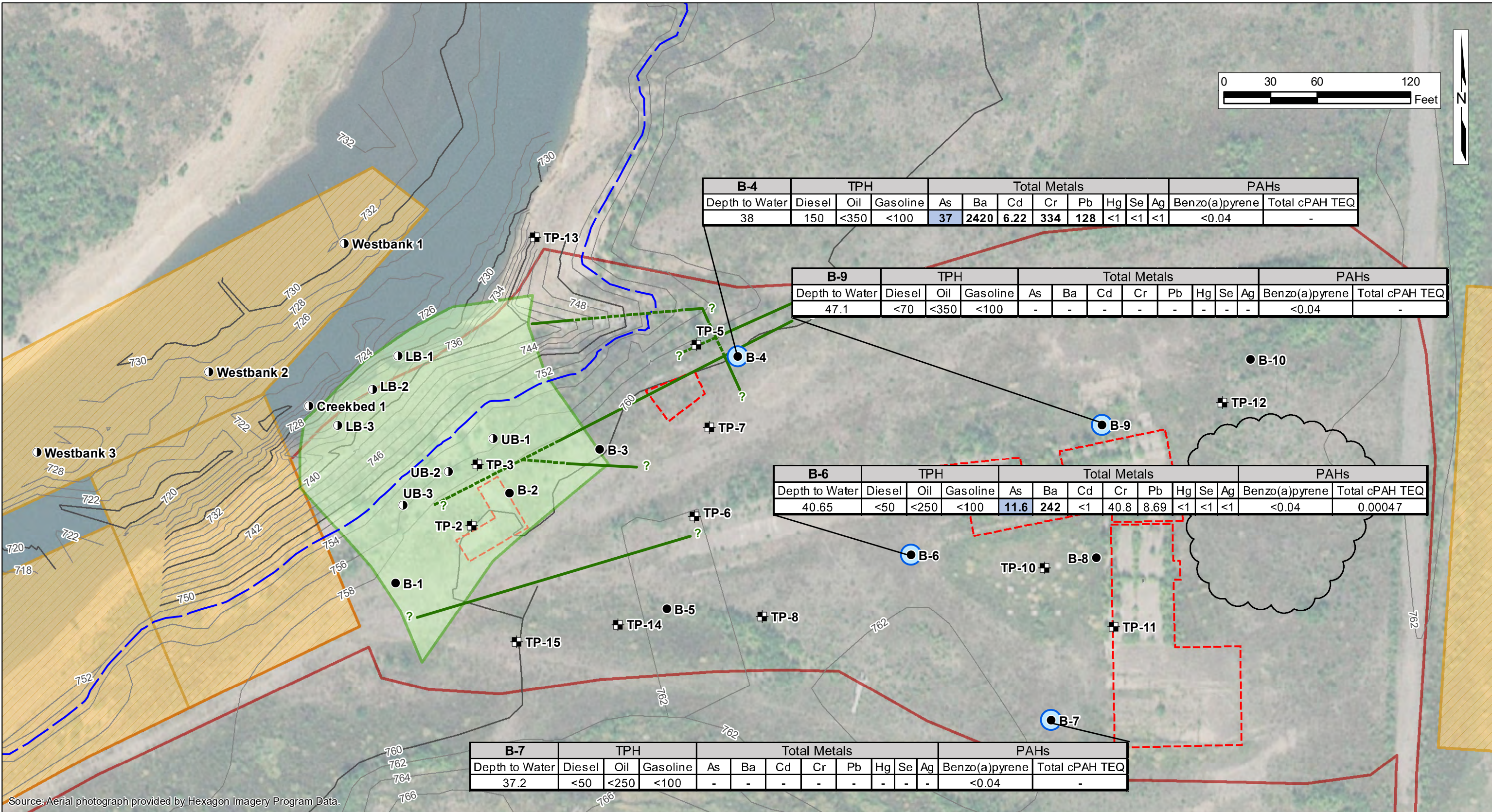
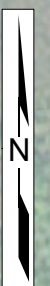
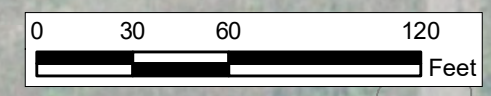
cPAH Detections in Soil

19499-00 11/20

HARTCROWSER
A division of Haley & Aldrich

Figure
5

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B-4		TPH			Total Metals							PAHs	
Depth to Water	Diesel	Oil	Gasoline	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Benzo(a)pyrene	Total cPAH TEQ
38	150	<350	<100	37	2420	6.22	334	128	<1	<1	<1	<0.04	-

B-9		TPH			Total Metals							PAHs	
Depth to Water	Diesel	Oil	Gasoline	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Benzo(a)pyrene	Total cPAH TEQ
47.1	<70	<350	<100	-	-	-	-	-	-	-	-	<0.04	-

B-6		TPH			Total Metals							PAHs	
Depth to Water	Diesel	Oil	Gasoline	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Benzo(a)pyrene	Total cPAH TEQ
40.65	<50	<250	<100	11.6	242	<1	40.8	8.69	<1	<1	<1	<0.04	0.00047

B-7		TPH			Total Metals							PAHs	
Depth to Water	Diesel	Oil	Gasoline	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Benzo(a)pyrene	Total cPAH TEQ
37.2	<50	<250	<100	-	-	-	-	-	-	-	-	<0.04	-

Source: Aerial photograph provided by Hexagon Imagery Program Data.

Legend

- Sonic Boring (2019)
- Soil Sample (2019)
- ⊕ Test Pit (2019)
- Groundwater Sample (2019)
- Current Reservoir's Full-Pool Operating Elevation at 749 Feet TCL (753 Feet NAVD 88)
- Pipe Encountered and Left in Place
- Pipe Encountered and Removed
- ?
- Approximate Area of Protective Cap
- Expanded APE - December 2019
- Original APE - October 2019
- Old/Abandoned Building Slab

- Notes:**
- Elevation contours, aerial photograph, and site Features/locations provided by the City of Tacoma Public Utilities.
 - Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 feet (NAVD 88).
 - Feature locations are approximate.
 - Concentrations are in microgram per liter (ug/L).
 - Shaded values are above MTCA Method A Cleanup Levels.
 - Tacoma City Light (TCL) datum is 3.96 feet below NAVD 88 datum.
 - Depth to water is in feet.

Kosmos Mill
Morton, Washington

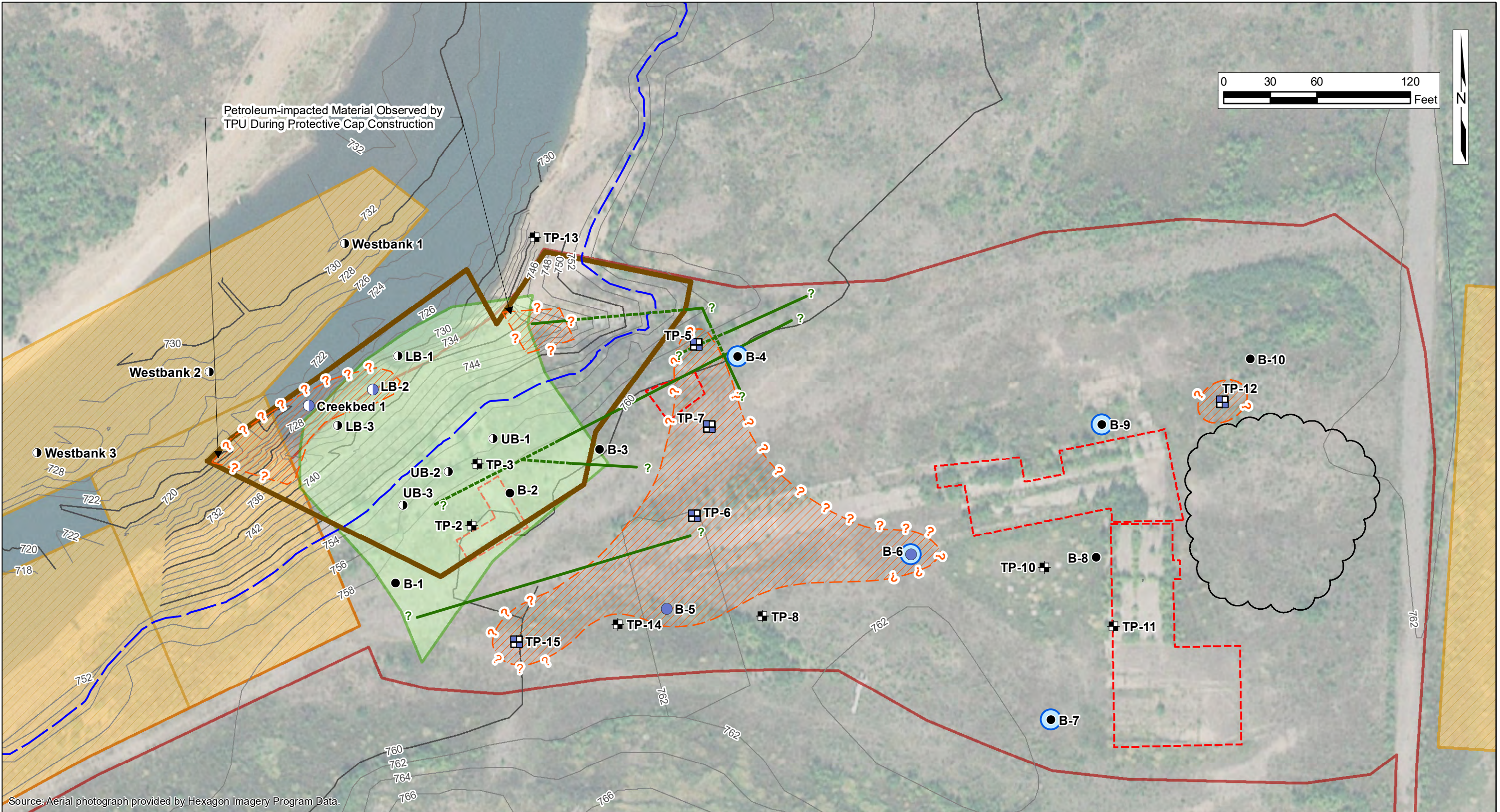
Detections in Groundwater

19499-00 11/20

HARTCROWSER

Figure
6

Document Path: L:\Notebooks\1949900_Kosmos_Mill_Oil_Cleanup\GIS\GIS1949900_AQ_SP-Extent.mxd Date: 11/12/2020 User Name: melissaschweitzer




Source: Aerial photograph provided by Hexagon Imagery Program Data.

Legend

- | | | |
|--|--------------------------------------|--|
| ● Sonic Boring (2019) | — Pipe Encountered and Left in Place | ▭ Approximate Extent of Excavation |
| ○ Soil Sample (2019) | - - - Pipe Encountered and Removed | ▭ Original APE - October 2019 |
| ⊕ Test Pit (2019) | ? Unknown Pipe Extent | ▭ Old/Abandoned Building Slab |
| ○ Groundwater Sample (2019) | ▭ Approximate Area of Protective Cap | ▨ Approximate Extent of Petroleum-Contaminated Soil Remaining in Place |
| - - - Current Reservoir's Full-Pool Operating Elevation at 749 Feet TCL (753 Feet NAVD 88) | ▭ Expanded APE - December 2019 | |

Notes:

1. Elevation contours, aerial photograph, and site features/locations provided by the City of Tacoma Public Utilities.
2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 feet (NAVD 88).
3. Feature locations are approximate.
4. Tacoma City Light (TCL) datum is 3.96 feet below NAVD 88 datum.

Kosmos Mill Morton, Washington	
Approximate Extent of Petroleum-Contaminated Soil	
19499-00	11/20
 <small>A division of Haley & Aldrich</small>	
Figure 8	

APPENDIX A
Analytical Laboratory Reports from
Tacoma Public Utilities, Tacoma Power

DEPARTMENT OF ECOLOGY
Manchester Environmental Laboratory
7411 Beach Drive East • Port Orchard, Washington 98366-8204

Case Narrative

April 29, 2019

To: Holcomb, Ron

Project: Kosmos Oil

Work Order: 1904068

Subject: Hydrocarbon Identification Qualitative

From: Dolores Montgomery *DM*

Sample Receipt

Enclosed are the HCID results for the samples received by MEL on April 29, 2019. All samples were received in acceptable condition unless noted in Analyst Comments. All samples were prepared and analyzed within holding times unless noted in Analyst Comments.

Analytical Methods

These samples were prepared, analyzed, and verified by MEL according to the submitted chain-of-custody and MEL's procedures. A Sample Correlation Table with batch summary is located in Appendix A. The samples were:

- analyzed following method HYDRO-ID.

Analyst Comments

The HCID analysis showed the following:

<u>Sample</u>	<u>Result</u>
1904068-02	The sample contains Bunker C oil.

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for

Project Name: Kosmos Oil
Work Order: 1904068
Project Officer: Holcomb, Ron

Analyte: Hydrocarbon identification
Method: HYDRO-ID
Matrix: Oil/Solvent

Sample #	Sample ID	Collected	Analyzed	Result
1904068-02	Bank#2	04/27/19	4/29/2019	The sample contains Bunker C oil.

QC Results for Batch ID:B19D195

Method Blank

B19D195-BLK1 Blank No detectable petroleum hydrocarbons or products found.

Authorized by: _____

OH

Release Date: _____

04/29/19

Page 1 of 1

Appendix A
Sample Correlation Table

Batch ID: B19D195

Prep Method: NA

Prepared: 4/29/2019

Analysis Method: HYDRO-ID

Field ID

Bank#2
Blank

MEL ID

1904068-02
B19D195-BLK1

06/12/2019

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Mike Rhubright

P.O.#: Auth #19-06-06-112
 Project: Kosmos
 Client ID: Rainy Creek
 Sample Matrix: Water
 Date Sampled: 06/05/2019
 Date Received: 06/06/2019
 Spectra Project: 2019060159
 Spectra Number: 1


Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<100	µg/L	NWTPH-D	1,4-Dichlorobenzene	<1	µg/L	SW846 8260C
Oil	<500	µg/L	NWTPH-D	2,2-Dichloropropane	<1	µg/L	SW846 8260C
1,1,1,2-Tetrachloroethane	<1	µg/L	SW846 8260C	2-Butanone (MEK)	<10	µg/L	SW846 8260C
1,1,1-Trichloroethane	<1	µg/L	SW846 8260C	2-Chloroethylvinyl Ether	<10	µg/L	SW846 8260C
1,1,2,2-Tetrachloroethane	<1	µg/L	SW846 8260C	2-Chlorotoluene	<1	µg/L	SW846 8260C
1,1,2-Trichloroethane	<1	µg/L	SW846 8260C	2-Hexanone (MBK)	<10	µg/L	SW846 8260C
1,1-Dichloroethane	<1	µg/L	SW846 8260C	4-Chlorotoluene	<1	µg/L	SW846 8260C
1,1-Dichloroethene	<1	µg/L	SW846 8260C	4-Isopropyltoluene	<1	µg/L	SW846 8260C
1,1-Dichloropropene	<1	µg/L	SW846 8260C	4-methyl-2-pentanone	<10	µg/L	SW846 8260C
1,2,3-Trichlorobenzene	<1	µg/L	SW846 8260C	Acetone	<1	µg/L	SW846 8260C
1,2,3-Trichloropropane	<1	µg/L	SW846 8260C	Acetonitrile	<10	µg/L	SW846 8260C
1,2,4-Trichlorobenzene	<1	µg/L	SW846 8260C	Acrolein	<10	µg/L	SW846 8260C
1,2,4-Trimethylbenzene	<1	µg/L	SW846 8260C	Acrylonitrile	<10	µg/L	SW846 8260C
1,2-Dibromo3Chloropropane	<10	µg/L	SW846 8260C	Benzene	<1	µg/L	SW846 8260C
1,2-Dibromoethane (EDB)	<1	µg/L	SW846 8260C	Bromobenzene	<1	µg/L	SW846 8260C
1,2-Dichlorobenzene	<1	µg/L	SW846 8260C	Bromochloromethane	<1	µg/L	SW846 8260C
1,2-Dichloroethane	<1	µg/L	SW846 8260C	Bromodichloromethane	<1	µg/L	SW846 8260C
1,2-Dichloropropane	<1	µg/L	SW846 8260C	Bromoform	<1	µg/L	SW846 8260C
1,3,5-Trimethylbenzene	<1	µg/L	SW846 8260C	Bromomethane	<1	µg/L	SW846 8260C
1,3-Dichlorobenzene	<1	µg/L	SW846 8260C	Carbon Disulfide	<10	µg/L	SW846 8260C
1,3-Dichloropropane	<1	µg/L	SW846 8260C	Carbon Tetrachloride	<1	µg/L	SW846 8260C

Surrogate	Recovery	Method
p-Terphenyl	86	NWTPH-D
Dibromofluoromethane	114	SW846 8260C
1,2-Dichloroethane-d4	120	SW846 8260C
Toluene-d8	88	SW846 8260C

Surrogate	Recovery	Method
4-Bromofluorobenzene	95	SW846 8260C

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager
 dj4/djs

06/12/2019

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Mike Rhubright

P.O.#: Auth #19-06-06-112
 Project: Kosmos
 Client ID: Rainy Creek
 Sample Matrix: Water
 Date Sampled: 06/05/2019
 Date Received: 06/06/2019
 Spectra Project: 2019060159
 Spectra Number: 1

Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Chlorobenzene	<1	µg/L	SW846 8260C	Vinyl chloride	<1	µg/L	SW846 8260C
Chlorodibromomethane	<1	µg/L	SW846 8260C	cis-1,2-Dichloroethene	<1	µg/L	SW846 8260C
Chloroethane	<1	µg/L	SW846 8260C	cis-1,3-Dichloropropene	<1	µg/L	SW846 8260C
Chloroform	<1	µg/L	SW846 8260C	n-Butylbenzene	<1	µg/L	SW846 8260C
Chloromethane	<1	µg/L	SW846 8260C	n-Propylbenzene	<1	µg/L	SW846 8260C
Dibromomethane	<1	µg/L	SW846 8260C	sec-Butylbenzene	<1	µg/L	SW846 8260C
Dichlorodifluoromethane	<1	µg/L	SW846 8260C	tert-Butylbenzene	<1	µg/L	SW846 8260C
Ethylbenzene	<1	µg/L	SW846 8260C	trans-1,2-Dichloroethene	<1	µg/L	SW846 8260C
Hexachlorobutadiene	<1	µg/L	SW846 8260C	trans-1,3-Dichloropropene	<1	µg/L	SW846 8260C
Iodomethane	<10	µg/L	SW846 8260C				
Isopropylbenzene	<1	µg/L	SW846 8260C				
Methyl-tert-Butyl Ether	<1	µg/L	SW846 8260C				
Methylene chloride	<5	µg/L	SW846 8260C				
Naphthalene	<1	µg/L	SW846 8260C				
Styrene	<1	µg/L	SW846 8260C				
Tetrachloroethene	<1	µg/L	SW846 8260C				
Toluene	<1	µg/L	SW846 8260C				
Total Xylenes	<2	µg/L	SW846 8260C				
Trichloroethene	<1	µg/L	SW846 8260C				
Trichlorofluoromethane	<1	µg/L	SW846 8260C				
Vinyl Acetate	<10	µg/L	SW846 8260C				

Surrogate	Recovery	Method
p-Terphenyl	86	NWTPH-D
Dibromofluoromethane	114	SW846 8260C
1,2-Dichloroethane-d4	120	SW846 8260C
Toluene-d8	88	SW846 8260C

Surrogate	Recovery	Method
4-Bromofluorobenzene	95	SW846 8260C

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager
 a14/djs

June 12, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Mike Rhubright

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019060159
Applies to Spectra #: 1

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 6/10/2019
Units: ug/L Date Analyzed: 6/11/2019

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	2257	90

METHOD BLANK

Date Extracted: 6/10/2019 Date Analyzed: 6/11/2019
Units: ug/L

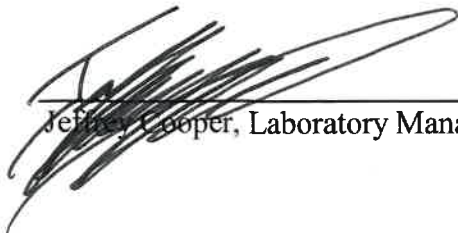
Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 66%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

June 7, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Sample matrix: Water

Spectra Project:
Spectra #
Applies to Samples

Date Analyzed:

Dilution:
<= less than
2019060159
Method Blank
#1

6/6/2019

1

VOLATILE ORGANIC ANALYSIS

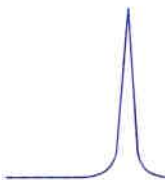
METHOD 624/8260

Compound	ug/L	Compound	ug/L
Acetone	< 10	1,2-Dichloropropane	< 1
Acrolein	< 10	1,3-Dichloropropane	< 1
Acrylonitrile	< 10	cis-1,3-Dichloropropene	< 1
Benzene	< 1	trans-1,3-Dichloropropene	< 1
Bromobenzene	< 1	2,2-Dichloropropane	< 1
Bromochloromethane	< 1	1,1-Dichloropropane	< 1
Bromodichloromethane	< 1	Ethylbenzene	< 1
Bromoform	< 1	2-Hexanone (MBK)	< 10
Bromomethane	< 1	Hexachlorobutadiene	< 1
2-Butanone (MEK)	< 10	Iodomethane	< 10
n-Butylbenzene	< 1	Isopropylbenzene	< 1
sec-Butylbenzene	< 1	p-Isopropyltoluene	< 1
tert-Butylbenzene	< 1	Methylene chloride	< 5
Carbon Disulfide	< 10	4-Methyl-2-pentanone (MIBK)	< 10
Carbon tetrachloride	< 1	MTBE	< 1
Chlorobenzene	< 1	Naphthalene	< 1
Chlorodibromomethane	< 1	n-Propylbenzene	< 1
Chloroethane	< 1	Styrene	< 1
2-Chloroethyl Vinyl ether	< 10	1,1,1,2-Tetrachloroethane	< 1
Chloroform	< 1	1,1,2,2-Tetrachloroethane	< 1
Chloromethane	< 1	Tetrachloroethene	< 1
2-Chlorotoluene	< 1	Toluene	< 1
4-Chlorotoluene	< 1	Total Xylenes	< 2
1,2-Dibromo-3-Chloropropane (DBCP)	< 10	1,2,3-Trichlorobenzene	< 2
1,2-Dibromoethane (EDB)	< 1	1,2,4-Trichlorobenzene	< 2
Dibromomethane	< 1	1,1,1-Trichloroethane	< 1
1,2-Dichlorobenzene	< 1	1,1,2-Trichloroethane	< 1
1,3-Dichlorobenzene	< 1	Trichloroethene	< 1
1,4-Dichlorobenzene	< 1	Trichlorofluoromethane	< 1
Dichlorodifluoromethane	< 1	1,2,3-Trichloropropane	< 1
1,1-Dichloroethane	< 1	1,2,4-Trimethylbenzene	< 1
1,2-Dichloroethane	< 1	1,3,5-Trimethylbenzene	< 1
1,1-Dichloroethene	< 1	Vinyl Acetate	< 10
cis-1,2-Dichloroethene	< 1	Vinyl chloride	< 1
trans-1,2-Dichloroethene	< 1	Gasoline	< 50

SURROGATE RECOVERIES

Dibromofluoromethane	113	%
1,2-Dichloroethane-d4	115	%
Toluene-d8	90	%
4-Bromofluorobenzene	95	%


Jeffrey Cooper
Laboratory Manager



June 7, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Sample Matrix: Water
EPA Method: 624/ 8260C
Spectra Project: 2019060159
Date Analyzed: 6/6/2019
Units: ug/L
Applies to Spectra #'s: #1

**GCMS VOLATILE ORGANIC ANALYSIS
Laboratory Control Sample (LCS) Results**

COMPOUND	SAMPLE RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
1,1-Dichloroethene	<1	10.00	10.6	106
Benzene	<1	10.00	11.0	110
Trichloroethene	<1	10.00	10.8	108
Toluene	<1	10.00	10.8	108
Chlorobenzene	<1	10.00	10.8	108

Surrogate Recoveries (%)	LCS
Dibromofluoromethane	102
1,2-Dichloroethane-d4	103
Toluene-d8	100
4-Bromofluorobenzene	92


Jeffrey Cooper
Laboratory Manager

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

** VOA vials are unpreserved*

CHAIN OF CUSTODY

SPECTRA PROJECT #
2019060159

Return Samples: Y

Page 1 of 1

STANDARD

RUSH

CLIENT: *Tacoma Power*

ADDRESS:

ADDRESS CHANGE

PROJECT: *Kosmos*

CONTACT: *Mike Rhubright*

SAMPLED BY: *J. Hildebrand / M. Rhubright*

PHONE: *502 8520* FAX:

e-MAIL: *mr.rhubright@ci.tacoma.wa.us* Prefer FAX e-MAIL

PURCHASE ORDER # *19-06-06-112*

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS			OTHER									
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270-625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX/EOX	TURBIDITY	FLASH POINT	BOD

	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
1	<i>Rainy Creek</i>	<i>6/5/19</i>	<i>14:00</i>	<i>water 3</i>
2				
3				
4				
5				
6				
7				
8				
9				
10				

LAB USE ONLY	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>Mike Rhubright</i>	<i>Mike Rhubright</i>	<i>TPU</i>	<i>6/6/19</i>	<i>14:30</i>
RECEIVED BY	<i>Marie Holt</i>	<i>MARIE HOLT</i>	<i>Spectra</i>	<i>6-6-19</i>	<i>2:30</i>
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC

08/20/2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Mike Rhubright

P.O.#: Auth #19-08-13-155
Project: Kosmos
Client ID: Kosmos-Upland
Sample Matrix: Soil/Oil
Date Sampled: 08/09/2019
Date Received: 08/13/2019
Spectra Project: 2019080321
Spectra Number: 1

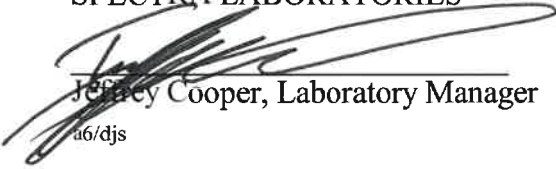
<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
HCID- Gasoline	<11000	mg/Kg	NWTPH-HCID
HCID-Diesel	<11000	mg/Kg	NWTPH-HCID
HCID-Oil	present*	mg/Kg	NWTPH-HCID

*Chromatogram was present for heavy oil range organics, however the pattern was not exclusively heavy oil, possible mineral oil present. However the pattern difference is not able to be determined.

*Surrogate diluted out of sample.

<u>Surrogate</u>	<u>Recovery</u>	<u>Method</u>
4-Bromofluorobenzene	0*	NWTPH-HCID
p-Terphenyl	0*	NWTPH-HCID

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

u6/djs

August 20, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma WA 98411
Attn: Mike Rhubright

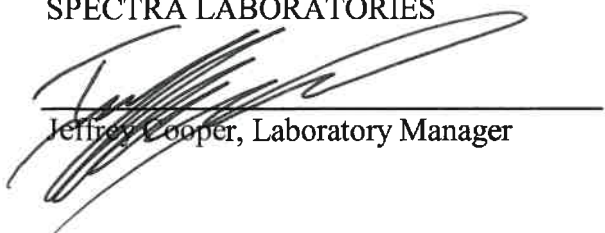
Method: WDOE NWTPH-HCID
Sample Matrix: Soil/Oil
Units: mg/Kg
Spectra Project: 2019080321
Applies to Spectra # 1

HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

METHOD BLANK

Date Extracted:	8/19/2019	Date Analyzed:	8/19/2019
HCID-Gasoline	<20		
HCID-Diesel	<50		
Heavy Oil	<100		

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838

www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

** Oil Product Identification Suspected Bunkers*

CHAIN OF CUSTODY

SPECTRA PROJECT #

2019080321

Return Samples: Y N

Page *1* of *1*

STANDARD

RUSH

CLIENT: *Taloma Power*

ADDRESS:

ADDRESS CHANGE

PROJECT: *Kosmos*
 CONTACT: *Mike Rubright*
 SAMPLED BY:
 PHONE: *253 502 8520* FAX:
 e-MAIL: *mrhubrig@ci.taloma.wa.us* Prefer FAX or e-MAIL
 PURCHASE ORDER # *19-08-13-155*

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS			OTHER									
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270-625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX/EOX	TURBIDITY	FLASH POINT	BOD

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
<i>Kosmos-upland</i>	<i>8/9/19</i>	<i>14:00</i>	<i>oil soil</i>
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

<i>1</i>	<i>X</i>																						

LAB USE ONLY

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>[Signature]</i>	<i>Mike Rubright</i>	<i>TPU</i>	<i>8/13/19</i>	<i>13:36</i>
RECEIVED BY	<i>[Signature]</i>	<i>Janice Bore</i>	<i>TPU</i>	<i>8/13/19</i>	<i>1336</i>
RELINQUISHED BY	<i>[Signature]</i>	<i>Janice Bore</i>	<i>TPU</i>	<i>8/13/19</i>	<i>1652</i>
RECEIVED BY	<i>[Signature]</i>	<i>Rachyn Peirce</i>	<i>Spectra</i>	<i>8-13-19</i>	<i>1652</i>

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC

10/25/2019

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Mike Rhubright

P.O.#: Auth #19-10-11-178
 Project: Kosmos Town Site
 Client ID: Kosmos Seep
 Sample Matrix: Soil
 Date Sampled: 10/10/2019
 Date Received: 10/11/2019
 Spectra Project: 2019100391
 Spectra Number: 1

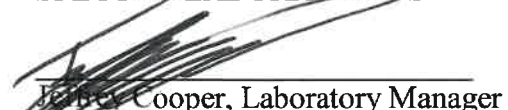
Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	5210	mg/Kg	NWTPH-D	1,1-Dichloropropene	<0.05	mg/Kg	SW846 8260C
Oil	9190	mg/Kg	NWTPH-D	1,2,3-Trichlorobenzene	<0.05	mg/Kg	SW846 8260C
Gasoline	<5	mg/Kg	NWTPH-G	1,2,3-Trichloropropane	<0.05	mg/Kg	SW846 8260C
Total Arsenic	< 2.5	mg/Kg	SW846 6010D	1,2,4-Trichlorobenzene	<0.05	mg/Kg	SW846 8260C
Total Barium	42.5	mg/Kg	SW846 6010D	1,2-Dibromo3Chloropropane	<0.5	mg/Kg	SW846 8260C
Total Cadmium	< 0.3	mg/Kg	SW846 6010D	1,2-Dichlorobenzene	<0.05	mg/Kg	SW846 8260C
Total Chromium	12.8	mg/Kg	SW846 6010D	1,2-Dichloroethane	<0.05	mg/Kg	SW846 8260C
Total Copper	45.2	mg/Kg	SW846 6010D	1,2-Dichloropropane	<0.05	mg/Kg	SW846 8260C
Total Lead	< 2.5	mg/Kg	SW846 6010D	1,3-Dichlorobenzene	<0.05	mg/Kg	SW846 8260C
Total Nickel	10.9	mg/Kg	SW846 6010D	1,3-Dichloropropane	<0.05	mg/Kg	SW846 8260C
Total Selenium	< 2.5	mg/Kg	SW846 6010D	1,4-Dichlorobenzene	<0.05	mg/Kg	SW846 8260C
Total Silver	< 0.7	mg/Kg	SW846 6010D	2,2-Dichloropropane	<0.05	mg/Kg	SW846 8260C
Total Zinc	48.6	mg/Kg	SW846 6010D	2-Chlorotoluene	<0.05	mg/Kg	SW846 8260C
Total Mercury	<0.05	mg/Kg	SW846 7471B	4-Chlorotoluene	<0.05	mg/Kg	SW846 8260C
PCB	<0.01	mg/Kg	SW846 8082A	Benzene	<0.05	mg/Kg	SW846 8260C
1,1,1,2-Tetrachloroethane	<0.05	mg/Kg	SW846 8260C	Bromochloromethane	<0.05	mg/Kg	SW846 8260C
1,1,1-Trichloroethane	<0.05	mg/Kg	SW846 8260C	Bromodichloromethane	<0.05	mg/Kg	SW846 8260C
1,1,2,2-Tetrachloroethane	<0.05	mg/Kg	SW846 8260C	Carbon Tetrachloride	<0.05	mg/Kg	SW846 8260C
1,1,2-Trichloroethane	<0.05	mg/Kg	SW846 8260C	Chlorobenzene	<0.05	mg/Kg	SW846 8260C
1,1-Dichloroethane	<0.05	mg/Kg	SW846 8260C	Chlorodibromomethane	<0.05	mg/Kg	SW846 8260C
1,1-Dichloroethene	<0.05	mg/Kg	SW846 8260C	Chloroethane	<0.05	mg/Kg	SW846 8260C

*Surrogates diluted out of range.

Surrogate	Recovery	Method
Nitrobenzene-d5	0*	SW846 8270D
2-Fluorobiphenyl	0*	SW846 8270D
p-Terphenyl-d14	0*	SW846 8270D
Toluene-d8	94	SW846 8260C

Surrogate	Recovery	Method
Dibromofluoromethane	96	SW846 8260C
4-Bromofluorobenzene	92	SW846 8260C
1,2-Dichloroethane-d4	104	SW846 8260C
Decachlorobiphenyl	63	SW846 8082A

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager
 a14/jac

10/25/2019

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Mike Rhubright

P.O.#: Auth #19-10-11-178
 Project: Kosmos Town Site
 Client ID: Kosmos Seep
 Sample Matrix: Soil
 Date Sampled: 10/10/2019
 Date Received: 10/11/2019
 Spectra Project: 2019100391
 Spectra Number: 1

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Chloroform	<0.05	mg/Kg	SW846 8260C	Anthracene	<4.1	mg/Kg	SW846 8270D
Chloromethane	<0.05	mg/Kg	SW846 8260C	Benzo(a)Anthracene	<4.1	mg/Kg	SW846 8270D
Dichlorodifluoromethane	<0.05	mg/Kg	SW846 8260C	Benzo(a)Pyrene	<4.1	mg/Kg	SW846 8270D
Ethylbenzene	<0.05	mg/Kg	SW846 8260C	Benzo(b)Fluoranthene	<4.1	mg/Kg	SW846 8270D
Hexachlorobutadiene	<0.05	mg/Kg	SW846 8260C	Benzo(ghi)Perylene	<4.1	mg/Kg	SW846 8270D
Methyl-tert-Butyl Ether	<0.05	mg/Kg	SW846 8260C	Benzo(k)Fluoranthene	<4.1	mg/Kg	SW846 8270D
Methylene chloride	<0.25	mg/Kg	SW846 8260C	Chrysene	5.36	mg/Kg	SW846 8270D
Tetrachloroethene	<0.05	mg/Kg	SW846 8260C	Dibenz(a,h)Anthracene	<4.1	mg/Kg	SW846 8270D
Toluene	<0.05	mg/Kg	SW846 8260C	Fluoranthene	<4.1	mg/Kg	SW846 8270D
Total Xylenes	<0.1	mg/Kg	SW846 8260C	Fluorene	<4.1	mg/Kg	SW846 8270D
Trichloroethene	<0.05	mg/Kg	SW846 8260C	Indeno(1,2,3-cd)Pyrene	<4.1	mg/Kg	SW846 8270D
Trichlorofluoromethane	<0.05	mg/Kg	SW846 8260C	Naphthalene	<4.1	mg/Kg	SW846 8270D
Vinyl chloride	<0.05	mg/Kg	SW846 8260C	Phenanthrene	10.5	mg/Kg	SW846 8270D
cis-1,2-Dichloroethene	<0.05	mg/Kg	SW846 8260C	Pyrene	6.05	mg/Kg	SW846 8270D
cis-1,3-Dichloropropene	<0.05	mg/Kg	SW846 8260C				
trans-1,2-Dichloroethene	<0.05	mg/Kg	SW846 8260C				
trans-1,3-Dichloropropene	<0.05	mg/Kg	SW846 8260C				
1-Methylnaphthalene	9.72	mg/Kg	SW846 8270D				
2-Methylnaphthalene	4.96	mg/Kg	SW846 8270D				
Acenaphthene	<4.1	mg/Kg	SW846 8270D				
Acenaphthylene	<4.1	mg/Kg	SW846 8270D				

*Surrogates diluted out of range.

Surrogate	Recovery	Method
Nitrobenzene-d5	0*	SW846 8270D
2-Fluorobiphenyl	0*	SW846 8270D
p-Terphenyl-d14	0*	SW846 8270D
Toluene-d8	94	SW846 8260C

Surrogate	Recovery	Method
Dibromofluoromethane	96	SW846 8260C
4-Bromofluorobenzene	92	SW846 8260C
1,2-Dichloroethane-d4	104	SW846 8260C
Decachlorobiphenyl	63	SW846 8082A

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

aljac

October 25, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Mike Rhubright

Method: NWTPH-Dx
Sample Matrix: Soil
Spectra Project: 2019100391
Applies to Spectra #: 1
Units: mg/Kg

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

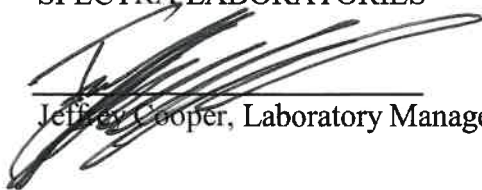
BLANK SPIKE (LCS)

Date Extracted:	10/16/19	Date Analyzed:	10/17/19	
<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<10.0	125	108.7	87.0

METHOD BLANK

Date Extracted:	10/16/19	Date Analyzed:	10/17/19
Diesel	<10.0	mg/Kg	
Heavy Oil	<50.0	mg/Kg	
Surrogate Recovery:	p-terphenyl	77%	

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

10/17/2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: mg/Kg
Spectra Project: 2019100391
Applies to Spectra #'s: 1
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP Metals SW846 6010D - Soil/Solids

Method Blank	
Date Digested: 10/17/2019	Date Analyzed: 10/17/2019
Element	Blank Result
Arsenic	< 2.5
Barium	< 0.2
Cadmium	< 0.3
Chromium	< 0.7
Copper	< 0.6
Lead	< 2.5
Nickel	< 1.5
Selenium	< 2.5
Silver	< 0.7
Zinc	< 0.6

Laboratory Control Sample (LCS)			
Date Digested: 10/17/2019	Date Analyzed: 10/17/2019		
Element	Spike Addition	LCS Conc.	LCS %Rec
Arsenic	200.0	190.0	95.0
Barium	200.0	192.9	96.5
Cadmium	200.0	187.2	93.6
Chromium	200.0	187.7	93.9
Copper	200.0	188.7	94.4
Lead	200.0	189.9	95.0
Nickel	200.0	193.8	96.9
Selenium	200.0	178.6	89.3
Silver	200.0	210.9	105.5
Zinc	200.0	196.7	98.4

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)							
Date Digested: 10/17/2019	Date Analyzed: 10/17/2019						
Sample Spiked: 2019100389-1							
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.0	200.0	184.4	92.2	185.1	92.6	0.4
Barium	16.3	200.0	197.5	90.6	203.3	93.5	3.2
Cadmium	0.0	200.0	180.1	90.1	180.5	90.3	0.2
Chromium	1.2	200.0	183.3	91.1	184.0	91.4	0.4
Copper	102.6	200.0	321.6	109.5	286.2	91.8	17.6
Lead	0.0	200.0	177.7	88.9	178.6	89.3	0.5
Nickel	66.2	200.0	242.2	88.0	241.0	87.4	0.7
Selenium	0.0	200.0	163.7	81.9	164.0	82.0	0.2
Silver	0.0	200.0	208.5	104.3	206.5	103.3	1.0
Zinc	60.3	200.0	252.4	96.1	248.5	94.1	2.1

Recovery Limits 75-125%

RPD Limit 20

Comment:

Spectra Laboratories

Jeffrey J. ...
Laboratory Manager

October 16, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: SW846 7471B
Spectra Project: 2019100391
Applies to Spectra #'s: 1
Sample Matrix: Soil
Units: mg/Kg
Analyst: CK

**MERCURY
QUALITY CONTROL RESULTS**

METHOD BLANK

Date Analyzed: 10/16/19

Mercury <0.05

LABORATORY CONTROL SAMPLE

Date Analyzed: 10/16/19

	<u>Sample Result</u>	<u>Spike Added</u>	<u>MS Result</u>	<u>% Recovery</u>
Mercury	<0.05	0.5000	0.487	97.4

Recovery Limit: 78-117%

MS/MSD

Date Analyzed: 10/16/19

<u>Spiked Sample</u>	<u>Sample Result</u>	<u>Spike Added</u>	<u>MS Result</u>	<u>% Recovery</u>	<u>MSD Result</u>	<u>% Recovery</u>	<u>RPD</u>
2019100389-1	0.000	0.4000	0.416	104.0	0.424	106.0	1.9

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

October 25, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Mike Rhubright

Method: EPA Method 8082A
Sample Matrix: Soil
Units: mg/Kg
Spectra Project: 2019100391
Applies to Spectra # 1

**PCB ANALYSIS
QUALITY CONTROL RESULTS**

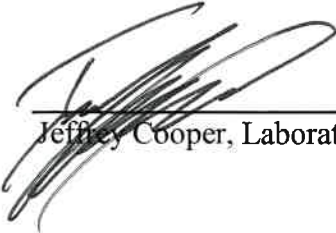
BLANK SPIKE (LCS)

Date Extracted:	10/16/2019			Date Analyzed:	10/17/2019
		Spike	Spike		
	Sample	Amount	Amount	Percent	
<u>Compound</u>	<u>Result</u>	<u>Added</u>	<u>Found</u>	<u>Recovery</u>	
AR1260	<0.01	0.025	0.0193	77%	

METHOD BLANK

Date Extracted:	10/16/2019			Date Analyzed:	10/17/2019
PCB's	<0.01				
Surrogate Recovery:					
Decachlorobiphenyl	77%				

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

METHOD BLANK VOA SOLID ANALYSIS

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98407

Sample ID: **Method Blank**
Sample Matrix: **Soil**
Spectra Project: **2019100391**

Methanolic Extraction


Date Analyzed: 10/16/2019
Sample Weight (g): 5g
< = less than
#1

VOLATILE ORGANIC ANALYSIS:

Compound	mg/Kg	Compound	METHOD 8260C-MeOH Ext. mg/Kg
Acetone	< 0.50	1,2-Dichloropropane	< 0.05
Benzene	< 0.05	1,3-Dichloropropane	< 0.05
Bromobenzene	< 0.05	cis-1,3-Dichloropropene	< 0.05
Bromochloromethane	< 0.05	trans-1,3-Dichloropropene	< 0.05
Bromodichloromethane	< 0.05	2,2-Dichloropropane	< 0.05
Bromoform	< 0.05	1,1-Dichloropropene	< 0.05
Bromomethane	< 0.05	Ethylbenzene	< 0.05
2-Butanone (MEK)	< 0.50	2-Hexanone (MBK)	< 0.50
n-Butylbenzene	< 0.05	Hexachlorobutadiene	< 0.05
sec-Butylbenzene	< 0.05	Isopropylbenzene	< 0.05
tert-Butylbenzene	< 0.05	p-Isopropyltoluene	< 0.05
Carbon tetrachloride	< 0.05	Methylene chloride	< 0.25
Chlorobenzene	< 0.05	4-Methyl-2-pentanone (MIBK)	< 0.50
Chlorodibromomethane	< 0.05	Naphthalene	< 0.05
Chloroethane	< 0.05	n-Propylbenzene	< 0.05
Chloroform	< 0.05	Styrene	< 0.05
Chloromethane	< 0.05	1,1,1,2-Tetrachloroethane	< 0.05
2-Chlorotoluene	< 0.05	1,1,2,2-Tetrachloroethane	< 0.05
4-Chlorotoluene	< 0.05	Tetrachloroethene	< 0.05
1,2-Dibromo-3-Chloropropane (DBCP)	< 0.50	Toluene	< 0.05
1,2-Dibromoethane (EDB)	< 0.05	1,2,3-Trichlorobenzene	< 0.05
Dibromomethane	< 0.05	1,2,4-Trichlorobenzene	< 0.05
1,2-Dichlorobenzene	< 0.05	1,1,1-Trichloroethane	< 0.05
1,3-Dichlorobenzene	< 0.05	1,1,2-Trichloroethane	< 0.05
1,4-Dichlorobenzene	< 0.05	Trichloroethene	< 0.05
Dichlorodifluoromethane	< 0.05	Trichlorofluoromethane	< 0.05
1,1-Dichloroethane	< 0.05	1,2,3-Trichloropropane	< 0.05
1,2-Dichloroethane	< 0.05	1,2,4-Trimethylbenzene	< 0.05
1,1-Dichloroethene	< 0.05	1,3,5-Trimethylbenzene	< 0.05
cis-1,2-Dichloroethene	< 0.05	Vinyl chloride	< 0.05
trans-1,2-Dichloroethene	< 0.05	Total Xylenes	< 0.05
		Methyl tert-butyl ether	< 0.05
		Acrolein	< 0.50
		Acrylonitrile	< 0.50
		Vinyl Acetate	< 0.50
		Gasoline	< 5

SURROGATE RECOVERIES

Dibromofluoromethane	99	%
1,2-Dichloroethane-d4	106	%
Toluene-d8	95	%
4-Bromofluorobenzene	97	%


Jeffrey Boone
Laboratory Manager

October 21, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Sample Matrix: Soil
EPA Method: 8260C
Spectra Project: 2019100391
Date Analyzed: 10/16/2019
Units: mg/Kg
Applies to Spectra #'s: #1

GCMS VOLATILE ORGANIC ANALYSIS
Laboratory Control Sample (LCS) Results

COMPOUND	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
1,1-Dichloroethene	0.50	0.559	112
Benzene	0.50	0.490	98.0
Trichloroethene	0.50	0.517	103
Toluene	0.50	0.525	105
Chlorobenzene	0.50	0.491	98.2
Gasoline	12.5	12.4	99.2

Surrogate Recoveries (%)	LCS
Dibromofluoromethane	99
1,2-Dichloroethane-d4	102
Toluene-d8	97
4-Bromofluorobenzene	99



Jeffrey Cooper
Laboratory Manager

10/25/2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

METHOD BLANK RESULTS

Sample matrix: Solid
Spectra Project: 2019100391
Applies to: #1

Date Extracted: 10/16/2019
Date Analyzed: 10/17/2019
Dilution: 1
< = less than

POLYNUCLEAR AROMATIC HYDROCARBON ANALYSIS

METHOD 8270

Compound	mg/Kg	Compound	mg/Kg
Naphthalene	< 0.033	Benzo(a)Anthracene	< 0.033
2-Methylnaphthalene	< 0.033	Chrysene	< 0.033
Acenaphthylene	< 0.033	Benzo(b)Fluoranthene	< 0.033
Acenaphthene	< 0.033	Benzo(k)Fluoranthene	< 0.033
Fluorene	< 0.033	Benzo(a)Pyrene	< 0.033
Phenanthrene	< 0.033	Indeno(1,2,3-cd)Pyrene	< 0.033
Anthracene	< 0.033	Dibenzo(a,h)Anthracene	< 0.033
Fluoranthene	< 0.033	Benzo(g,h,i)Perylene	< 0.033
Pyrene	< 0.033	1-Methylnaphthalene	< 0.033

SURROGATE RECOVERIES

Nitrobenzene-d5	43	%
2-Fluorobiphenyl	39	%
p-Terphenyl-d14	74	%



Jeffrey Cooper
Laboratory Manager

October 25, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Spectra Project # 2019100391
Sample Spiked: Method Blank
Date Extracted: 10/16/2019
Date Analyzed: 10/17/2019
Units: mg/Kg
Applies to Spectra #'s: #1

**GCMS Semi-Volatile Organic Analysis, Method 8270D (Scan Mode)
Blank Spike (LCS) Results in Soil/ Solids**

Compound	Blank Conc.	Spike Added	LCS Conc.	LCS %Rec	Rec. Limits
Phenol	<0.08	2.50	1.59	64	32-84
2-Chlorophenol	<0.08	2.50	1.57	63	35-84
1,4-Dichlorobenzene	<0.08	1.67	1.05	63	15-90
N-Nitroso-Di-N-Propylamine	<0.08	1.67	1.08	65	31-104
1,2,4-Trichlorobenzene	<0.08	1.67	1.10	66	24-82
4-Chloro-3-Methylphenol	<0.08	2.50	1.70	68	34-107
Acenaphthene	<0.03	1.67	1.16	70	34-98
2,4-Dinitrotoluene	<0.08	1.67	1.02	61	32-105
4-Nitrophenol	<0.08	2.50	1.99	80	26-156
Pentachlorophenol	<0.08	2.50	0.64	25	0-85
Pyrene	<0.03	1.67	1.15	69	40-135

Surrogates	%Rec
2-Fluorophenol	63
Phenol-d5	66
Nitrobenzene-d5	76
2-Fluorobiphenyl	70
2,4,6-Tribromophenol	69
p-Terphenyl-d14	78



Jeffrey Cooper
Laboratory Manager

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

RCRA metals
 + Cu Ni + Zn

CHAIN OF CUSTODY

SPECTRA PROJECT #

209100391

Return Samples: Y N

Page 1 of 1

STANDARD

RUSH

CLIENT: Tacoma Power

ADDRESS:

ADDRESS CHANGE

PROJECT: Kosmos Town Site

CONTACT: Mike Rhubright

SAMPLED BY: Jame Bozic

PHONE: (253) 502 8520 FAX: _____

e-MAIL: mrhubrigh@ci.tacoma.wa.us Prefer FAX or e-MAIL

PURCHASE ORDER # 19-10-11-170

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS			OTHER										
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270-625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY) <u>Cu, Ni + Zn</u>	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TXTOX/EOX	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
<u>1 Kosmos Seep</u>	<u>10/10/19</u>	<u>11:00</u>	<u>soil + product</u>

LAB USE ONLY	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<u>[Signature]</u>	<u>Mike Rhubright</u>	<u>TPU</u>	<u>10/11/19</u>	<u>0942</u>
RECEIVED BY	<u>[Signature]</u>	<u>Patricia Riley</u>	<u>Spectra</u>	<u>10.11.19</u>	<u>0942</u>
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC

APPENDIX B
AIRO 1993 Site Assessment Report

SITE ASSESSMENT REPORT
RIFFE LAKE RESERVOIR
FORMER KOSMOS MILL SITE
GLENOMA, WA

Prepared for:

TACOMA PUBLIC UTILITIES
3628 SOUTH 35TH STREET
TACOMA, WA 98411

Prepared by:

AIRO ENVIRONMENTAL SERVICES, INC.
4110 EAST 11TH STREET
TACOMA, WA 98275

March 31, 1993

Site History:

The Riffe Lake reservoir is part of the power generating system operated by Tacoma Public Utilities (TPU). It is located south of the town of Morton, Washington, off Highway 12. When the reservoir was created in 1968, it flooded the town of Kosmos at the east end of the lake. Next to the town was a lumber mill that was abandoned at the same time. All buildings were torn down to their foundations before the water covered the former town and mill site. This area is under water most of the year. During winter drawdown, the water level in the reservoir drops exposing the area. Spring rainfall and snow melt normally reflow the site. Due to the extreme drought conditions in 1992, this area was dry and accessible to vehicular traffic for an extended time.

In July, 1992, TPU contacted AIRO Services, Inc. Campers at the reservoir had discovered two (2) tanks at the former mill site. AIRO mobilized to the site to remove the tanks.

Site Operations:

On July 21, 1992, AIRO sampled the two (2) USTs (Lab Report #72101 & 72102). The first tank was partially exposed sticking out of an earthen bank. It was filled with lake water. The tank appeared to be a 500 gallon steel tank. The water in the tank had no sheen or any indication of petroleum product. It appeared to have been emptied and left open when the area was originally flooded. The second tank was below ground level and contained product. It was next to the mill site foundations. The soil around the tank was contaminated with heavy oil. The fill opening was uncovered and the tank contents sampled. It appeared to be Bunker C fuel oil.

The tank filled with lake water was analyzed for PCBs and Total Halogens (TX). Neither compound was present. The tank with heavy oil was analyzed for HCID, PCBs, TX. Total Halogens were reported at 5,100 mg/kg. The sample was then further analyzed for semi-volatile and volatile organics per EPA Methods 8270 and 8240.

Between July 28 to July 30, 1992, the tanks were excavated, cleaned, and removed from the site. The 500 gallon tank was lifted from its location and emptied. The larger tank was excavated using a tracked excavator. It was a 5,000 gallon steel tank. The tanks were taken to a scrap metal facility.

The product removed from the large tank was classified as a dangerous waste, W02, under ECOLOGY Dangerous Waste Regulations, Chapter 173 - 303 WAC. This classification used due to the presence of halogenated hydrocarbon

compounds in the oil. 3900 gallons of oil w/ halogenated hydrocarbons was transported to Burlington Environmental, Inc. (BEI) for disposal on manifest #29414.

Soil from the excavation was stockpiled on-site. Approval to dispose of this soil at the Kitsap County Landfill was obtained. Approximately 87 cubic yards was transported and disposed at the landfill.

Site Assessment Sampling:

On July 30, 1992, samples were taken in the excavation area where the 5,000 gallon tank had been located. Sampling was done by Alex Koch of AIRO Environmental Services, Inc. Sample locations were determined at the time of sampling under the direction of Richard Walker, ECOLOGY. Soil samples were taken to Sound Analytical Services, in Fife. All soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) by Method WTPH-418.1 Modified and Total Halogens (TX) per EPA Method 9076. Following are the analytical results from this sampling reported in mg/kg. Refer to Drawing No. 1 for sample locations:

Lab Report #26037, dated August 3, 1992

<u>Sample #</u>	<u>Location</u>	<u>TPH</u>	<u>TX</u>
RIF-1	NE corner, 9.5 ft bgs	<100	<10
RIF-2	Center floor, 9.5 ft bgs	250	<10
RIF-3	West wall, 6.5 ft bgs	310	<10
RIF-4	Duplicate (RIF-3)	<100	<10
RIF-5	Stockpiled material	4300	<10
RIF-6	Stockpiled material	5300	<10

The area was over excavated on August 6, 1992. Samples were retaken from the floor and west wall. Following are their results:

Lab Report #26173, dated August 11, 1992

<u>Sample #</u>	<u>Location</u>	<u>TPH</u>	<u>TX</u>
RIF-2	Center floor, 11 feet bgs	300	<10
RIF-34	West wall, 7 feet bgs	360	<10

The area was again over excavated on August 14, 1992. Refer to Drawing #2 for sample locations. Samples were taken following this activity. Following are their results:

Lab Report #26380, dated August 18, 1992

<u>Sample #</u>	<u>Location</u>	<u>TPH</u>	<u>TX</u>
RIF-11	Center floor, 13 feet bgs	<100	<10
RIF-12	West wall, 7 feet bgs	<100	<10

Summary:

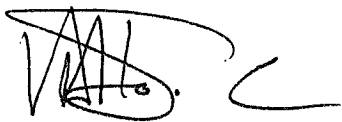
Based on the sampling results, no further excavation was done at the site. There were no piping system exposed during the excavation. The only remaining piping had been attached to the tank and did not continue out of the immediate area around the tank.

The level of ground water in the excavation was approximately ten to eleven feet below ground surface (bgs). There was a light sheen visible, but no floating product.

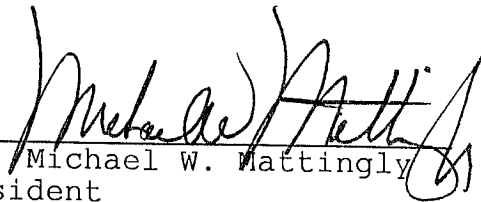
The soil excavated from around the Bunker C tank is normally lake bottom. It is best classified as organic silts and organic silty clays of low plasticity (OL). This material remained consistent to the depth of the excavation.

The area was turned back over to Tacoma Public Utilities.

AIRO Environmental Services, Inc. makes no warranty to the environmental condition of this property or to any bordering property or properties. AES has solely reported findings from specific actions taken as a result of decommissioning of USTs and from performing a site-specific assessment. AES does warranty that all its work performed was in accordance with state and federal regulations and with acceptable industry standards.



Alexander H. Koch
Site Assessment Manager



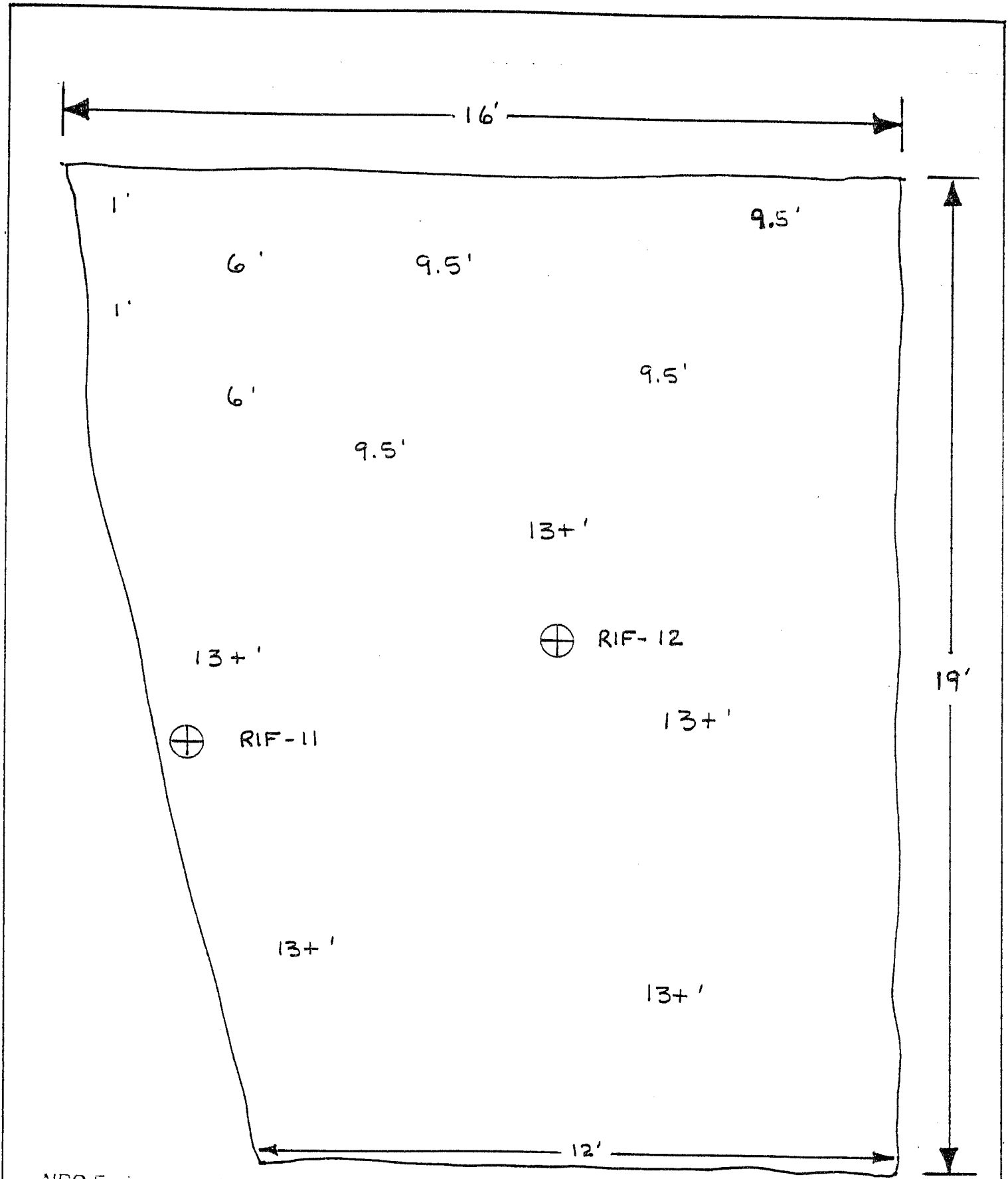
Michael W. Mattingly
President

3.31.93
Date

3.31-93
Date

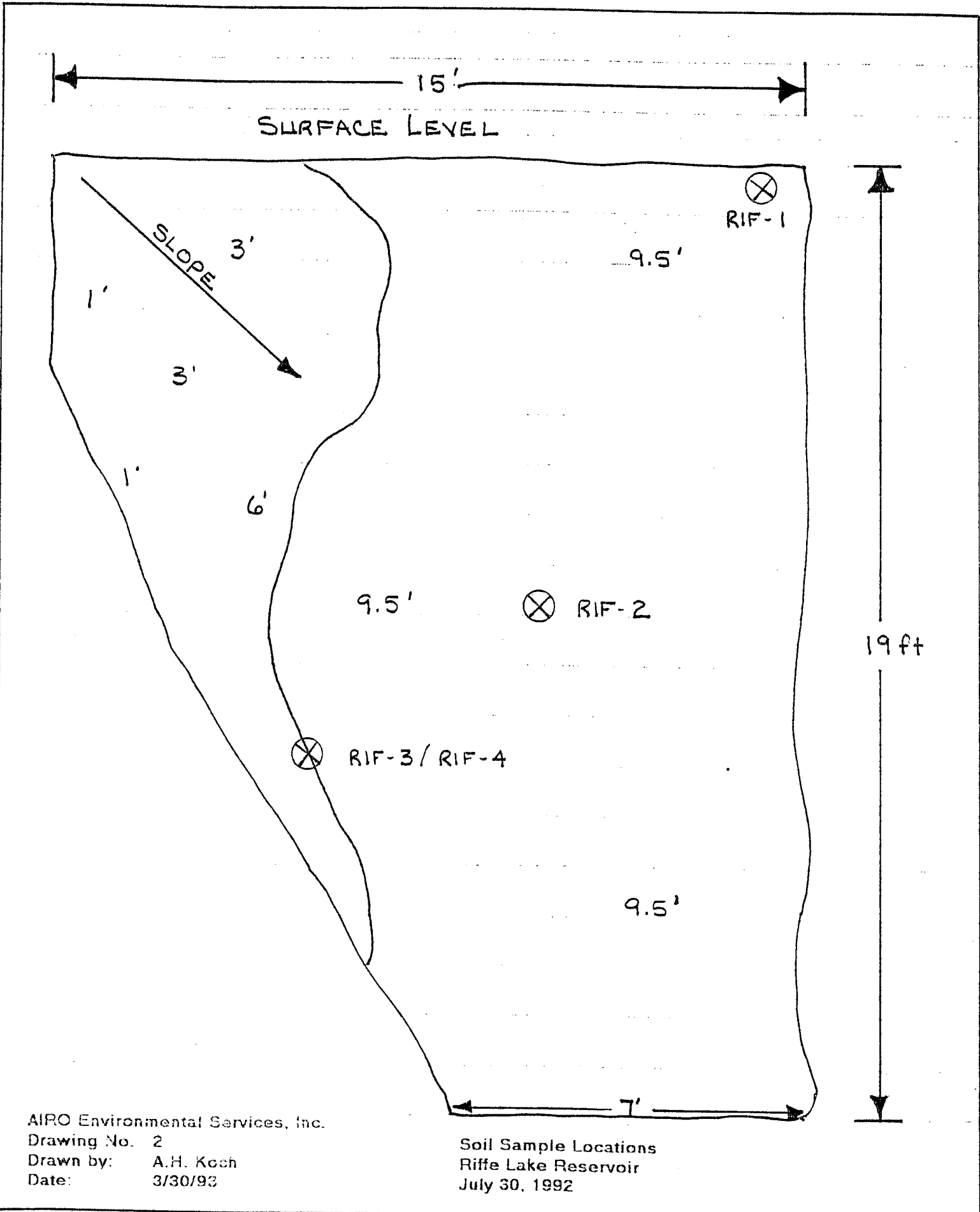
EXHIBIT A

SITE LOCATION MAP AND AREA DRAWINGS



AIRO Environmental Services, Inc.
 Drawing No. 1
 Drawn by: A.H. Koch
 Date: 3/30/93

Soil Sample Locations
 Riffe Lake Reservoir
 August 14, 1992



AIRO Environmental Services, Inc.
Drawing No. 2
Drawn by: A.H. Koch
Date: 3/30/93

Soil Sample Locations
Riffe Lake Reservoir
July 30, 1992

EXHIBIT B

ANALYTICAL REPORTS

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Airo Services, Inc.

Date: July 23, 1992

Revised: July 27, 1992

Report On: Analysis of Waste Oil
& Oily Water

Lab No.: 25760

Page 1 of 8

IDENTIFICATION:

Samples received on 07-21-92

Project: 92ES043

ANALYSIS:

Lab No. 25760-1

Client ID: 72101 (Waste Oil)

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 7-24-92

Date Analyzed: 7-24-92

CAS No.	Compounds	Concentration ug/kg	PQL
108-95-2	Phenol	ND	450,000
111-44-4	bis(2-Chloroethyl) ether	ND	450,000
95-57-8	2-Chlorophenol	ND	450,000
541-73-1	1,3-Dichlorobenzene	ND	450,000
106-46-7	1,4-Dichlorobenzene	ND	450,000
100-51-6	Benzyl Alcohol	ND	900,000
95-50-1	1,2-Dichlorobenzene	ND	450,000
95-48-7	2-Methylphenol	ND	450,000
39638-32-9	bis(2-Chloroisopropyl) ether	ND	450,000
106-44-5	4-Methylphenol	ND	450,000
621-64-7	N-Nitroso-Di-N-propylamine	ND	450,000
67-72-1	Hexachloroethane	ND	450,000
98-95-3	Nitrobenzene	ND	450,000
78-59-1	Isophorone	ND	450,000
88-75-5	2-Nitrophenol	ND	450,000
105-67-9	2,4-Dimethylphenol	ND	450,000
65-85-0	Benzoic Acid	ND	2,200,000
111-91-1	bis(2-Chloroethoxy)methane	ND	450,000
120-83-2	2,4-Dichlorophenol	ND	450,000
120-82-1	1,2,4-Trichlorobenzene	ND	450,000
91-20-3	Naphthalene	*(520,000)	450,000
106-47-8	4-Chloroaniline	ND	900,000
87-68-3	Hexachlorobutadiene	ND	450,000
59-50-7	4-Chloro-3-methylphenol	ND	900,000

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
 Project: 92ES043
 Page 2 of 8
 Lab No. 25760
 July 23, 1992
 Revised: July 27, 1992

Lab No. 25760-1

Client ID: 72101 (Waste Oil)

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL
91-57-6	2-Methylnaphthalene	2,600,000	450,000
77-47-4	Hexachlorocyclopentadiene	ND	450,000
88-06-2	2,4,6-Trichlorophenol	ND	450,000
95-95-4	2,4,5-Trichlorophenol	ND	450,000
91-58-7	2-Chloronaphthalene	ND	450,000
88-74-4	2-Nitroaniline	ND	2,200,000
131-11-3	Dimethyl phthalate	ND	450,000
208-96-8	Acenaphthylene	ND	450,000
99-09-2	3-Nitroaniline	ND	2,200,000
83-32-9	Acenaphthene	*(130,000)	450,000
51-28-5	2,4-Dinitrophenol	ND	2,200,000
100-02-7	4-Nitrophenol	ND	2,200,000
132-64-9	Dibenzofuran	ND	450,000
121-14-2	2,4-Dinitrotoluene	ND	450,000
606-20-2	2,6-Dinitrotoluene	ND	450,000
84-66-2	Diethylphthalate	ND	450,000
7005-72-3	4-Chlorophenyl phenyl ether	ND	450,000
86-73-7	Fluorene	*(240,000)	450,000
100-01-6	4-Nitroaniline	ND	2,200,000
534-52-1	4,6-Dinitro-2-methylphenol	ND	2,200,000
86-30-6	N-Nitrosodiphenylamine	ND	450,000
101-55-3	4-Bromophenyl phenyl ether	ND	450,000
118-74-1	Hexachlorobenzene	ND	450,000
87-86-5	Pentachlorophenol	ND	2,200,000
85-01-8	Phenanthrene	*(800,000)	450,000
120-12-7	Anthracene	*(190,000)	450,000
84-74-2	Di-n-butylphthalate	ND	450,000

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
 Project: 92ES043
 Page 3 of 8
 Lab No. 25760
 July 23, 1992
 Revised: July 27, 1992
 Lab No. 25760-1

Client ID: 72101 (Waste Oil)

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL
206-44-0	Fluoranthene	ND	450,000
129-00-0	Pyrene	*(240,000)	450,000
85-68-7	Butyl benzyl phthalate	ND	450,000
91-94-1	3,3'-Dichlorobenzidine	ND	900,000
56-55-3	Benzo(a)anthracene	*(120,000)	450,000
117-81-7	bis(2-ethylhexyl)phthalate	ND	450,000
218-01-9	Chrysene	*(240,000)	450,000
117-84-0	Di-n-octyl phthalate	ND	450,000
205-99-2	Benzo(b)fluoranthene	ND	450,000
207-08-9	Benzo(k)fluoranthene	ND	450,000
50-32-8	Benzo(a)pyrene	ND	450,000
193-39-5	Indeno(1,2,3-cd)pyrene	ND	450,000
53-70-3	Dibenz(a,h)anthracene	ND	450,000
191-24-2	Benzo(g,h,i)perylene	ND	450,000

ND - Not Detected

PQL - Practical Quantitation Limit - These are the quantitation limits for this sample. This number is based on sample size, matrix and dilution required.

*Compound was detected but below PQL. Value shown is an estimated quantity.

Results are reported on a dry weight basis.

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d ₅	X8	35 - 114	23 - 120
2-Fluorobiphenyl	X8	43 - 116	30 - 115
p-Terphenyl-d ₁₄	X8	33 - 141	18 - 137
Phenol-d ₆	X8	10 - 94	24 - 113
2-Fluorophenol	X8	21 - 100	25 - 121
2,4,6-Tribromophenol	X8	10 - 123	19 - 122

Continued . . .

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
Project: 92ES043
Page 4 of 8
Lab No. 25760
July 23, 1992
Revised: July 27, 1992

Lab No. 25760-1

Client ID: 72101
(Waste Oil)

WTPH-HCID

Date Extracted: 7-21-92
Date Analyzed: 7-21-92

Gasoline, mg/kg (C7 - C12)	< 20
Diesel, mg/kg (> C12 - C24)	> 50
Heavy Oil, mg/kg (C24+)	> 100

SURROGATE RECOVERY, %

1-chlorooctane	X8
o-terphenyl	X8

TOX Per EPA Method 9076
Date Extracted: 7-21-92
Date Analyzed: 7-21-92

Total Halogens, mg/kg 5,100

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
Project: 92ES043
Page 5 of 8
Lab No. 25760
July 23, 1992
Revised: July 27, 1992

Lab No. 25760-1

Client ID: 72101
(Waste Oil)

PCB'S Per EPA Method 8080
Date Extracted: 7-21-92
Date Analyzed: 7-22-92

<u>PCB Compounds</u>	<u>Conc., mg/kg</u>	<u>PQL</u>
Aroclor 1016	ND	1.0
Aroclor 1221	ND	1.0
Aroclor 1232	ND	1.0
Aroclor 1242	ND	1.0
Aroclor 1248	ND	1.0
Aroclor 1254	ND	1.0
Aroclor 1260	ND	1.0

<u>SURROGATE RECOVERY, %</u>	
2,4,5,6-Tetrachloro-m-xylene	94
Decachlorobiphenyl	93

ND = Not Detected.

PQL - Practical Quantitation Limit - These are the detection limits for this sample. This number is based on sample size, matrix and dilution required.

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
 Project: 92ES043
 Page 6 of 8
 Lab No. 25760
 July 23, 1992
 Revised: July 27, 1992

Lab No. 25760-1

Client ID: 72101
 (Waste Oil)

Volatile Organics by Method 8240
 Date Extracted: 7-23-92
 Date Analyzed: 7-23-92

CAS No.	Compounds	Concentration ug/kg	PQL
74-87-3	Chloromethane	ND	4,000
74-83-9	Bromomethane	ND	4,000
75-01-4	Vinyl Chloride	ND	4,000
75-00-3	Chloroethane	ND	4,000
75-09-2	Methylene Chloride	ND	2,000
67-64-1	Acetone	ND	20,000
75-15-0	Carbon Disulfide	ND	2,000
75-35-4	1,1-Dichloroethene	ND	2,000
75-34-3	1,1-Dichloroethane	ND	2,000
540-59-0	1,2-Dichloroethene (Total)	ND	2,000
67-66-3	Chloroform	ND	2,000
107-06-2	1,2-Dichloroethane	ND	2,000
78-93-3	2-Butanone	ND	10,000
71-55-6	1,1,1-Trichloroethane	ND	2,000
56-23-5	Carbon Tetrachloride	ND	2,000
108-05-4	Vinyl Acetate	ND	10,000
75-27-4	Bromodichloromethane	ND	2,000
78-87-5	1,2-Dichloropropane	ND	2,000
10061-01-5	Cis-1,3-Dichloropropene	ND	2,000
79-01-6	Trichloroethene	ND	2,000
124-48-1	Dibromochloromethane	ND	2,000
79-00-5	1,1,2-Trichloroethane	ND	2,000

ND = Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
 Project: 92ES043
 Page 7 of 8
 Lab No. 25760
 July 23, 1992
 Revised: July 27, 1992

Lab No. 25760-1

Client ID: 72101
 (Waste Oil)

8240 Continued

CAS No.	Compounds	Concentration ug/kg	PQL
71-43-2	Benzene	*(1,200)	2,000
10061-02-6	Trans-1,3-Dichloropropene	ND	2,000
75-25-2	Bromoform	ND	2,000
108-10-1	4-Methyl-2-Pentanone	ND	10,000
591-78-6	2-Hexanone	ND	2,000
127-18-4	Tetrachloroethene	ND	2,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	2,000
108-88-3	Toluene	10,000	2,000
108-90-7	Chlorobenzene	ND	2,000
100-41-4	Ethyl Benzene	5,800	2,000
100-42-5	Styrene	ND	2,000
1330-20-7	Total Xylenes	35,000	2,000

ND - Not Detected

PQL - Practical Quantitation Limit - These are the detection limits for this sample. This number is based on sample size, matrix and dilution required.

*Compound was detected but below PQL. Value shown is an estimated quantity.

Results are reported Blank Corrected.

Volatile Surrogates

Surrogate	Percent Recovery	Control Limits
Toluene - D8	96	81 - 117
Bromofluorobenzene	100	74 - 121
1,2-Dichloroethane D4	90	70 - 121

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services, Inc.
Project: 92ES043
Page 8 of 8
Lab No. 25760
July 23, 1992
Revised: July 27, 1992

Lab No. 25760-2

Client ID: 72102
(Oily Water)

PCB'S Per EPA Method 8080
Date Extracted: 7-21-92
Date Analyzed: 7-22-92

<u>PCB Compounds</u>	<u>Conc., mg/l</u>	<u>PQL</u>
Aroclor 1016	ND	0.01
Aroclor 1221	ND	0.01
Aroclor 1232	ND	0.01
Aroclor 1242	ND	0.01
Aroclor 1248	ND	0.01
Aroclor 1254	ND	0.01
Aroclor 1260	ND	0.01

<u>SURROGATE RECOVERY, %</u>	
2,4,5,6-Tetrachloro-m-xylene	100
Decachlorobiphenyl	101

ND - Not Detected

PQL - Practical Quantitation Limit - These are the detection limits for this sample. This number is based on sample size, matrix and dilution required.

TOX Per EPA Method 9076
Date Extracted: 7-21-92
Date Analyzed: 7-21-92

Total Halogens, mg/l < 10

SOUND ANALYTICAL SERVICES

MARTY FRENCH

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 · TELEPHONE (206)922-2310 · FAX (206)922-5047

QUALITY CONTROL REPORT

Page 1 of 2

Client: Airo Services, Inc.
Lab No: 25760mb1
Units: ug/kg
Date: July 23, 1992
Blank No: V4195

METHOD BLANK

VOLATILE ORGANICS EPA SW-846 METHOD 8240

Compound	Blank Value	PQL
Chloromethane	ND	400
Bromomethane	ND	400
Vinyl Chloride	ND	400
Chloroethane	ND	400
Methylene Chloride	950	200
Acetone	ND	2,000
Carbon Disulfide	ND	200
1,1-Dichloroethene	ND	200
1,1-Dichloroethane	ND	200
1,2-Dichloroethene (Total)	ND	200
Chloroform	ND	200
1,2-Dichloroethane	ND	200
2-Butanone	ND	1,000
1,1,1-Trichloroethane	ND	200
Carbon Tetrachloride	ND	200
Vinyl Acetate	ND	1,000
Bromodichloromethane	ND	200
1,2-Dichloropropane	ND	200
Cis-1,3-Dichloropropene	ND	200
Trichloroethene	ND	200
Dibromochloromethane	ND	200
1,1,2-Trichloroethane	ND	200
Benzene	ND	200
Trans-1,3-Dichloropropene	ND	200
Bromoform	ND	200
4-Methyl-2-Pentanone	ND	1,000
2-Hexanone	ND	200
Tetrachloroethene	ND	200
1,1,2,2-Tetrachloroethane	ND	200
Toluene	*(70)	200
Chlorobenzene	ND	200
Ethyl Benzene	*(71)	200
Styrene	ND	200
Total Xylenes	*(110)	200

Continued

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Page 2 of 2

Client: Airo Services, Inc.
Lab No: 25760mbl
Units: ug/kg
Date: July 23, 1992
Blank No: V4195

METHOD BLANK

VOLATILE ORGANICS EPA SW-846 METHOD 8240

ND = Not Detected

PQL = Practical Quantitation Limit - These are the detection limits for this sample. This number is based on sample size, matrix and dilution required.

*Compound was detected but below PQL. Value shown is an estimated quantity.

VOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits	
		Water	Soil
Toluene - d8	101	86 - 115	81 - 117
Bromofluorobenzene	93	76 - 114	74 - 121
1,2-Dichloroethane d4	90	88 - 110	70 - 121

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

WTPH-HCID

Client: Airo Services, Inc.
Lab No: 25760mb2
Units: mg/kg
Date: July 23, 1992

METHOD BLANK

Parameter	Blank Value	FLAGS
Gasoline (C ₇ -C ₁₂)	< 20	
Diesel (>C ₁₂ -C ₂₄)	< 50	
Heavy Petroleum Oil (C ₂₄ +)	< 100	
<u>SURROGATE RECOVERY, %</u>		
1-chlorooctane	98	
o-terphenyl	76	

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

PCB'S by Method 8080

Client: Airo Services, Inc.
Lab No: 25760mb3
Units: mg/kg
Date: July 23, 1992

METHOD BLANK

Compound	Blank Value	PQL
Aroclor 1016	ND	1.0
Aroclor 1221	ND	1.0
Aroclor 1232	ND	1.0
Aroclor 1242	ND	1.0
Aroclor 1248	ND	1.0
Aroclor 1254	ND	1.0
Aroclor 1260	ND	1.0
<u>SURROGATE RECOVERY%</u>		
2,4,5,6-TCMX	103	
Decachlorobiphenyl	101	

ND = Not Detected.

PQL = Practical Quantitation Limit - These are the detection limits for this sample. This number is based on sample size, matrix and dilution required.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Total Halogens

Client: Airo Services, Inc.
Lab No: 25760mb4
Units: mg/l
Date: July 23, 1992

METHOD BLANK

Parameter	Blank Value
TOX	< 1

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

DATA QUALIFIER FLAGS

- ND: Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation limit, corrected for sample dilution.
- J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity. This qualifier is used when estimating a TIC concentration or when the concentration of the analyte is less than the practical quantitation limit.
- C: The identification of this analyte was confirmed by GC/MS.
- B: This analyte was also detected in the associated method blank. There is a possibility of blank contamination.
- E: The concentration of this analyte exceeded the instrument calibration range.
- D: The reported result for this analyte is calculated based on a secondary dilution factor.
- A: This TIC is a suspected aldol-condensation product.
- X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____.
- X2: Contaminant does not appear to be "typical" product. Further testing is suggested for identification.
- X3: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended.
- X4: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is non-homogeneous.
- X5: Matrix spike was diluted out during analysis.
- X6: Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results.
- X7: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data.
- X8: Surrogate was diluted out during analysis.
- X9: Surrogate recovery outside QC limits due to matrix composition.
- X10: Surrogate recovery outside QC limits due to high contaminant levels.



SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

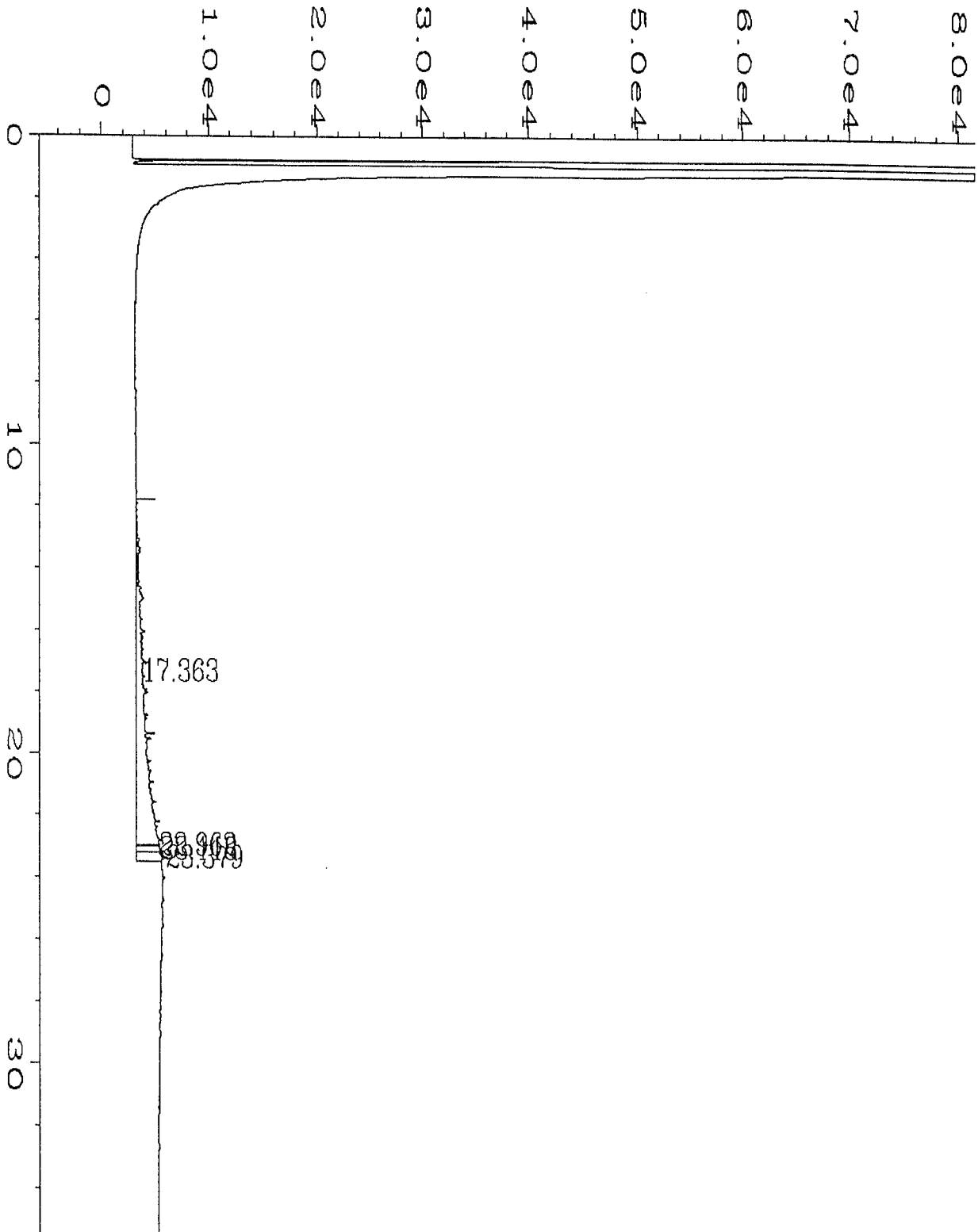
4813 Pacific Hwy. East
Tacoma, Washington 98424
(206) 922-2310 • FAX (206) 922-5047

CHAIN OF CUSTODY / REQUEST FOR LABORATORY ANALYSIS

CLIENT: <u>Aino Svcs</u>					# of Containers	ANALYSIS REQUESTED:															
PROJECT NAME: <u>9295043</u>						Halogenated Volatiles EPA 601/6010	Aromatic Volatiles EPA 602/6020	Chlorinated Pest., PCB's EPA 608/6080	PAH's	Volatile Organics EPA 624/8240 (GC/MS)	Semi-volatiles EPA 625/8270 (GC/MS)	TPH 418.1	Oil & Grease	Total Metals (Specify below)	TCLP Extraction						
CONTACT: <u>Ric Olvera</u>														8 Metals	Volatiles	Semi-volatiles	Pesticides & Herbicides				
PHONE NO: <u>353-41911</u>																					
LAB #	SAMPLE I.D.	DATE	TIME	MATRIX																	
	<u>A72101</u>	<u>7/21</u>	<u>8:00A</u>	<u>WATER</u>					<u>X</u>									<u>X</u>	<u>X</u>	<u>X</u>	
	<u>72102</u>	<u>7/21</u>	<u>8:00A</u>	<u>WATER</u>														<u>X</u>	<u>X</u>	<u>X</u>	

	Signature	Printed Name	Firm	Time / Date	SPECIAL INSTRUCTIONS/COMMENTS: <u>PCB & TOX</u> <u>HCLD</u> <u>2nd PCB + TOX</u> <u>8240 added 7/22 per Alex Koch</u> <u>1/11</u>
Relinquished By	<u>John C. Kern</u>	John C. Kern	Aino	0840-7-21	
Received By	<u>SGiang</u>	SGiang	SAS	840 7/21	
Relinquished By					
Received By					
Received By					

24 hr



Data File Name	: C:\HPCHEM\1\DATA\072192_B\043R0101.D	Page Number	: 1
Operator	: DAS/DMW	Vial Number	: 43
Instrument	: HP 5890	Injection Number	: 1
Sample Name	: 25760-1 1:20	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	TERPH-I.MTH
Acquired on	: 22 Jul 92 07:19 AM	Analysis Method	: II-HCID.MTH
Report Created on:	22 Jul 92 08:14 AM	Sample Amount	: 0
Last Recalib on	: 21 JUL 92 03:05 PM	ISTD Amount	:
Multiplier	: 1		

External Standard Report

```

Data File Name   : C:\HPCHEM\1\DATA\072192_B\043R0101.D
Operator        : DAS/DMW
Instrument       : HP 5890
Sample Name     : 25760-1 1:20
Run Time Bar Code:
Acquired on     : 22 Jul 92  07:19 AM
Report Created on: 22 Jul 92  08:14 AM
Last Recalib on : 21 JUL 92  03:05 PM
Multiplier      : 1
Page Number     : 1
Vial Number     : 43
Injection Number: 1
Sequence Line   : 1
Instrument Method: TERPH-I.MTH
Analysis Method : II-HCID.MTH
Sample Amount   : 0
ISTD Amount     :
  
```

Sig. 2 in C:\HPCHEM\1\DATA\072192_B\043R0101.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name
4.933	* not found *			1		HCID-GAS
17.363	491794	PH + 0.000		1	99.662	HCID-DIESEL

Not all calibrated peaks were found

External Standard Report

```

Data File Name      : C:\HPCHEM\1\DATA\072192_B\043R0101.D
Operator           : DAS/DMW
Instrument          : HP 5890
Sample Name        : 25760-1 1:20
Run Time Bar Code :
Acquired on       : 22 Jul 92 07:19 AM
Report Created on : 22 Jul 92 08:25 AM
Last Recalib on  : 26 JUN 92 08:17 AM
Multiplier        : 1
Page Number       : 1
Vial Number       : 43
Injection Number  : 1
Sequence Line     : 1
Instrument Method : TERPH-I.MTH
Analysis Method   : O-TERPH2.MTH
Sample Amount     : 0
ISTD Amount       :
  
```

Fig. 2 in C:\HPCHEM\1\DATA\072192_B\043R0101.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name
8.297	273	BB	0.044	1	2.059	1-Cl-Octane
19.358	2627	PV	0.043	1	2.762	o-Terphenyl

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Airo Services

Date: August 3, 1992

Report On: Analysis of Soil

Lab No.: 26037

IDENTIFICATION:

Samples received on 07-31-92

Project: 92ES043

ANALYSIS:

Lab No. 26037-1

Client ID: RIF-1

WTPH-418.1 Modified

Date Extracted: 7-31-92

Date Analyzed: 8-2-92

Heavy petroleum oils, mg/kg < 100
(C24+)

TOX Per EPA Method 9076

Date Extracted: 7-31-92

Date Analyzed: 7-31-92

Total Halogens, mg/kg < 10

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services
Project: 92ES043
Page 3 of 4
Lab No. 26037
August 3, 1992

Lab No. 26037-4

Client ID: RIF-4

WTPH-418.1 Modified
Date Extracted: 7-31-92
Date Analyzed: 8-2-92

Heavy petroleum oils, mg/kg < 100
(C24+)

TOX Per EPA Method 9076
Date Extracted: 7-31-92
Date Analyzed: 7-31-92

Total Halogens, mg/kg < 10

Lab No. 26037-5

Client ID: RIF-5

WTPH-418.1 Modified
Date Extracted: 7-31-92
Date Analyzed: 8-2-92

Heavy petroleum oils, mg/kg 4,300
(C24+)

TOX Per EPA Method 9076
Date Extracted: 7-31-92
Date Analyzed: 7-31-92

Total Halogens, mg/kg < 10

Continued

SOUND ANALYTICAL SERVICES, INC.

Airo Services
Project: 92ES043
Page 4 of 4
Lab No. 26037
August 3, 1992

Lab No. 26037-6

Client ID: RIF-6


WTPH-418.1 Modified
Date Extracted: 7-31-92
Date Analyzed: 8-2-92

Heavy petroleum oils, mg/kg 5,300
(C24+)

TOX Per EPA Method 9076
Date Extracted: 7-31-92
Date Analyzed: 7-31-92

Total Halogens, mg/kg < 10

SOUND ANALYTICAL SERVICES


MARTY FRENCH

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

WTPH-418.1 Heavy Petroleum Oils (C24+)

Client: Airo Servcies
Lab No: 26037qc
Matrix: Soil
Units: mg/kg
Date: August 3, 1992

DUPLICATES

Dup No. 26037-5

Parameter	Sample (S)	Duplicate (D)	RPD
TPH	5,300	4,600	14

RPD = Relative Percent Difference
= $[(S - D) / ((S + D) / 2)] \times 100$

METHOD BLANK

Parameter	Blank Value
TPH	< 100



SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 Pacific Hwy. East
Tacoma, Washington 98424
(206) 922-2310 • FAX (206) 922-5047

CHAIN OF CUSTODY / REQUEST FOR LABORATORY ANALYSIS

CLIENT: AIRO					ANALYSIS REQUESTED:																										
PROJECT NAME: QZES043					# of Containers	Halogenated Volatiles EPA 601/8010	Aromatic Volatiles EPA 602/8020	Chlorinated Pest., PCB's EPA 609/8080	PAH's	Volatile Organics EPA 624/8240 (GC/MS)	Semi-volatiles EPA 625/8270 (GC/MS)	TPH 418.1	Oil & Grease	Total Metals (Specify below)	TCLP Extraction				WTPH - 418.1	TOX											
CONTACT: Alex															8 Metals	Volatiles	Semi-volatiles	Pesticides & Herbicides													
PHONE NO: 383-4916																															
LAB #	SAMPLE I.D.	DATE	TIME	MATRIX																											
	RIF-1	7/30/92	1500	SOIL															X	X											
	RIF-2	7/30/92		SOIL															X	X											
	RIF-3			SOIL															X	X											
	RIF-4			SOIL															X	X											
	RIF-5		1600	SOIL															X	X											
	RIF-6			SOIL															X	X											
Signature					Printed Name					Firm					Time / Date					SPECIAL INSTRUCTIONS/COMMENTS: RUSH											
Relinquished By					AH Koch					AIRO					7/31/92 9:10																
Received By					Mary Curtiss					SAS					7/31/92 9:10																
Relinquished By																															
Received By																															
Relinquished By																															
Received By																															

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Airo Services

Date: August 11, 1992

Report On: Analysis of Solid

Lab No.: 26173

IDENTIFICATION:

Sample received on 08-06-92

Project: 92ES043

ANALYSIS:

Lab No. 26173-1

Client ID: Rif -2

TPH per EPA Method 418.1

Date Extracted: 8-10-92

Date Analyzed: 8-10-92

Total Petroleum

Hydrocarbons, mg/kg

300

TOX per EPA Method 9076

Date Extracted: 8-6-92

Date Analyzed: 8-7-92

Total Halogens, mg/kg

< 10

Lab No. 26173-2

Client ID: Rif-34

TPH per EPA Method 418.1

Date Extracted: 8-10-92

Date Analyzed: 8-10-92

Total Petroleum

Hydrocarbons, mg/kg

360

TOX per EPA Method 9076

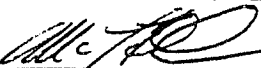
Date Extracted: 8-6-92

Date Analyzed: 8-7-92

Total Halogens, mg/kg

< 10

SOUND ANALYTICAL SERVICES



MARTY FRENCH

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Airo Services

Date: August 18, 1992

Report On: Analysis of Soil

Lab No.: 26380

IDENTIFICATION:

Sample received on 08-14-92

Project: 92ES043 Lake Riffe

ANALYSIS:

Lab No. 26380-1

Client ID: RIF-11

WTPH-418.1 Modified

Date Extracted: 8-16-92

Date Analyzed: 8-17-92

Heavy petroleum oils, mg/kg
(C24+)

< 100

TOX per EPA Method 9076

Date Extracted: 8-17-92

Date Analyzed: 8-17-92

Total Halogens, mg/kg

< 10

Lab No. 26380-2

Client ID: RIF-12

WTPH-418.1 Modified

Date Extracted: 8-16-92

Date Analyzed: 8-17-92

Heavy petroleum oils, mg/kg
(C24+)

< 100

TOX per EPA Method 9076

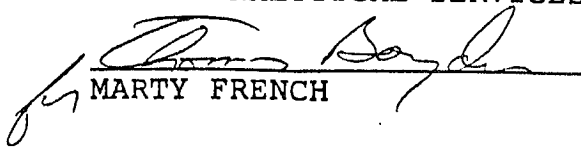
Date Extracted: 8-17-92

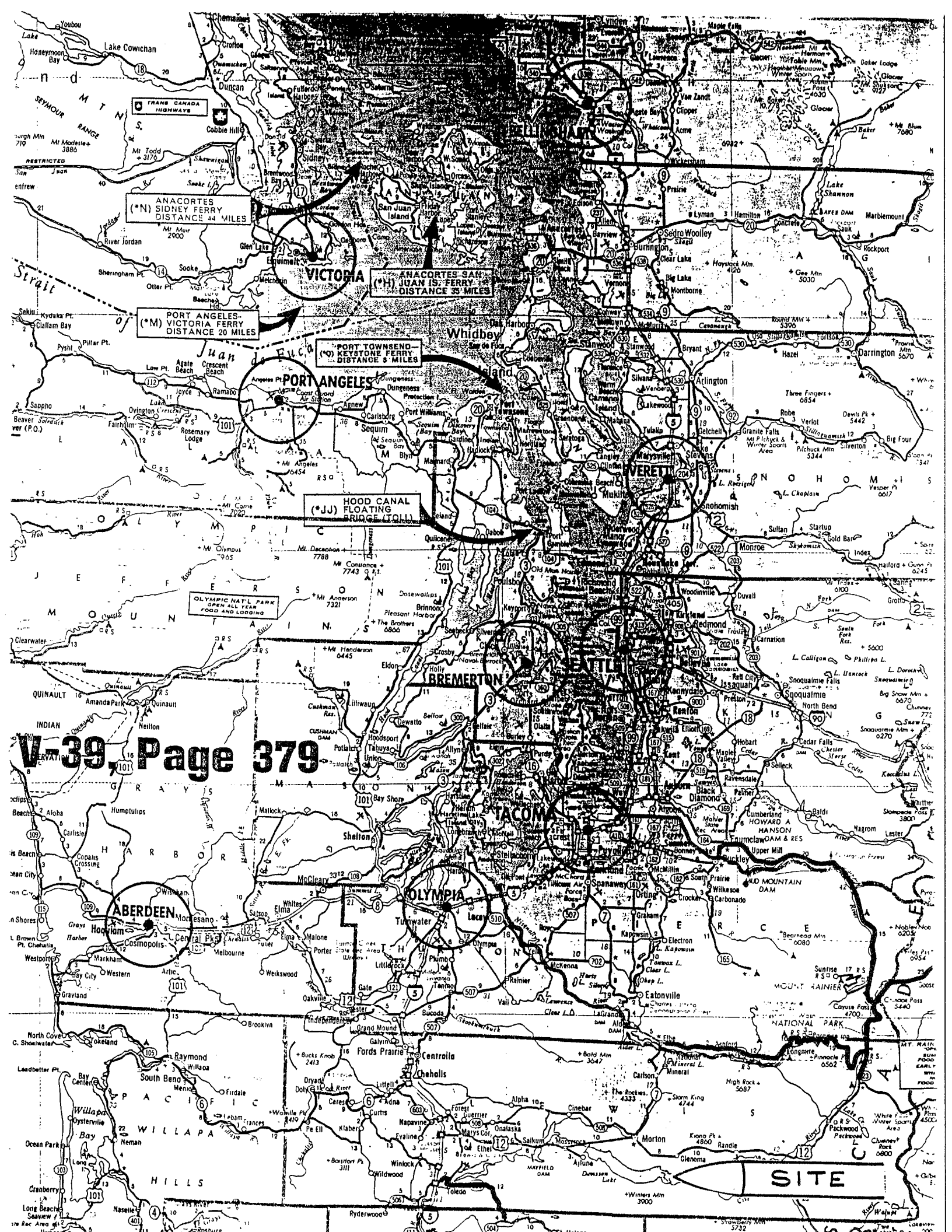
Date Analyzed: 8-17-92

Total Halogens, mg/kg

< 10

SOUND ANALYTICAL SERVICES


MARTY FRENCH



ANACORTES SIDNEY FERRY
DISTANCE 44 MILES

ANACORTES-SAN
JUAN IS. FERRY
DISTANCE 35 MILES

PORT ANGELES-
VICTORIA FERRY
DISTANCE 20 MILES

PORT TOWNSEND-
KEYSTONE FERRY
DISTANCE 5 MILES

HOOD CANAL
FLOATING
BRIDGE (TOLL)

OLYMPIC NATL. PARK
OPEN ALL YEAR
FOOD AND LODGING

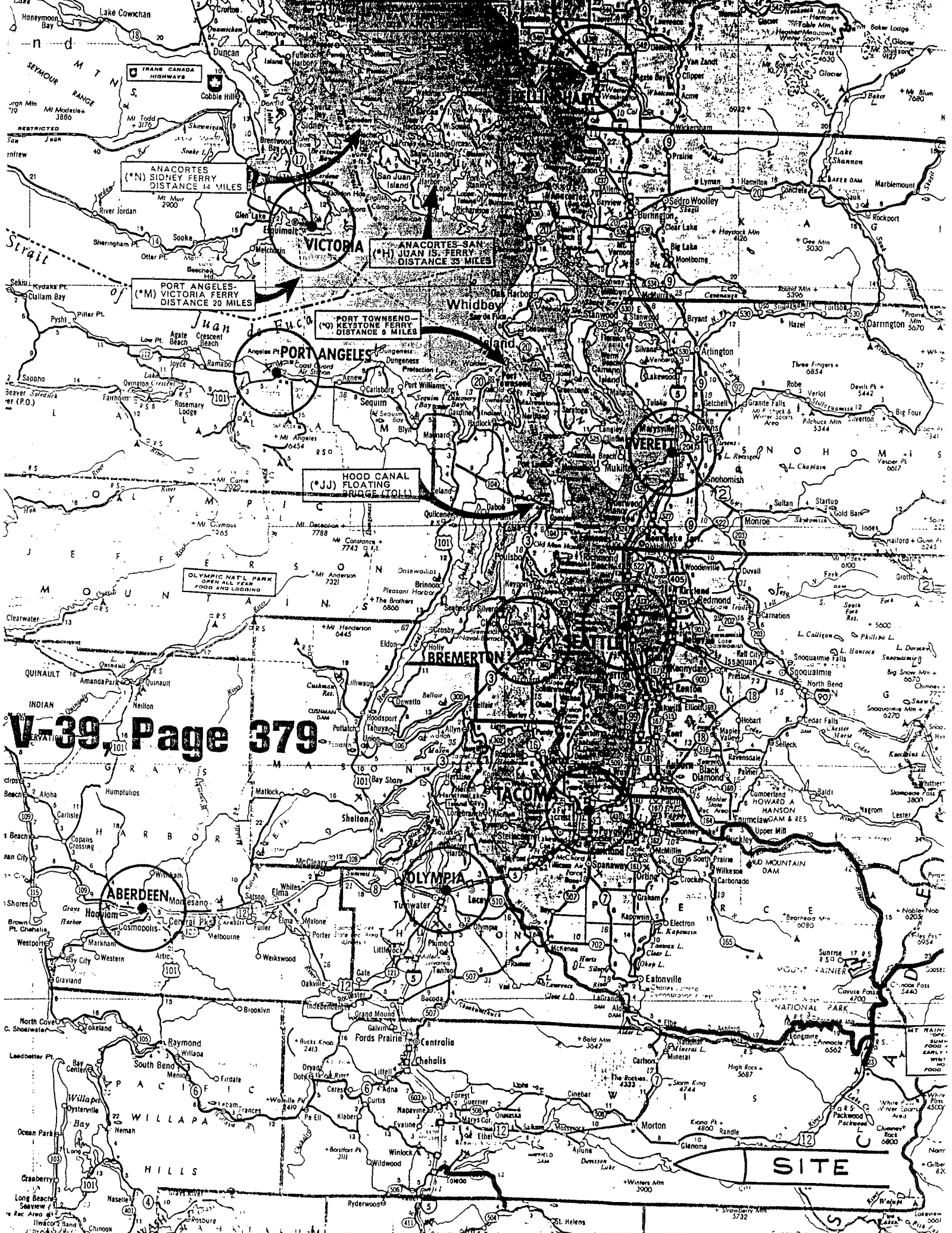
V-39, Page 379

ABERDEEN

OLYMPIA

TACOMA

SITE



(*N) ANACORTES-SIDNEY FERRY
DISTANCE 44 MILES

(*H) ANACORTES-SAN JUAN IS. FERRY
DISTANCE 33 MILES

(*M) PORT ANGELES-VICTORIA FERRY
DISTANCE 20 MILES

(*O) PORT TOWNSEND-KEYSTONE FERRY
DISTANCE 8 MILES

(*JJ) HOOD CANAL FLOATING BRIDGE (TOLL)

OLYMPIC NAT'L PARK
OPEN ALL YEAR
FOOD AND LODGING

V-39, Page 379

ABERDEEN

OLYMPIA

TACOMA

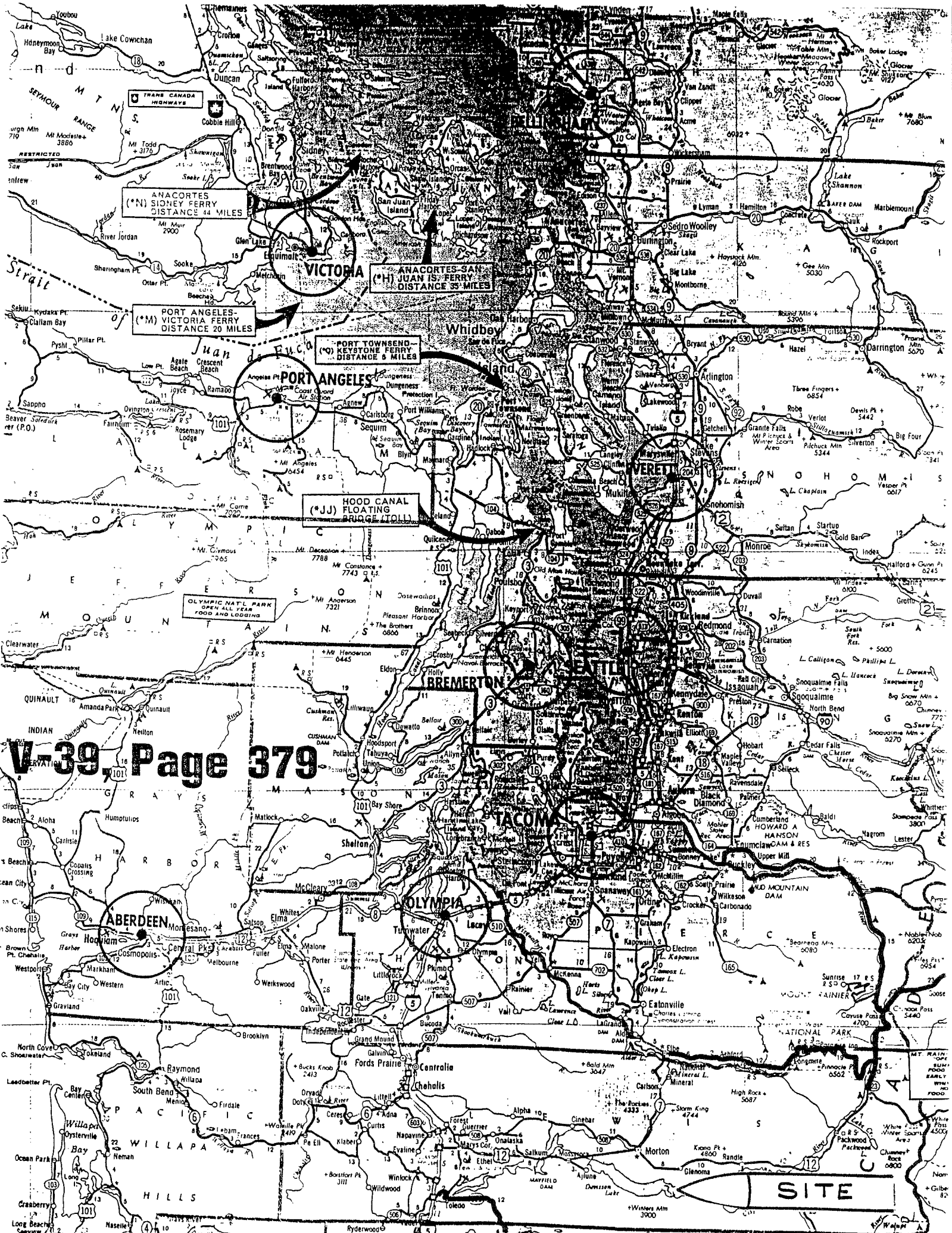
BREMERTON

SEATTLE

VICTORIA

PORT ANGELES

SITE



V-39, Page 379

SITE

ANACORTES SIDNEY FERRY DISTANCE 44 MILES

ANACORTES-SAN JUAN IS. FERRY DISTANCE 39 MILES

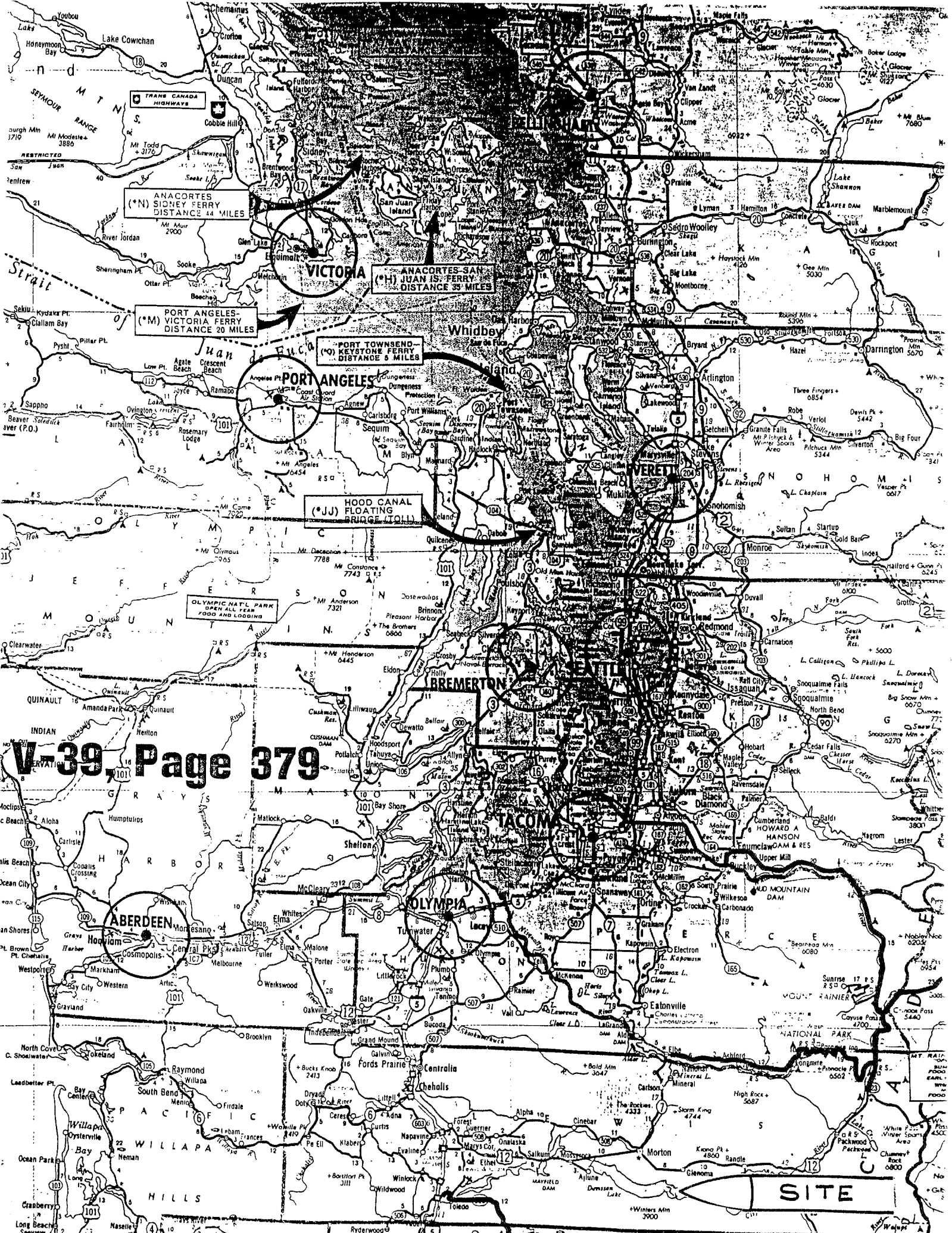
PORT ANGELES VICTORIA FERRY DISTANCE 20 MILES

PORT TOWNSEND DISTANCE 8 MILES

HOOD CANAL FLOATING BRIDGE (TOLL)

OLYMPIC NATL PARK OPEN ALL YEAR FOOD AND LODGING

MT. RAINIER NATIONAL PARK



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SITE



UNDERGROUND STORAGE TANK Site Check/Site Assessment Checklist

The purpose of this form is to certify the proper investigation of an UST site for the presence of a release. These activities shall be conducted in accordance with Chapter 173.360 WAC. A description of the various situations requiring a site check or site assessment is provided in the guidance document for UST site checks and site assessments.

This Site Check/Site Assessment Checklist shall be completed and signed by a person registered with the Department of Ecology to perform site assessments.

Two copies of the results of the site check or site assessment should be included with this checklist according to the reporting requirements in the guidance document for UST site checks and site assessments.

For further information about completing this form, please contact the Department of Ecology UST Program.

The completed checklist should be mailed to the following address:

Underground Storage Tank Section
Department of Ecology
Mail Stop PV-11
Olympia, WA 98504-8711

1. UST SYSTEM OWNER AND LOCATION

UST Owner/Operator: Tacoma Public Utilities

Owners Address: _____
Street P.O. Box 11007
Tacoma WA 98411
City State ZIP-Code

Telephone: (206) 383-2471 Ext. 8513

Site ID Number (on invoice or available from Ecology if tank is registered): N/A

Site/Business Name: Riffe Lake Reservoir

Site Address: _____
Former Kosmos Mill Site Lewis
Street County
Glenoma WA 98336
City State ZIP-Code

2. SITE CHECK/SITE ASSESSMENT CONDUCTED BY:

Registered Person: Alexander H. Koch (Airo Environmental)

Address: _____
4110 East 11th Street
Street
Tacoma WA 98421
City State ZIP-Code

Telephone: (206) 383-4916



UNDERGROUND STORAGE TANK

Permanent Closure/Change-In-Service Checklist

The purpose of this form is to certify the proper closure/change-in-service of underground storage tank (UST) systems. These activities must be conducted in accordance with Chapter 173.360 WAC. Washington State UST rules require the tank owner or operator to notify Ecology in writing 30 days prior to closure or change-in-service of tanks. This must be done by completing the 30 Day Notice form (ECY 010-155).

This Permanent Closure Checklist shall be completed and signed by a **Licensed Decommissioning Supervisor**. The supervisor shall be on site when all tank permanent closure/change-in-service activities are being conducted. The firm which employs the licensed supervisor shall also be licensed by the Washington State Department of Ecology as a **Service Provider**. If any of the activities listed below have been supervised by a different licensed supervisor, a separate checklist must be filled out and signed by the licensed supervisor performing those activities.

For further information about completing this form, please contact the Department of Ecology UST Program.

A separate checklist must be completed for each UST system (tank and associated piping), except that UST systems at one site may be reported together by completing page 2 of this form separately for each system. The completed checklist should be mailed to the following address within 30 days of the completion of the closure or change-in-service.

Underground Storage Tank Section
 Department of Ecology
 Mail Stop PV-11
 Olympia, WA 98504-8711

1. UST SYSTEM OWNER AND LOCATION

Site Owner/Operator:	<u>Tacoma Public Utilities</u>		
Owners Address:	<small>Street</small>	<small>P.O. Box</small>	
	<u>Tacoma</u>	<u>WA</u>	<u>P.O. Box 11007</u>
	<small>City</small>	<small>State</small>	<small>ZIP-Code</small>
			<u>98411</u>
Telephone:	<u>(206) 383-2471 Ext. 8513</u>		
Site ID Number (on invoice or available from Ecology if tank is registered):	<u>N/A</u>		
Site/Business Name:	<u>Riffe Lake Reservoir</u>		
Site Address:	<small>Street</small>	<small>County</small>	
	<u>Former Kosmos Mill Site</u>	<u>Lewis</u>	
	<small>City</small>	<small>State</small>	<small>ZIP-Code</small>
	<u>Glenoma</u>	<u>WA</u>	<u>98336</u>

2. TANK PERMANENT CLOSURE/CHANGE-IN-SERVICE PERFORMED BY:

Firm:	<u>Airo Services, Inc.</u>	License Number:	<u>5002034</u>
Address:	<small>Street</small>	<small>P.O. Box</small>	
	<u>4110 East 11th Street</u>	<u>WA</u>	<u>98421</u>
	<small>City</small>	<small>State</small>	<small>ZIP-Code</small>
			<u>98421</u>
Telephone:	<u>(206) 383-4916</u>		
Licensed Supervisor:	<u>HENRY R. OHRAZDA</u>	Decommissioning License Number:	<u>W002087</u>

This page must be completed separately for each tank permanently closed (decommissioned) or change-in-service at the site. For additional tanks you may photocopy this form prior to completing.

3. TANK CLOSURE/CHANGE-IN-SERVICE INFORMATION

- 1. Tank ID Number (as registered with Ecology): N/A
- 2. Year installed: N/A
- 3. Tank capacity in gallons: 5000
- 4. Date of last use: N/A
- 5. Last substance stored: Bunker C
- 6. Date of closure/change-in-service: July 29, 1992
- 7. Type of closure: Closure with Tank Removal In-place Closure Change-in-Service
- 8. If in-place closure is used, the tank has been filled with the following substance: _____
- 9. If change-in-service, indicate new substance stored in tank: _____
- 10. Local permit(s) (if any) obtained from: _____
- 11. Has a site assessment been completed? Yes No

Always contact local authorities regarding permit requirements.

Unless an external release detection system is operating at the time of closure or change in service, and a report is provided as specified in WAC 173-360-390, a site assessment must be conducted. This site assessment must be conducted by a person registered with the Department of Ecology to perform site assessments. Results of the site assessment must be included with the Site Assessment Checklist (ECY 010-158).

4. CHECKLIST

Each item of the following checklist shall be initiated by the licensed supervisor whose signature appears below.

	Yes	No	NA*
1. Has all liquid been removed from product lines?			X
2. Has all product piping been capped or removed?			X
3. Have all non-product lines been capped or removed?			X
4. Have all liquid and accumulated sludges been removed from the tank?			X
5. Has the tank been properly purged or inerted?	X		
6. Have the drop tube, fill pipe, gauge pipe, pumps and other tank fixtures been removed?	X		
7. Have all tank openings been plugged or capped? NOTE: One plug should have 1/8 inch vent hole.			X
8. Have all sludges removed from the tank been designated and disposed of in accordance with the state of Washington's dangerous waste regulations (Chapter 173-303 WAC)?			X
9. If removed, was tank properly labeled and disposed of in accordance with all applicable local, state and federal regulations?	X		
*Item not applicable	X		

I hereby certify that I have been the licensed supervisor present on site during the above listed permanent closure activities and to the best of my knowledge they have been conducted in compliance with all applicable state and federal laws, regulations and procedures pertaining to underground storage tanks.

Persons submitting false information are subject to penalties under Chapter 173.360 WAC.

3-31-93
Date

Henry R. Oranga
Signature of Licensed Supervisor

5. ADDITIONAL REQUIRED SIGNATURES

3-31-93
Date

Michael W. Hattis
Signature of Licensed Service Provider, Firm Owner or Authorized Representative

4-29-93
Date

James R. King
Signature of Tank Owner or Authorized Representative

Table B-1 - Analytical Results for Water at Site D

Sample ID	71202
Sampling Date	7/21/1992
Media	Water

Total Halogens in mg/L

EPA Method 9076

Total Halogens	10 U
----------------	------

PCBs in mg/L

EPA Method 8080

Acroclor 1016	0.01 U
Acroclor 1221	0.01 U
Acroclor 1232	0.01 U
Acroclor 1242	0.01 U
Acroclor 1248	0.01 U
Acroclor 1254	0.01 U
Acroclor 1260	0.01 U

U = Not detected at detection limit indicated.

Table B-2 - Analytical Results for Soil Samples at Site A

Sample ID	RIF-1	RIF-2	RIF-3	RIF-4	RIF-5	RIF-6	RIF-2	RIF-34	RIF-11	RIF-12
Sampling Date	7/30/1992	7/30/1992	7/30/1992	7/30/1992	7/30/1992	7/30/1992	8/6/1992	8/6/1992	8/18/1992	8/18/1992
Media	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Location	NE corner	Center floor	West wall	Duplicate (RIF-3)	Stockpile	Stockpile	Center floor	West wall	Center floor	West wall
Depth in feet	9.5	9.5	6.5	6.5			11	7	13	12
TPH in mg/kg										
WTPH-418.1, WTPH-HCID										
Heavy Petroleum Oils C25+	100 U	250	310	100 U	4300	5300	300	360	100 U	100 U
Total Halogens in mg/kg										
EPA Method 9076										
Total Halogens	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

U = Not detected at detection limit indicated.

Table B-3 - Analytical Results for Waste Oil Sample at Site A

Sheet 1 of 3

Sample ID	72101
Sampling Date	7/21/1992
Media	Waste Oil

TPH in mg/kg**WTPH-418.1, WTPH-HCID**

Gasoline	20 U
Diesel	50 U
Heavy Oil	100 U

Total Halogens in mg/kg**EPA Method 9076**

Total Halogens	5100
----------------	-------------

VOCs in µg/kg**Method 8240**

Chloromethane	4000 U
Bromomethane	4000 U
Vinyl Chloride	4000 U
Chloroethane	4000 U
Methylene Chloride	4000 U
Acetone	20000 U
Carbon Disulfide	2000 U
1,1-Dichloroethene	2000 U
1,1-Dichloroethane	2000 U
1,2-Dichloroethene (Total)	2000 U
Chloroform	2000 U
1,2-Dichloroethane	2000 U
2-Butane	10000 U
1,1,1-Trichloroethane	2000 U
Carbon Tetrachloride	2000 U
Vinyl Acetate	10000 U
Bromodichloromethane	2000 U
1,2-Dichloropropane	2000 U
Cis-1,3-Dichloropropene	2000 U
Trichloroethene	2000 U
Dibromochloromethane	2000 U
1,1,2-Trichloroethane	2000 U
Benzene	1200
Trans-1,3-Dichloropropene	2000 U
Bromoform	2000 U
4-Methyl-2-Pentanone	2000 U
2-Hexanone	2000 U
Tetrachloroethene	2000 U
1,1,2,2-Tetrachloroethane	2000 U
Toluene	10000
Chlorobenzene	2000 U
Ethyl Benzene	5800
Styrene	2000 U
Total Xylenes	35000

SVOCs in µg/kg**EPA SW-846 Method 8270**

Phenol	
bis(2-Chloroethyl) ether	450000 U
2-Chlorophenol	450000 U
1,3-Dichlorobenzene	450000 U

Table B-3 - Analytical Results for Waste Oil Sample at Site A

Sample ID	72101
Sampling Date	7/21/1992
Media	Waste Oil
1,4-Dichlorobenzene	450000 U
Benzyl Alcohol	450000 U
1,2-Dichlorobenzene	450000 U
2-Methylphenol	450000 U
bis(2-chloroisopropyl)ether	450000 U
N-Nitroso-Di-N-propylamine	450000 U
Hexachloroethane	450000 U
Nitrobenzene	450000 U
Isophorone	450000 U
2-Nitrophenol	450000 U
2,4-Dimethylphenol	450000 U
Benzoic Acid	2200000
bis(2-Chloroethoxy)methane	450000 U
2,4-Dichlorophenol	450000 U
1,2,4-Trichlorobenzene	450000 U
Naphthalene	520000
4-Chlorozniline	900000 U
Hexachlorobutadiene	450000 U
4-Chloro-3-methylphenol	900000 U
2-Methylnaphthalene	2600000
Hexachlorocyclopentadiene	450000 U
2,4,6-Trichlorophenol	450000 U
2,4,5-Trichlorophenol	450000 U
2-Chloroaphthalene	450000 U
2-Nitroaniline	2200000 U
Dimethyl phthalate	450000 U
Acenaphthylene	450000 U
3-Nitroaniline	450000 U
Acenaphthene	130000
2,4-Dinitrophenol	2200000 U
4-Nitrophenol	2200000 U
Dibenzofuran	450000 U
2,4-Dinitrotoluene	450000 U
2,6-dinitrotoluene	450000 U
Diethylphthalate	450000 U
4-Chlorophenyl phenyl ether	450000 U
Fluorene	240000
4-Nitroaniline	2200000 U
4,6-Dinitro-2-methylphenol	2200000 U
N-Nitrosodiphenylamine	450000 U
4-Bromophenyl phenyl ether	450000 U
Hexachlorobenzene	450000 U
Pentachlorophenol	2200000 U
Phenanthrene	800000
Anthracene	190000
Di-n-butylphthalate	450000 U
Fluoranthene	450000 U
Pyrene	240000
Butyl benzyl phthalate	450000 U
3,3'-Dichlorobenzidine	900000 U
Benzo(a)anthracene	120000
bis(2-ethylhexyl)phthalate	450000 U
Chrysene	240000

Table B-3 - Analytical Results for Waste Oil Sample at Site A

Sample ID	72101
Sampling Date	7/21/1992
Media	Waste Oil
Di-n-octyl phthalate	450000 U
Benzo(b)fluoranthene	450000 U
Benzo(k)fluoranthene	450000 U
Benzo(a)pyrene	450000 U
Indeno(1,2,3-cd)pyrene	450000 U
Dibenz(a,h)anthracene	450000 U
Benzo(g,h,i)perylene	450000 U

PCB's in mg/kg**EPA Method 8080**

Acroclor 1016	1 U
Acroclor 1221	1 U
Acroclor 1232	1 U
Acroclor 1242	1 U
Acroclor 1248	1 U
Acroclor 1254	1 U
Acroclor 1260	1 U

U = Not detected at detection limit indicated.

APPENDIX C
Emergency Independent Remedial
Action Completion Summary

APPENDIX C

EMERGENCY INDEPENDENT REMEDIAL ACTION COMPLETION SUMMARY

Introduction

This emergency IRA completion summary details the excavation and off-site disposal of petroleum-contaminated soil and the construction and installation of a protective cap in association with the petroleum seeps observed in the area of the former Kosmos Mill Site. In April 2019, the seeps were reported to Ecology. Tacoma Power immediately began investigating the seep and implementing measures to mitigate risks to human and environmental health.

In November 2019, Tacoma Power declared an emergency in order to conduct an IRA at the Site while the seep was exposed/accessible and before the water levels were expected to rise. The emergency IRA included the following components:

- Installation of BMPs prior to construction;
- Design of an engineered cap;
- Soil excavation from the creek bank and sloping back the bank for proper cap placement;
- Surface water quality sampling during construction to verify BMP effectiveness;
- Temporarily collecting construction dewatering discharge;
- Temporarily stockpiling petroleum-impacted soil separately in the upland area of the Site;
- Soil sampling and analysis of the bank and creek bed material (remaining in-place) prior to placement of the cap;
- Stockpile sampling and analysis for off-site disposal of the excavated petroleum-contaminated soil;
- Disposal of approximately 186,200 gallons of construction dewatering discharge to the City of Morton's, PRS Group's, and City of Tacoma's wastewater treatment plants; and
- Disposal of approximately 10,956 tons of petroleum-impacted soil off-site at the Cowlitz County Headquarters Landfill and Hillsboro Landfill.

Details of these components are summarized below.

Best Management Practices

BMPs were installed by Tacoma Power, NRC Environmental, and AEC before earth work activities began. Ecology reviewed and approved a WQPP that outlined the proposed BMPs and water quality monitoring

that would be conducted during construction (Appendix D). The selected and approved BMPs were implemented in order to prevent, minimize, and control the discharge of waste and other controllable water quality factors associated with the emergency IRA. Erosion and sediment control measures were installed and in-place at all times during the emergency IRA work.

Temporary erosion control measures included plastic sheeting covering during significant weather events, straw bales, and plastic-lined silt fence at the bank toe of on Rainey Creek that contained the construction area. The silt fence was effectively keyed-in to the bank toe subsurface to prevent sediment discharge off-site and into the creek. Sea curtains and booms were installed in several locations within the creek, downstream of the work area (as shown in Figure 7). Water quality samples from the creek surface waters were collected in several locations to monitor and evaluate the effectiveness of the BMPs. The location of the BMPs and creek surface water sample locations are shown on Figure 7 in Section 5.4.1.

Cap Design

The protective cap consisted of placement of clean sand (6-inch layer) followed by a granular Organoclay liner to adsorb any NAPL from water (Reactive Core Mat™ [RCM] with Organoclay® by Cetco). Another layer of clean sand (8 inches) and a permeable composite geotextile was placed on top of the liner for protection prior to covering with an 18-inch thick layer of large quarry spalls (4-8 inch). The cap liner and quarry spalls were keyed into the existing grade at the toe of the creek. The slope key is essentially an excavated trench at the toe of the slope to key in the liner and riprap. The sides and up-slope segments of the cap were also keyed into the respective existing grades with an anchor trench (as shown on Figure C-4) to properly secure the RCM liner. Based on the hydraulic calculations (presented in Appendix J), heavy riprap was recommended for the riprap slope key at the toe of the slope, and large spalls (or light-loose riprap) for the cap cover material.

Hart Crowser recommended a Reactive Core Mat™ (RCM) with Organoclay® by Cetco as a potential BMP, because it is a permeable composite of geotextile and granular Organoclay that reliably absorbs NAPL and low solubility organics from water. This product is routinely used for embankment seepage control, groundwater remediation, and subaqueous caps for contaminated sediments. The product sheet and material technical data is provided in Appendix I. The use of the RCM was selected by Tacoma Power as a BMP based on the literature search and its application and effectiveness in similar situations. Since time was of the essence, as the water elevations in the lake and creek were anticipated to rise, the team proceeded with a protective cap utilizing Cetco's RCM with Organoclay as part of the IRA. No bench-scale or pilot study was conducted on the selected BMP based on the time constraints and therefore the design relied upon the published data, similar experiences, and collaboration with the Tacoma Power team and selected contractor (AEC).

In order to install the RCM and keep the product securely in place during any fluctuations in Rainey Creek water levels, Tacoma Power suggested installing a riprap cover to key-in the RCM product since there was limited time available to construct the cap while water levels were down (and the oil seeps were accessible). Hart Crowser estimated appropriate riprap sizing and provided a conceptual design that could be installed by AEC and field-fitted based on the changing (and unknown) conditions at the Site. The

conceptual cap design that was provided to Tacoma Power in November 2019 is illustrated on Figures C-1 through C-4 and the design details are provided below.

Basis of Design

Due to the emergency and urgent nature of the project, Hart Crowser used readily available information, similar project experience, and collaboration with AEC and the project team to prepare a conceptual-level design. Several assumptions were made in conducting hydrologic and hydraulic analyses, which included a high factor of safety to determine the required riprap size for the cap design. Surveyed cross sections of the bank, stream channel, and floodplains were not available. Typical bed and bank material descriptions and other details were researched but not available to assist in the hydrologic and hydraulic analyses, or to help obtain a deeper understanding of the flow conditions associated with the stream reach. The designed cap was successfully implemented and installed (field-fitted) in December 2019 by AEC, with oversight by Hart Crowser and Tacoma Power.

Flow Conditions. Typical stream bank restoration efforts are designed to convey the 2-year peak flow at a bank-full elevation. The United States Geological Survey (USGS) StreamStats Washington web-based GIS application (StreamStats), was used to determine the approximate drainage basin area for the ungauged creek. StreamStats provides basin characteristics and flow statistics; it also uses local regression equations to calculate the peak flows for a variety of storm events.

The contributing area from the Rainey Creek drainage basin area is approximately 20.22 square miles that is conveyed to/past the seep. The estimated creek flows (including stormwater runoff and snow melt) that is conveyed past the seep location is 856 cubic feet per second (cfs) for the 2-year peak flow (Q_2) and 2,940 cfs for the 100-year peak flow (Q_{100}). Details are provided in Appendix J.

Riprap Sizing. The USGS riprap sizing method (USGS 1986) is based on analysis of field data from 26 sites across the northwest (and 39 large storm events at these sites) to relate the hydraulic conditions at the site to the performance of the riprap. This method utilizes an average channel velocity in the computation of median riprap size. Although this method typically provides overly conservative results, a safety factor was also applied due to the significant uncertainties associated with the design parameters, and to account for potential higher flow velocities and shear stresses that may occur along the cap structure.

The velocity and median riprap relationship were correlated resulting in the following equation and results are provided in Table C-1:

$$D_{50} = 0.01V_a^{2.44}$$

Where V_a = average channel velocity in feet per second (ft/s); and

D_{50} = calculated median riprap size in feet

Table C-1 – Riprap Sizing Table

Flow Condition Scenario	Calculated Median Riprap Size (D ₅₀) ^a	Applied Safety Factor	Recommended Riprap Size
Low Water Levels (slope key area)	1.27 feet	1.5 x 1.27 = 1.91 feet 3.0 x 1.27 = 3.81 feet	Heavy Riprap (WSDOT) D ₅₀ = 2.2 feet
Higher Water Levels (main cap cover material)	0.34 feet	1.5 x 0.34 = 0.51 feet 3.0 x 0.34 = 1.02 feet	Quarry Spalls or Light Loose Riprap (WSDOT) ^b D ₅₀ = 0.5 feet D ₅₀ = 1.1 feet

Notes:

- Riprap size was calculated using the USGS method and checked against the Izbash curve to confirm the material size is acceptable.
- Large quarry spalls (D₅₀ of 4 to 8 inches) was the recommended minimum size for the cap cover material, but light loose riprap would also be acceptable and possibly more readily available and cost effective.

In addition to the cap design and construction oversight, Hart Crowser representatives also assisted Tacoma Power staff with the creek surface water sampling, soil sampling following the completion of excavation, and stockpile soil sampling.

Excavation of Petroleum-Impacted Soil

To properly install the cap, the creek bank needed to be sloped back to physically construct and accommodate the cap structure over the observed oil seep locations Figure 3 illustrates the location of the cap area.

The excavation for the cap area was approximately 160 to 175 feet (northeast to southwest) and approximately 130 to 160 feet (northwest to southeast). At the toe of the creek bank, the depth of the excavation ranged between approximately 10 feet towards the center of the bank near the oil seep and over 20 feet along the north edge. The excavation tapered to approximately 6 inches at the top of the slope.

The cap keyed-in on the top and sides with Detail 1 – RCM Anchor Trench Detail. The bottom of the cap was stabilized with Detail 3 – Riprap Slope Key. The depth and details on how they were generally constructed are shown on Figure C-4. All of the excavated soil was segregated and stockpiled on the eastern side of the Site as illustrated on Figure 2, labeled stockpile area.

During construction, AEC diverted some of the flow in the bottom of the creek bed away from the cap slope key to facilitate construction. The material was not removed, but instead was moved toward the silt fence. This work kept the lower flows more in the center of the creek bed and away from the construction. The channel that was more clearly defined by this work, was approximately 170 feet long, 7.5 feet wide, and 1.5 feet deep.

During soil excavation of the creek bank, a Hart Crowser field representative was periodically assessing soil for environmental impacts using field screening methods, including visual and olfactory observations,

sheen testing, and organic vapors monitoring using a PID. Based on field screening results, soil near the top of the bank did not have any obvious environmental impacts within approximately the first two feet bgs and tapered to approximately less than 4 inches near the toe of the creek bank. This overburden soil was segregated and stockpiled (SP1) in the upland area of the Site for further characterization and to determine eligibility for reuse as backfill or for the soil to remain at the Site.

Hart Crowser observed petroleum-impacted soil beneath the overburden where the oil seeps were located on the creek bank and towards upland area to the southeast, as well as in the creek bed adjacent to the observed oil seeps. The petroleum-impacted soil near the oil seeps (samples LB-2, LB-3, and UB-1) exhibited grey and black staining with strong petroleum-like odors. A strong petroleum-like odor was noted from the area of Rainey Creek's creek bed where sample Creekbed1 was collected. PID readings were generally elevated and ranged from approximately 60 to 400 ppm. Petroleum-impacted soil was observed below the surface during some grading work near the ravine area to the northeast. Tacoma Power staff observed petroleum-impacted soil southwest of the cap footprint as described in Section 7.0.

An abandoned pipe remnant and an old culvert were discovered while excavating the creek bank, at the top of the slope in the upland area east of the original oil seep area and in ravine area, respectively. The discovered pipe remnant and the culvert section had some noted seeping water and were removed. Another pipe remnant was discovered to the south while excavating near the former building foundations (Figure 8). The pipe contained some oily product (NAPL) and part of the pipe was removed. The pipe origin is unknown, but may have been related to the former USTs associated with historical mill operations.

Observed petroleum impacts appeared to extend across a majority of the face of the creek bank where the cap was to be placed, which was subsequently excavated and temporarily stockpiled (SP2) in the upland area of the Site.

The cap footprint and excavation were extended northeast to the edge of the ravine area and southeast to chase the petroleum-impacted soil. The petroleum-impacted soil was excavated as much as possible; however, the lake and creek water levels were rising as precipitation increased and major storm events were predicted. The excavation was terminated in order to install the cap and stabilize the Site in a timely manner. The petroleum-impacted soil extents were not fully evaluated or removed along the creek bed. Along the creek bank, the petroleum-impacted soil that was visible was covered by the cap. On the west side of the cap, a vein of petroleum-impacted soil was observed by Tacoma Power staff to be running parallel with the creek but covered with four feet of material that did not appear impacted. This vein of impacted material extended beyond the cap footprint; however, it is unknown how far it extends (as shown in Figure 8).

Although some residually impacted soil was left in-place, a large amount of petroleum-impacted soil was removed from the Site. Selected photos from the emergency IRA are provided in Appendix K.

After excavation was completed and before the cap was installed, soil confirmation samples were collected from the creek bank within the excavated footprint near the observed oil seep. These confirmation samples represent *in-situ* soil conditions and are described in detail in Section 5.2 and summarized in Table 3.

Rainey Creek Surface Water Monitoring

BMPs were monitored during excavation activities through surface water sampling of Rainey Creek, per the WQPP in Appendix D of this report. Figure 7 illustrates where the BMPs were installed in Rainey Creek. The analytical results of the surface water samples are described in Section 5.4.1 and summarized in Table 5 for samples collected during excavation activities and in Table 6 for samples collected by Tacoma Power after excavation activities. Most of the surface water exceedances observed during excavation activities were contained within the sea curtain across Rainey Creek (directly adjacent to the excavation area). Only one sample slightly exceeded the zinc indicator level outside the sea curtain; however, subsequent surface water sampling during excavation activities at this sample location and downstream were below zinc indicator levels. The remaining surface water samples collected during excavation activities were within indicator levels, confirming that the BMPs used were effective.

After excavation was completed, surface water samples that exceeded the indicator levels were possibly due to the increase in precipitation and runoff since excavation activities were completed and the upstream sample (U-3) contained copper and TPH-O concentrations exceeding indicator levels.

On-Site Water Treatment System

Dewatering was performed as needed by AEC on water that accumulated in the construction area between the bank and the plastic-lined silt fence for constructing the cap and slope key. The water was pumped up the bank to a treatment system that was installed for the purpose of treating the petroleum-impacted water encountered in the construction area. The dewatering operations and treatment system were designed and operated by AEC and their subcontractor, Hydrocon. A Water Treatment Plan by AEC/Hydrocon was submitted to Ecology for review and approval. Dewatering from cap construction activities was pumped to the uplands to on-site baker tanks for storage, treatment, and possible on-site disposal in the former log pond area, as approved by Ecology.

However, on-site disposal was not possible because of the lack of infiltration of the site soil and the heavy rains. Also, treated water was sampled and tested by Hydrocon for petroleum (gasoline, diesel, and oil), TSS, BTEX, and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc). The treated water did not meet the TSS, copper, and zinc water quality limits established in Table 1 of the WQPP. After several passes through the treatment system the water still appeared very cloudy and did not meet the water quality limits. Modifications to the treatment system were explored; however, there was not time to design and test a new system. Therefore, this water was hauled off-site for disposal. Approximately 186,200 gallons of impacted water was disposed of off-site at the City of Morton's, PRS Group's, and City of Tacoma's wastewater treatment facilities.

In the final days of hauling the petroleum-contaminated stockpile and construction water, large amounts of precipitation prevented the off-site disposal. A temporary surface water diversion trench was graded on the east and north sides of the stockpile area to keep the rainwater from accumulating in the stockpile area (Figure 2). The stockpile area was lined with plastic sheeting; however, the plastic sheeting was being removed when loading the petroleum-contaminated soil in trucks. The baker tanks that were used for temporary storage of impacted water were full and could not keep up with the heavy rains; therefore,

hauling of the decanted water from the petroleum-contaminated stockpile was limited to the available trucks. Sawdust and diatomaceous earth were added to the stockpile until the soil was dry enough to load on trucks. After conversations and an on-site visit with Ecology, some of the stockpile decanted water was pumped into the log pond for infiltration. This was necessary in order to keep the stockpile area dry enough to remove the petroleum-contaminated soil before the entire site was submerged. Pumping to the log pond was intermittent over an 8-hour period as required to keep the water level down in the stockpile area and began on the afternoon of February 6. On February 7, 2020, AEC was able to resume and complete hauling of petroleum-contaminated soil. On February 8, 2020, two water quality samples (Log Pond #1 and Log Pond #2, Figure 2) were taken and exceeded indicator levels as defined in the WQPP for pH in both samples and turbidity in sample Log Pond #2.

Soil Stockpile Characterization Summary

During excavation of the cap area, overburden soil was segregated into separate stockpiles based on observed petroleum impacts. Each stockpile was characterized for petroleum, petroleum-constituents, and metals. The temporary stockpiles were constructed in the upland area towards the east (Figure 2), and placed on and covered with, plastic sheeting. Around the perimeter of the stockpile area plastic-lined silt fence was installed, and outside of the silt fence a dewatering trench was constructed to keep stormwater runoff (via sheet flow) from contacting petroleum-contaminated soils within the stockpile area. During removal of the petroleum-contaminated soil, sumps were installed in the stockpile area to pump impacted water to baker tanks for removal. Stockpile BMPs were implemented and maintained by AEC and Tacoma Power.

Approximately 3,000 tons of the observed to be non-impacted soil was stockpiled (SP1) and approximately 10,956 tons of the petroleum-impacted soil was stockpiled (SP2). Five soil samples were collected from SP1 and eleven soil samples were collected from SP2.

Stockpile samples were analyzed by Friedman and Bruya for one or more of the following:

- TPH-D
- TPH-O
- TPH-G
- BTEX
- Total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver)
- PAHs, including cPAHs

The stockpile soil sample analytical results are summarized in Table C-2 and the chemical data quality review and laboratory reports are provided in Appendix G.

Analytical results were compared to the MTCA Method A soil CULs for unrestricted land use. Analytical results are summarized below.

Stockpile SP1 Analytical Results. All the stockpile soil sample results from SP1 were below MTCA Method A CULs or the laboratory reporting limits.

Stockpile SP2 Analytical Results. Several stockpile soil sample results from SP2 were above applicable MTCA CULs for TPH-D, TPH-O, TPH-G, and PAHs, confirming that the petroleum-impacted soil that was stockpiled needed to be disposed of off-site at a regulated landfill.

Petroleum-Impacted Soil Disposal

The petroleum-impacted stockpile (SP2) was removed and disposed of off-site at Cowlitz County Headquarters Landfill and Hillsboro Landfill, Inc. for a total of 10,955.79 tons. The disposal was completed on February 7, 2020.

Since stockpile SP1 did not exceed MTCA Method A soil cleanup levels, the stockpile was left on-site. In April 2020, the stockpile was graded and seeded for stabilization.

Ponded Water Monitoring

In March 2020, Tacoma Power collected surface water samples (SOP 1 and COP 1) from ponded water in the former stockpiled area (Figure 2). Grab samples were collected by directly submerging sample containers at the sampling location. The analytical results of the ponded water samples are described in Section 5.4.2 and sample results are summarized in Table 6. Both surface water sample results contained concentrations of turbidity, copper, and zinc above indicator levels. Sample SOP 1 contained elevated concentrations of TPH-D and TPH-O above indicator levels as well as below indicator levels for pH.

There were no releases of this ponded water outside of the stockpile area. Tacoma Power developed a plan to cover the stockpile area with bioretention soil and biofiltration seed to further stabilize the stockpile area, fill in the depressed areas to promote drainage, and to promote further vegetation growth.

Summary and Recommendations

Approximately 10,956 tons of petroleum-impacted soil and 186,200 gallons of impacted water was removed and disposed of off-site. A protective cap was installed along the Rainey Creek bank, which included a permeable RCM to treat any residual impacts that remain in-place following the excavation work. Some soil with elevated concentrations of TPH-O, TPH-D, and cPAHs were left in-place (samples LB-2 that was covered by the cap and Creekbed 1) as well as areas observed to have petroleum impacts during construction of the cap (northeast near the ravine and southwest near the toe of the creek that was covered with non-impacted soil during grading) due to limited time before water levels in the lake and creek rose.

The cap is currently being monitored by Tacoma Power staff through weekly inspections. The Tacoma Power inspection form is provided in Appendix L. Tacoma Power inspections began March 17, 2020, and shortly after were suspended due to COVID restrictions. Inspections resumed on June 2, 2020, and are ongoing.

Inspections of the protective cap can only be conducted when the cap is exposed. During the recreation season (May through September) the reservoir is operated with the goal of keeping the water level at elevation 749 feet (753 feet NAVD 88), which results in the cap mostly being underwater. The Tacoma

Power staff's routine visual inspections assess if the protective cap is performing as intended (physical isolation, soil stabilization, and chemical isolation). Specific items or processes that may be monitored include cap integrity, thickness, and consolidation; the need for cap replenishment; and chemical migration potential.

Capping and natural recovery performance should be monitored over time in order to confirm that the cap continues to isolate petroleum-impacted soil and/or that natural recovery processes continue to function. This is especially important following high energy disturbances at the Site, such as big storm events, in which the mechanism of the remedy can be damaged or when the water levels fluctuate at the Site. For example, storm events can expose petroleum-impacted soils that were capped or erode those that were previously isolated. Monitoring should confirm that:

- The thickness of the cap is maintained, and Tacoma Power staff should note any signs of failure such as slumping, scouring, and channeling.
- The edges of the cap are maintained.
- The bank upstream and downstream of the cap have been maintained. Erosion, especially downstream of the Site, shall be monitored for any additional seeps.

REFERENCES

USGS 1986. Rock riprap design for protection of stream channels near highway structures; Volume 2, Evaluation of Riprap design procedures. By J.C. Blodgett and C.E. McConaughy. Water-Resources Investigations Report 86-4128. 1986.

Table C-2 - Analytical Results for Stockpile Soil Samples

Sample ID Sampling Date	MTCA Method A Cleanup Level ^a	SP1-1 12/5/2019	SP1-2 12/5/2019	SP1-3 12/5/2019	SP1-4 12/5/2019	SP1-5 12/5/2019	SP2-1 12/5/2019	SP2-2 12/5/2019	SP2-3 12/5/2019	SP2-4 12/5/2019	SP2-5 12/5/2019	SP2-6 12/6/2019
TPH in mg/kg												
Diesel Range Organics	2000	50 U	83	50 U	50 U	110	50 U	74	170	50 U	50 U	660
Lube Oil	2000	250 U	600	250 U	250 U	620	250 U	480	250 U	250 U	250 U	2300
Gasoline Range Organics	30/100 ^b	5 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 UJ
Metals in mg/kg												
Arsenic	20	1.45	1.57	2.22	1.49	1.38	1.12	1.44	1.31	1 U	1.91	1.81
Barium		65.8	48.6	51.5	61.3	71.9	61.7	60.7	58.7	67	60.6	54.8
Cadmium	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chromium	19/2000 ^c	18.1	12.4	14	14.7	19.1	15.4	14.7	18.6	15.9	18.5	11
Lead	250	6.7	13.1	2.51	2.62	3.29	2.49	16.9	2.44	2.56	3.52	9.06
Mercury	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Selenium		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Silver		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
BTEX in mg/kg												
Benzene	0.03	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 UJ
Ethylbenzene	6	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.1 UJ
Toluene	7	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.1 UJ
Total Xylenes	9	0.06 U	0.3 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.3 UJ
PAHs in mg/kg												
Acenaphthene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.07
Acenaphthylene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Anthracene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.11
Benz[a]anthracene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.16
Benzo(a)pyrene	0.1	0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.14
Benzo(b)fluoranthene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Benzo(ghi)perylene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Benzo(k)fluoranthene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Chrysene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.3
Dibenzo(a,h)anthracene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Fluoranthene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.063
Fluorene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.14
Indeno(1,2,3-cd)pyrene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Naphthalene	5	0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.05 U	0.5 U	0.05 U	0.05 U	0.5 U	0.05 U
Phenanthrene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.052	0.5 U	0.072	0.05 U	0.5 U	0.41
Pyrene		0.5 U	0.5 U	0.01 U	0.01 U	0.5 U	0.054	0.5 U	0.072	0.05 U	0.5 U	0.66
Total cPAHs TEQ	0.1	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	0.16

Table C-2 - Analytical Results for Stockpile Soil Samples

Sample ID Sampling Date	MTCA Method A Cleanup Level ^a	SP2-7 12/6/2019	SP2-8 12/8/2019	SP2-9 12/8/2019	SP2-10 12/8/2019	SP2-11 12/8/2019
TPH in mg/kg						
Diesel Range Organics	2000	12000	110	4300	440	1700
Lube Oil	2000	12000	250 U	4300	870	3000
Gasoline Range Organics	30/100 ^b	25 UJ	5 U	240	25 U	110
Metals in mg/kg						
Arsenic	20	2.18	1.61	1.59	1.79	1.79
Barium		70.1	52.5	42.6	56.9	50
Cadmium	2	1 U	1 U	1 U	1 U	1 U
Chromium	19/2000 ^c	12	14.3	12.4	13.5	16.1
Lead	250	21.8	13.5	6.19	6.45	4.91
Mercury	2	1 U	1 U	1 U	1 U	1 U
Selenium		1 U	1 U	1 U	1 U	1 U
Silver		1 U	1 U	1 U	1 U	1 U
BTEX in mg/kg						
Benzene	0.03	0.02 UJ	0.02 U	0.02 U	0.02 U	0.02 U
Ethylbenzene	6	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U
Toluene	7	0.1 UJ	0.1 U	0.28	0.1 U	0.1 U
Total Xylenes	9	0.3 UJ	0.3 U	0.88	0.3 U	0.3 U
PAHs in mg/kg						
Acenaphthene		0.5 U	0.05	1.2	0.2	0.5 U
Acenaphthylene		0.5 U	0.05 U	0.5 U	0.05 U	0.5 U
Anthracene		0.5 U	0.1	2.1	0.38	0.66
Benz[a]anthracene		0.52	0.12	1.6	0.3	0.93
Benzo(a)pyrene	0.1	0.35	0.071	0.62	0.16	0.72
Benzo(b)fluoranthene		0.5 U	0.05 U	0.5 U	0.064	0.5 U
Benzo(ghi)perylene		0.5 U	0.05 U	0.5 U	0.05 U	0.5 U
Benzo(k)fluoranthene		0.5 U	0.05 U	0.5 U	0.05 U	0.5 U
Chrysene		0.96	0.19	2	0.52	1.6
Dibenzo(a,h)anthracene		0.5 U	0.05 U	0.5 U	0.05 U	0.5 U
Fluoranthene		0.5 U	0.05 U	0.6	0.12	0.5 U
Fluorene		0.5 U	0.11	2.7	0.45	0.71
Indeno(1,2,3-cd)pyrene		0.5 U	0.05 U	0.5 U	0.05 U	0.5 U
Naphthalene	5	0.5 U	0.05 U	0.5 U	0.058	0.5 U
Phenanthrene		0.9	0.36	8.5	1.4	2.4
Pyrene		2.1	0.43	4.9	1.1	3.7
Total cPAHs TEQ	0.1	0.41	0.085	0.80	0.21	0.83

NC=Not Calculated

U = Not detected at detection limit indicated.

J = Estimated.

a. Method A soil cleanup level for unrestricted land use.

b. 30 mg/kg when benzene is present; 100 when benzene is not detected.

c. 19 mg/kg as Chromium VI/2000 mg/kg as Chromium III.

Detected concentrations are bolded.

Concentrations that exceed cleanup level are shaded.

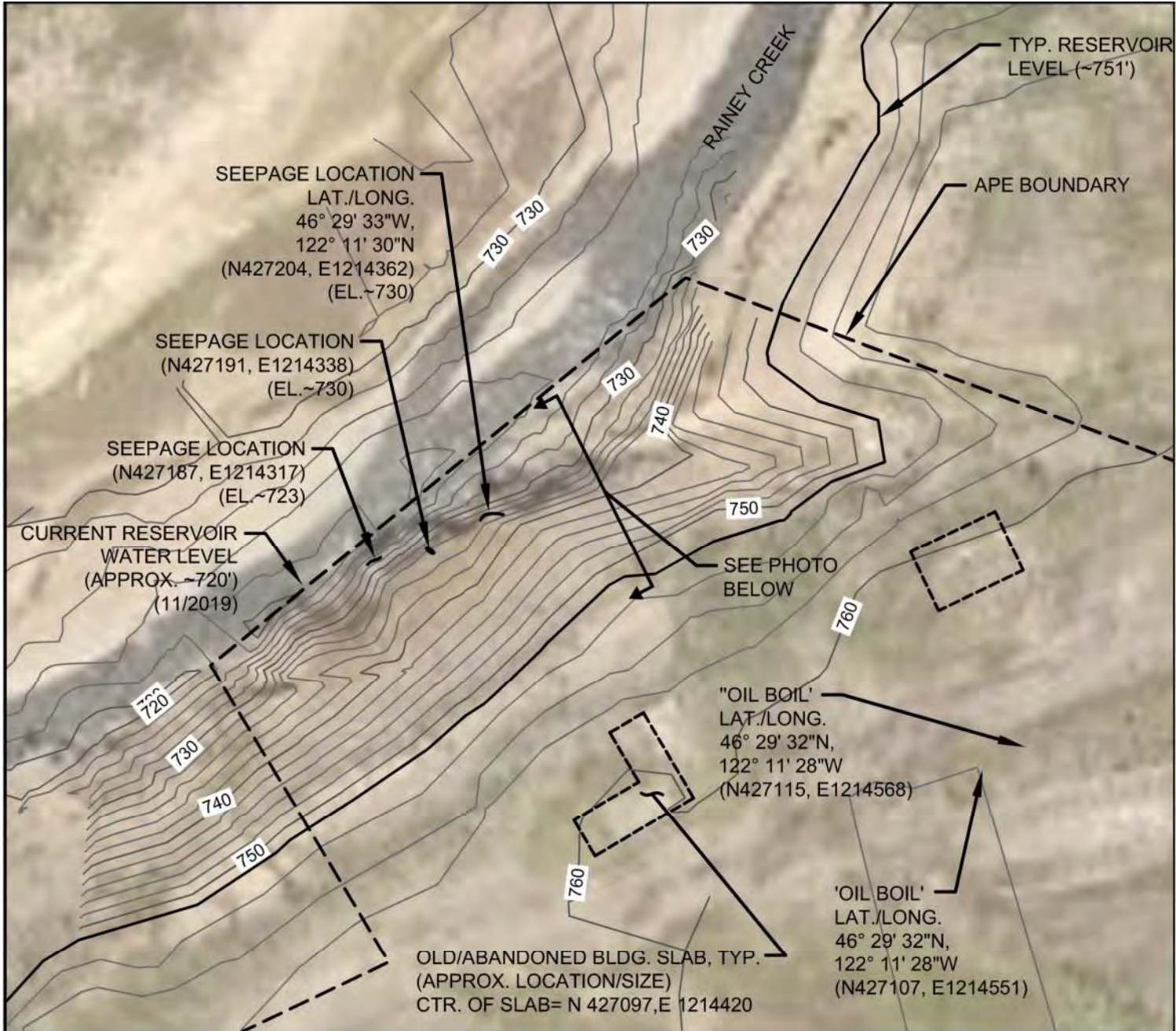


Photo: Seep location and slope conditions. View looking southwest.
Date: 10/10/2019.

Notes:

1. Elevation contours and site features/locations provided by the City of Tacoma Public Utilities.
2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at el.=750.7 (NGVD '88) and adjusted with recent data obtained via two (2) topographic and bathymetric surveys done August and November of 2019.
3. All proposed work will be conducted within the Area of Potential Effect (APE) boundary.

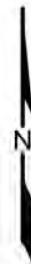
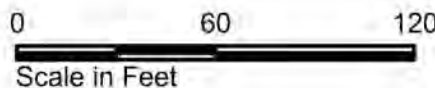
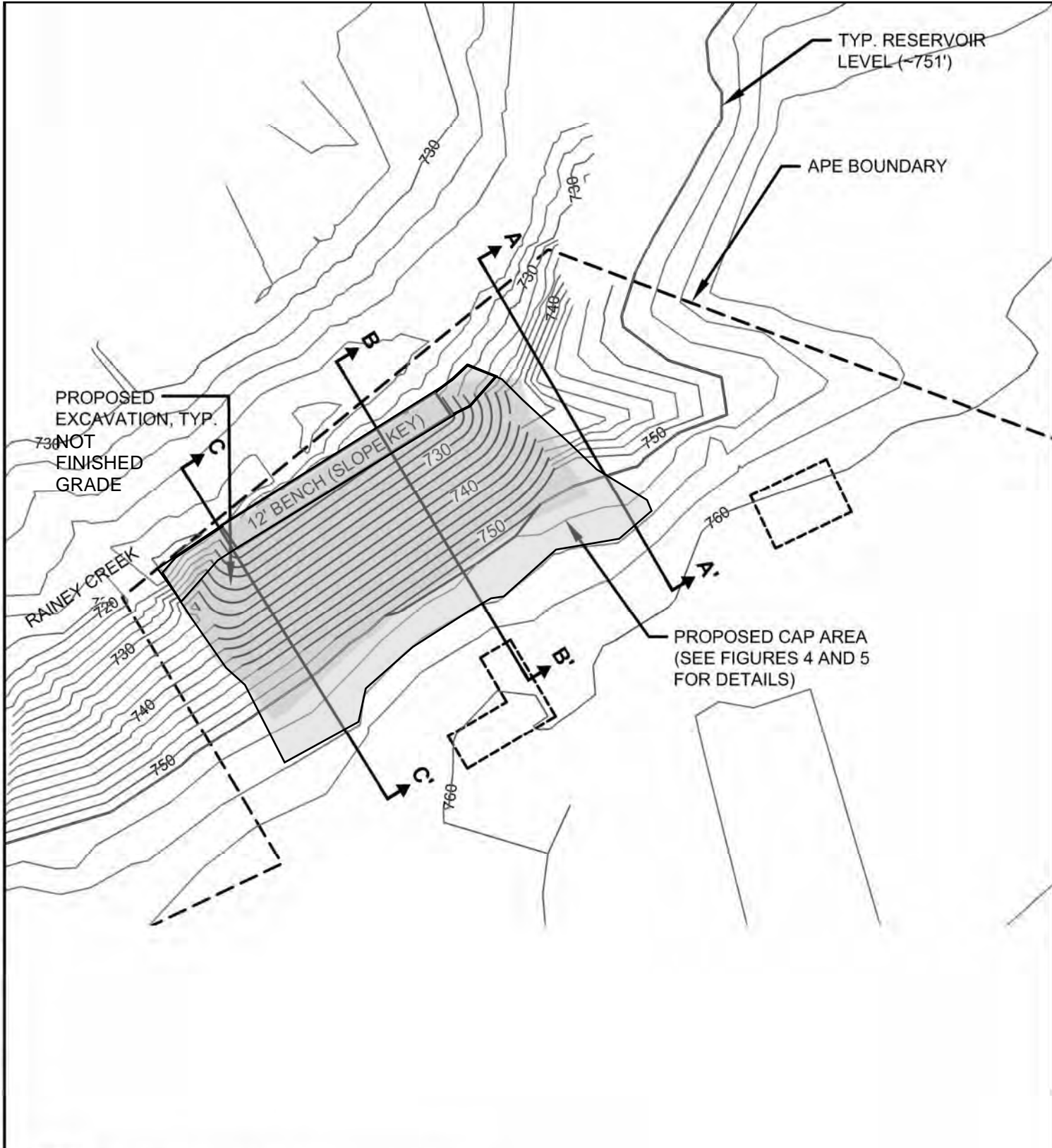


Figure C-1 - Existing Conditions

Reference Number:	_____
Applicant Name:	<i>Tacoma Public Utilities</i>
Proposed Project:	<i>Kosmos Oil Seep - Proposed Cap</i>
Location:	<i>Former Kosmos Mill Site</i>
Date:	<i>11/20/19</i>



Notes:

- 1. Existing elevation contours and site features/locations provided by the City of Tacoma Public Utilities.
- 2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 (NGVD '88).
- 3. All proposed work will be conducted within the Area of Potential Effect (APE) boundary.
- 4. See Figures 4 and 5 for proposed cap details.

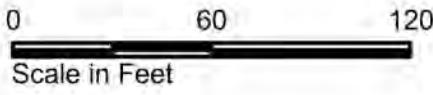


Figure C-2 - Cap Area

Reference Number: _____
 Applicant Name: *Tacoma Public Utilities*
 Proposed Project: *Kosmos Oil Seep - Proposed Cap*
 Location: *Former Kosmos Mill Site*
 Date: *11/20/19*

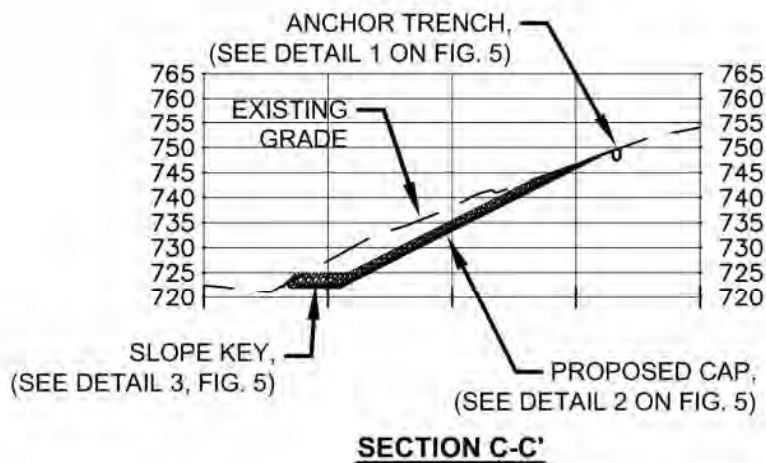
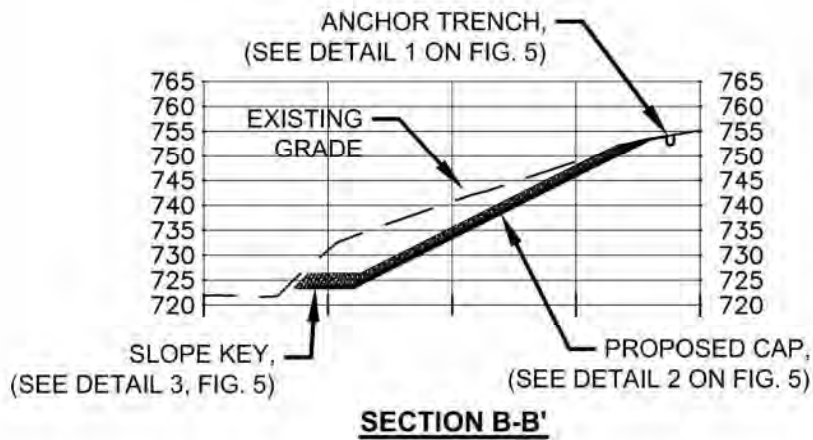
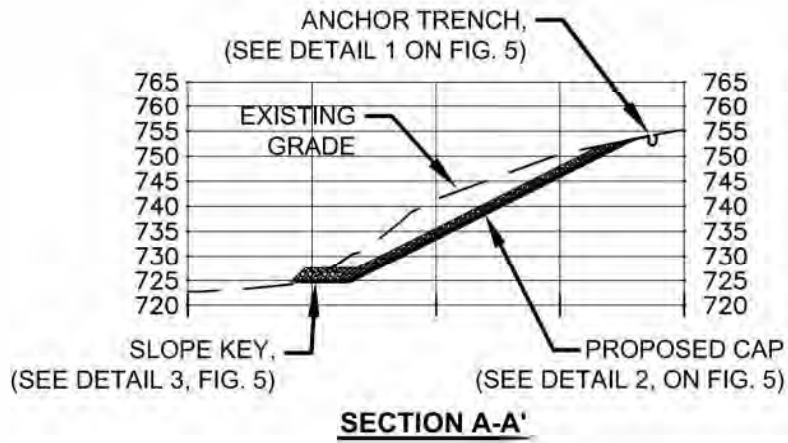
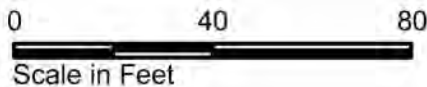
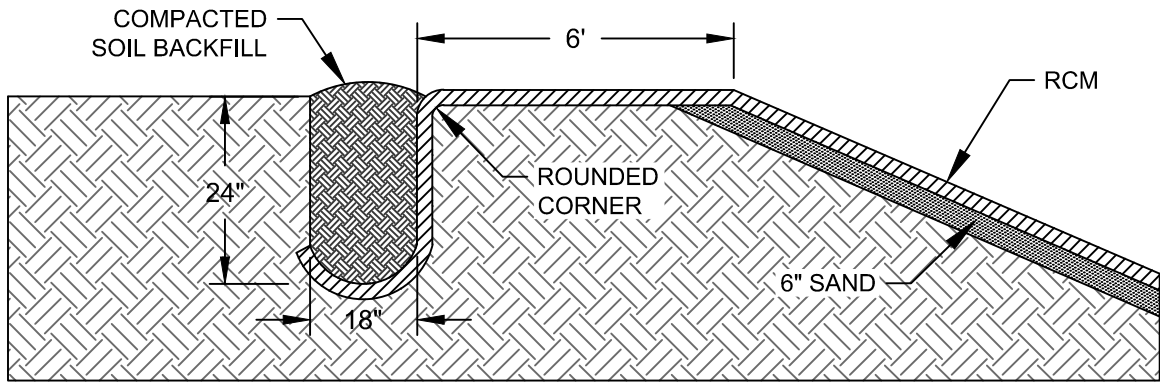


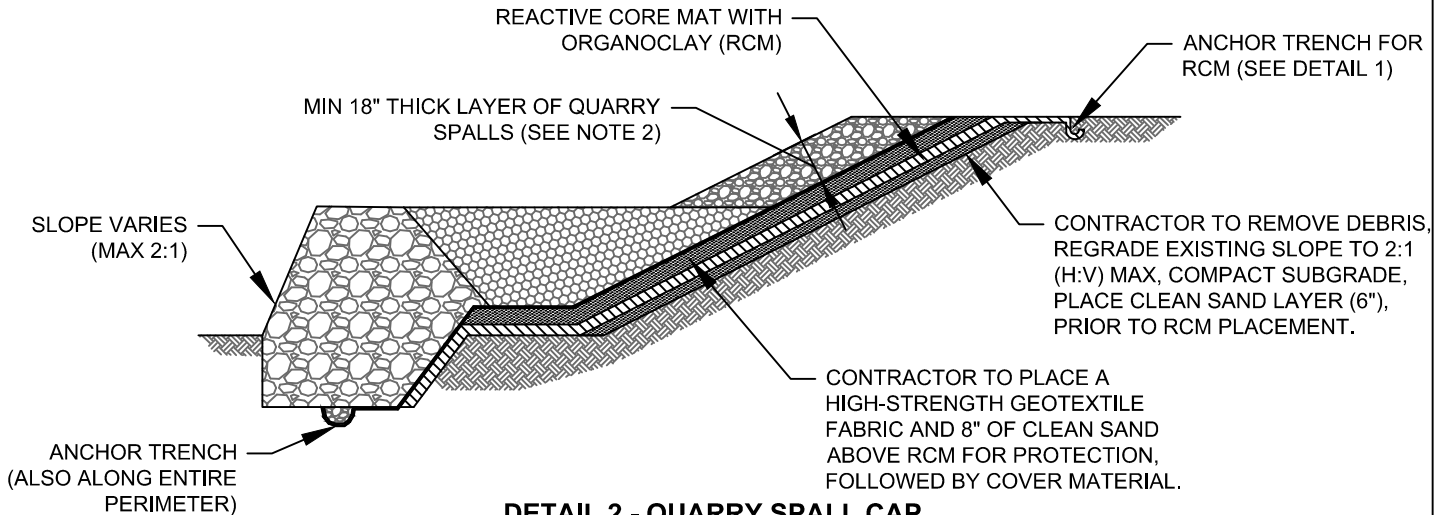
Figure C-3 - Cross Sections

Reference Number: _____
 Applicant Name: *Tacoma Public Utilities*
 Proposed Project: *Kosmos Oil Seep - Proposed Cap*
 Location: *Former Kosmos Mill Site*
 Date: *11/20/19*

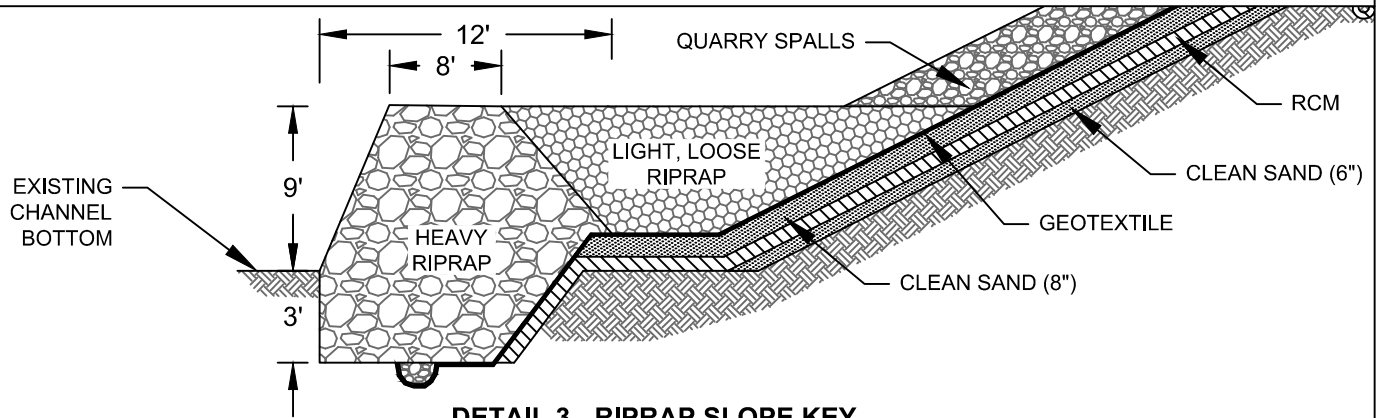




DETAIL 1 - RCM ANCHOR TRENCH DETAIL



DETAIL 2 - QUARRY SPALL CAP



DETAIL 3 - RIPRAP SLOPE KEY

Notes:

1. Subgrade preparation. The subgrade surface must be relatively smooth and free of vegetation, sharp-edged rocks, stones, sticks, construction debris, and other foreign matter that could contact the RCM. All protrusions extending more than 1 inch from the subgrade surface shall be removed, crushed, or pushed into the surface. Contractor will then compact the existing subgrade and place a minimum 6" layer of clean sand.
2. Slope capping tolerance. The layer thickness shown on the plans for filter material and riprap slope capping materials is a minimum thickness. Slope capping materials shall be placed within a tolerance of +6 inches.
3. Any impacted soil encountered during earthwork/regrading of slope will be removed by Contractor and disposed of off-site at an appropriate disposal facility.
4. Contractor shall follow the RCM manufacturer's installation instructions. All RCM panels should lie flat, with no wrinkles or folds, especially at the exposed edges of the panels. The end of the RCM roll should be placed in an anchor trench at the top of the slope. RCM seams are constructed by overlapping adjacent panel edges and ends. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Seam should be overlapped by a minimum of 12 inches. If the RCM is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area. Contractor shall place a high-strength geotextile fabric over the RCM for protection, prior to placing the quarry spalls.
5. Cover Material: Contractor shall carefully place large quarry spalls (4" - 8") and/or light loose riprap over the high-strength geotextile fabric as shown in the details above.

FIGURE C4 - CAP DETAILS

Reference Number: _____
 Applicant Name: Tacoma Public Utilities
 Proposed Project: Kosmos Oil Seep - Proposed Cap
 Location: Former Kosmos Mill Site
 Date: 11/20/19

APPENDIX D
Water Quality Protection Plan –
Tacoma Public Utilities, Tacoma Power

Kosmos Oil Seep Exploration and Capping

Water Quality Protection Plan (WQPP)

12/2/2019 — 12/2/2022



Tacoma Power

12/2/2019

Revised 12/11/2019

Initial approval provided by Ecology on 12/06/2019

List of Acronyms and Abbreviations

Acronym / Abbreviation	Explanation
303(d)	Section of the Clean Water Act pertaining to Impaired Waterbodies
BFO	Bellingham Field Office of the Department of Ecology
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO₂	Carbon Dioxide
CRO	Central Regional Office of the Department of Ecology
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERO	Eastern Regional Office of the Department of Ecology
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
GULD	General Use Level Designation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWRO	Northwest Regional Office of the Department of Ecology
pH	Power of Hydrogen
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
su	Standard Units
SWMMEW	Stormwater Management Manual for Eastern Washington
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
SWRO	Southwest Regional Office of the Department of Ecology
TMDL	Total Maximum Daily Load
VFO	Vancouver Field Office of the Department of Ecology
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWHM	Western Washington Hydrology Model

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Introduction

General purpose of the WQPP

The Water Quality Protection Plan (WQPP) is a compliance tool that provides the Washington State Department of Ecology (Ecology) with “reasonable assurance” of the protection of water quality.

Existing permits and regulations

	Number	Date(s)
401 WQC	11-2001	01/15/2002
HPA	Emergency Verbal HPA (Scott Brummer) 2019-5-129+01	11/26/2019 12/06/2019 - 01/24/2020
USACE 404 Nationwide	NWS-2019-941-WRD (NWP 38 - Cleanup of Hazardous and Toxic Waste)	11/26/2019 - 03/18/2022

Project Summary

- Project/Site Name: Kosmos Oil Seep Exploration and Capping
- Street/Location: Champion Haul Road
- City: Glenoma
- County: Lewis
- State: WA
- Zip code: 98336
- Parcel Number: 30775001000
- Location (lat/long): 46.492262, -122.191761
- Waterbody: Riffe Lake/Rainey Creek
- FERC License Number: 2016

This document presents the Water Quality Protection Plan (WQPP) for activities related to the Kosmos Oil Seep Exploration and Capping located in Lewis County, Washington. Activities performed under this WQPP are covered by Tacoma Power’s Hydraulic Project Approval (HPA) issued by Washington Department of Fish and Wildlife (WDFW) and Clean Water Act Section 404 Nationwide Permit (NWP) issued by the United States Army Corps of Engineers. WDFW (Scott Brummer) issued an emergency verbal permit on November 26, 2019. The Emergency HPA (Permit Number: 2019-5-129+01) was issued on December 6, 2019 and covers a period of November 26, 2019 through January 24, 2020 (Appendix A). Tacoma Power obtained coverage under NWP 38 – Cleanup of Hazardous and Toxic Waste from the USACOE in an emailed letter (NWS-2019-941-WRD) on November 26, 2019 (Appendix B). NWP authorization is valid until March 18, 2022, unless the NWP is modified, reissued, or revoked prior to that date.

This WQPP describes the project area, activities performed, and Best Management Practices (BMPs) utilized to prevent environmental degradation resulting from the actions of capping contaminated soils and exploratory drilling/test pits to characterize the source and extent of contamination. The Washington Department of Ecology (Ecology) regulates hydroelectric projects as it relates to Section 401 Water Quality Certification (WQC) of the Federal Water Pollution Control Act (Clean Water Act 33) (U.S.C § 1341). Specific WQC conditions for the Cowlitz Hydroelectric Project (FERC No.2016) are found in the WQCs dated 1/15/2002 (Order

11-2001), amended date 8/20/2002 (Amended Order No. DE02WQSR-4098A-01), and supplemental date 6/18/2003 (Supplemental Order in 01SEASR-3367). Tacoma Power, per Ecology's guidance, has prepared this WQPP to comply with the above referenced documents. It is our intent to proceed with this work as soon as Ecology has provided written approval of this document and all required permits have been obtained.

Project Location:

The site is located adjacent to both an abandoned industrial sawmill that was part of a 1992 environmental cleanup and the former town of Kosmos which was inundated following construction of Mossyrock Dam. It is situated along Rainey Creek in the Kosmos Flats area next to Riffe Lake. Rainey Creek flows into Riffe Lake and at times, Riffe Lake backwaters into Rainey Creek. From the intersection of Highway 12 and Kosmos Road continue south along Kosmos Road for approximately 0.1 miles and then take a sharp left onto Champion Haul Road. Continue along Champion Haul Road for approximately 1.8 miles and the entrance to the site is located on the right. The area is also known as the Dog Mountain landing zone, a site used by hang gliders and paragliders.

Project Description:

The objective of the project is to stabilize and temporarily cap an area on the the left bank of Rainey Creek to prevent discharge of deleterious materials to waters of the state. Investigative actions will occur to characterize the extent and source of contamination. A subsequent remediation plan will be developed following exploratory/investigative actions and will include an additional or updated WQPP.

The cap is designed to protect Rainey Creek and Riffe Lake from discharge of Bunker C Oil, diesel, gasoline, and potential metals. Bunker C oil was discovered seeping from an eroded bank along Rainey Creek in April 2019 and reported to the Washington Department of Ecology (Ecology). Tacoma Power met with Ecology (Spills Program and Toxics Cleanup Program) on site and implemented periodic visual inspections following discovery of the initial seeps. Tacoma Power's environmental consultant assessed the site but the seeps were inundated by Riffe Lake during the evaluation. Following the recreation season, the elevation of Riffe Lake dropped and the site was again exposed. During subsequent visual inspections additional upland oil areas were discovered. Tacoma Power contracted with Hart Crowser to conduct exploratory actions to determine the source and extent of the contaminants and during the site visit additional upland oil areas were again observed. An oil sheen was first observed at the site on the surface of Rainey Creek in October 2019. Tacoma Power and our contractor (NRC Environmental Services) immediately installed BMP's (oil absorbant booms, oil snares, oil absorbant wattles), reported the oil sheen to Ecology and asked for technical assistance. Tacoma Power in collaboration with the regulatory agencies made a decision to design and install a temporary cap for protection of the site from potential bank failure associated with high inflow events and prevention of discharge of contaminants to Rainey Creek/Riffe Lake. Anderson Environmental Consulting (AEC) has been contracted to construct the cap and associated components of the project. Following construction of the cap, Hart Crowser will continue with exploratory/investigative actions to determine the pathway and source of contamination.

Ecology's Hydroelectric WQ Compliance Manager was provided a timeline on November 12, 2019 that included actions/events with corresponding water surface elevations of Riffe Lake that occurred since filling of an ERTS incident (#688792) on April 26, 2019 (Appendix C).

Project Narrative

Placement of the cap along a portion of the left bank of Rainey Creek is anticipated to occur while the elevation of Riffe Lake is below approximately 720 feet to facilitate working in the dry as is practical. When Riffe Lake elevations are below 720 feet the project site is not backwatered by Riffe Lake. Cap construction is expected to be completed in approximately ten (10) days. Best Management Practices (BMPs) will be installed prior to construction and monitored continually for effectiveness throughout the project. Equipment utilized for the project will likely include excavators, bulldozers, heavy trucks and hand tools. Construction will consist of establishment/reinforcement of the construction entrance and access roads, excavation and grading the bank to create an approximate 2:1 slope with potential benches to support the cap materials, potential limited dredging of a small portion of the creek channel to facilitate creation of a preferential path for water in an attempt to keep the work area as dry as possible, transportation of spoils (both contaminated and uncontaminated) to stockpile locations, transportation of contaminated spoils to a disposal facility, placement of a rip-rap slope key at the toe of the slope and construction of the cap itself. The cap structure upslope of the rip-rap slope key will consist of the following: a layer of sand, an organoclay reactive core mat (RCM), an additional layer of sand, high strength geotextile fabric and a top layer of quarry spalls.

The majority of actions performed will be near- or in-water activities with only establishment/reinforcement of access roads, transportation of spoils, stockpiling of spoils and disposal of spoils occurring in the upland areas. Below is a description of each action addressed by this WQPP. Site maps included in Appendix D illustrate the locations of activities, monitoring compliance points and associated BMPs employed to minimize environmental impacts to the aquatic and terrestrial communities.

Work Sequence

- 1) Installation of BMPs (effectiveness of BMPs will be monitored throughout the project and adaptive management employed to assure adequate protections are in place and functioning)
- 2) Establishment/reinforcement of access roads
- 3) Excavation and grading
- 4) Transportation and storage of spoils
- 5) Creation of preferential water path within the stream bed through limited dredging
- 6) Placement of rip-rap slope key to support cap
- 7) Construction of cap
 - Placement and grading of sand
 - Placement of RCM
 - Placement and grading of sand
 - Placement of high strength geotextile fabric
 - Placement of quarry spalls
- 7) Removal of BMPs
- 8) Summary report sent to Ecology

Erosion, Sediment and Pollution Control Best Management Practices (BMPs)

This Water Quality Protection Plan (WQPP) describes BMPs associated with the Kosmos Oil Seep Exploration and Capping. Personnel noted in the Relevant Project Contacts section below will ensure proper implementation and effectiveness of the WQPP. Should the measures initially installed prove to be inadequate, the personnel identified in the Relevant Project Contacts section will immediately implement additional measures to protect receiving waters; and immediately contact Ecology's Hydroelectric WQ Compliance Manager, Carol Serdar. Where appropriate, additional contingency measures are not limited to those mentioned. This plan recognizes the obligation to employ all known and reasonable methods of prevention, control and treatment (AKART) to prevent pollution of the waters of the State of Washington. Appropriate BMPs to prevent erosion and sedimentation, and identify, reduce, eliminate or prevent water pollution associated with construction activities and capping of contaminated soils will be implemented.

This WQPP is a living document (with Ecology WQ Program oversight) and adaptive management employing AKART is expected at all locations. The following BMPs may be utilized and are included in the attached site plans (Appendix D).

General BMPs

- 1) Equipment utilized will be free of external petroleum based products while working in- or near-water.
- 2) Accumulations of soils or other debris will be removed from the drive mechanisms and undercarriage of utilized equipment prior to performing work.
- 3) Equipment will be checked for leaks and necessary repairs prior to commencing in- or near-water actions.
- 4) Equipment will be positioned to protect and minimize disturbance to riparian vegetation.
- 5) Equipment will remain on developed roadways and structures as practical.
- 6) Equipment will operate below ordinary high water but drive mechanisms (wheels, tires, tracks, etc.) will not enter the wetted perimeter.
- 7) Refueling activities will be performed a minimum of 50 feet from waters of the state and secondary containment will be utilized.
- 8) All equipment with fuel will have secondary containment for 120% capacity of fuel potential in the equipment.
- 8) Dump truck bed will be sealed or lined to prevent leakage of saturated spoils and debris.
- 9) Spoils will not be stockpiled in or adjacent to waters of the state to prevent turbid backflow.
- 10) Water quality will be monitored as appropriate (see Monitoring section below; map of monitoring sites may be found in Appendix D).

Site-Specific BMPs

BMPs and methodologies found in the 2012 [Stormwater Management Manual for Western Washington](#) (updated 2014) that may be utilized include:

- BMP C105: Stabilized Construction Entrance / Exit
- BMP C107: Construction Road/Parking Area Stabilization
- BMP C123: Plastic Covering
- BMP C150: Materials on Hand
- BMP C153: Material Delivery, Storage and Containment
- BMP C160: Certified Erosion and Sediment Control Lead
- BMP C162: Scheduling
- BMP C233: Silt Fence
- BMP C236: Vegetative Filtration (for discharge of clean water)
- BMP C251: Construction Stormwater Filtration
- Pumps, lines and dispersion equipment

BMPs, details, and installation guidelines found in WSDOT's [Best Management Practices, Regional Road Maintenance Program List of BMPs](#), and [Best Management Practices Field Guide for ESA § 4 \(d\) Habitat Protection](#) that may be utilized include:

- Construction Access Road
- Dewatering
- Plastic Covering
- Rip Rap
- Sandbags
- Silt Fence
- Sweeping (of Champion Haul Rd. to assure any track out is addressed)
- Turbidity Curtain/Sea Curtain

Alternative BMPs utilized but not included in the references above include:

- Alternative BMP: Geomembrane Base
- Alternative BMP: Plastic Lined Silt Fence
- Alternative BMP: Reactive Core Mat (organoclay)
- Alternative BMP: Absorbent Oil Booms (assure changing of booms occurs as needed)
- Alternative BMP: Hard Containment Boom
- Alternative BMP: Oil Absorbent Pads
- Alternative BMP: Plastic Lined Depression (to contain contaminated water)
- Alternative BMP: Baker Tanks

*See attached maps in Appendix D for proposed locations of actions, BMPs and monitoring compliance locations.

Site-specific Near- and/or In-Water BMP narrative

1) Silt fencing installed along portion of access road adjacent to Riffe Lake.

- 2) Turbidity curtain installed downstream of site across entire channel.
- 3) Absorbent oil booms installed downstream of site across entire channel; these will be continually monitored, and replaced when booms become clogged with sediment/fines or oil. During replacement of booms the new boom will be installed downstream of the old boom prior to removal of the old boom.
- 4) Hard containment boom lined with oil absorbant boom installed along shoreline of seep slope; boom will be continually monitored, and replaced when clogged with sediment/fines or oil.
- 5) Oil absorbant pads utilized for clean-up of spot discharges along seep slope and for oil drips from vehicles; pads will be disposed of properly in plastic garbage bags.
- 6) Plastic-lined silt fencing installed at toe of seep slope.
- 7) Water collected on the upslope side of the plastic lined silt fencing will be pumped upland for vegetative/overland infiltration, deposited into a plastic lined depression or deposited into baker tanks for treatment if it is contaminated.
- 8) Base of stockpile location lined with plastic or geomembrane (if geomembrane is permeable it will not be used).
- 9) Stockpiles covered with plastic sheeting and sand bags; straw bales at base of slope will be wrapped with plastic covering to shed water off the stockpile.

Specific Work Areas/Activities

1. Installation of BMPs

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

BMPs installed for in- or near-water work.

2. Establishment/reinforcement of access roads

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

Placement of geotextile fabric on potential access roads, construction entrance and parking areas. Utilization of heavy trucks, bulldozers and excavators to place, grade and compact quarry spalls for access roads, construction entrance and parking areas.

3. Excavation and grading

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

Excavators and bulldozers utilized to remove material for establishment of approximate 2:1 grade with potential benching at several elevations; Removed spoils immediately loaded into dump truck with sealed beds. Removed spoils will not be allowed to dewater over water or along shorelines.

4. Transportation and storage of spoils

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

A depression(s) will be created and lined at the upland disposal site for deposition and containment of spoils; This location has no potential to discharge to waters of the state.

5. Creation of preferential water path within the stream bed through limited dredging actions

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

Excavator utilized to remove material from the river right streambed and placed along the river left streambed to create a temporary pathway for water flow away from the project streambank. Dredged materials consisting of gravels, cobbles and fines will remain within the established bed of the channel.

6. Placement of rip-rap slope key

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

Excavator utilized for placement of rip-rap at toe of slope to function as a slope key for the cap.

7. Construction of cap

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

Excavator, bulldozer, and handwork utilized for sequenced placement of the following onto the prepared base substrate:

- Layer of sand
- Organoclay RCM
- Additional layer of sand
- High strength geotextile fabric
- Layer of quarry spall.

8. Removal of BMPs

Location of Activities and Associated BMPs

See attached maps (Appendix D).

Description of Activities:

BMPs will be removed and site conditions restored following completion of project. Note that several BMPs may be left in place for the remediation phase and will be addressed in an updated or new WQPP.

Monitoring/Sampling Methodology

Water quality sampling will be performed daily during active slope excavation and grading. Sampling will consist of: 1) grab samples to be analyzed by an accredited laboratory; and 2) insitu sampling (for turbidity and pH) performed using calibrated instrumentation or strip technology. All holding times for the methodologies required will be adhered to. The table included in Appendix E describes the parameters, analytical methods, detection limits (DLs) and quantitation levels (QLs) Ecology requires for these activities. All final sample reports and

chains of custody will be provided to Ecology within 24-hour of receipt. Sampling will continue as directed until Ecology has provided authorization to modify the sampling regime.

Sampling water in Rainey Creek and Riffe Lake will occur to establish hardness values; this will be reported to Ecology's Hydroelectric WQ Compliance Manager to ensure the table included in Appendix E remains adequate for protecting waters specific to Rainey Creek and Riffe Lake.

Initial grab sampling will be performed at four locations. These include: 1) approximately 100 feet upstream of the site (to establish background levels); 2) on the upslope side of the alternative BMP consisting of silt fence lined with plastic (to establish if water seeping from the site is contaminated); 3) Live water located immediately outside (waterward) of alternative BMP consisting of silt fence lined with plastic (to establish if containment by BMPs is effective and if additional measures need to be implemented); and 4) in Rainey Creek downstream of excavation area (between booms where new oil contamination of booms was found on December 6, 2019). Sampling at the upstream location and upslope of the silt fence lined with plastic will only occur the initial day of sampling but may be modified as needed. Sampling of live water immediately outside of the installed BMPs (identified as location 3 above) will occur daily during active slope excavation and grading.

In situ sampling for turbidity and pH will occur by instrumentation or other reliable technologies in conjunction with all grab samples in addition to locations 150 feet and 300 feet downstream of the active site. All data will be recorded in a site log and provided to Ecology.

Visual turbidity monitoring of Rainey Creek will be performed throughout construction. Visual turbidity monitoring will be employed throughout construction actions. Per WAC 173-201A-200 (1)(e)(i), a temporary area of mixing shall be as follows:

- (A) For waters up to 10 cfs flow at the time of actions, the point of compliance shall be one hundred feet downstream of the activity causing the turbidity exceedance.
- (B) For waters above 10 cfs up to 100 cfs flow at the time of actions, the point of compliance shall be two hundred feet downstream of the activity causing the turbidity exceedance.
- (C) For waters above 100 cfs flow at the time of actions, the point of compliance shall be three hundred feet downstream of the activity causing the turbidity exceedance.

(D) For projects within or along lakes, ponds, wetlands, or other non-flowing waters, the point of compliance shall be at a radius of one hundred fifty feet from the activity causing the turbidity exceedance.

Rainey Creek flows during the actions will be approximately 100 cfs or more, therefore the intended points of compliance for visual turbidity monitoring are as follows:

- 300 feet downstream of actions – when site is not backwatered from Riffe Lake
- 150 foot radius from actions – when site is backwatered by Riffe Lake

If a visible turbidity plume is observed at a point of compliance, it will be documented on a site inspection form/logbook, actions will be temporarily suspended and Ecology's SWRO Federal Permit Coordinator, Carol Serdar (360-407-6269 or 360-742-9751) will be notified. Work stoppage will continue until the turbidity plume has completely dissipated and no visual difference in turbidity is perceived. A visible plume is defined as any difference between

upstream of the action location and at the downstream compliance points (300 feet downstream of action causing discharge), or outside of the 150-foot radius from the activity for work within a lake or reservoir. See Appendix F for a table of relevant project contacts.

All sampling locations are included in Appendix D.

Applicable project criteria and information:

Aquatic Life Use Category: Core Summer Salmonid Habitat

Aquatic Life Turbidity Criteria in Freshwater: 5 NTU over background when the background is 50 NTU or less; or A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

Flow at time of construction: 100 cfs or more

Temporary area of mixing for turbidity: 300 feet downstream or 150 feet radius (water elevation dependant).

Aquatic Life pH Criteria in Freshwater: pH shall be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.

Aquatic Life Dissolved Oxygen Criteria: > 9.5 mg/L

Aquatic Life Temperature Criteria (Highest 7DAD Max): 16°C (60.8°F)

Aquatic Life Dissolved Gas Criteria: Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.

Contingency Plan

A contingency plan develops a set of actions to be considered to adaptively manage the project site and associated BMPs for the protection of waters from site contaminants. The primary contingency plan considered for this project is a water treatment plan. Protective measures that may include capturing and treatment of contaminated water within Rainey Creek immediately down gradient of the observed seeps may be implemented. HydroCon (environmental contractor) is preparing a water treatment plan that will be reviewed and approved by Ecology. Flexibility in managing contaminated stormwater and/or contaminated dewatering water will be included in the water treatment plan. The general water treatment plan can be characterized as follows:

- Removal of surface water through utilization of pumps and transportation through hoses to a series of temporary storage tanks stored in the upland area.
- Contaminated water pumped through sand filter to reduce turbidity and then through a series of granular activated carbon (GAC) to remove contaminants.
- Once analytical testing demonstrates compliance with standards the treated effluent will be discharged to an upland location(s) that is acceptable to Ecology.

Site Inspections

Daily site monitoring/inspections and any other required monitoring will be led by a Certified Erosion and Sediment Control Lead (CESCL). A site monitoring/inspections log containing monitoring/inspection data (including tables) and comments will be kept on site at all times along with this WQPP. A sample site inspection form is included as Appendix G of this document. The CESCL will examine discharge for the presence of suspended sediment, turbidity, discoloration, and sheen throughout the site (including puddles). They will evaluate and document in the monitoring/inspection log the effectiveness of the installed BMPs and determine if repair or replacement of any BMP is warranted to improve the quality of project discharge. Any major changes to the WQPP and associated BMPs will be reviewed and approved by Ecology.

Surveys for dead, dying or distressed organisms within and downstream of the project site will be performed throughout construction and during subsequent water quality sampling events. If dead, dying or distressed organisms are observed during surveys all activities causing harm will immediately stop and Tacoma Power will notify both the Washington Department of Fish and Wildlife and Ecology. Organisms discovered during surveys will be documented on the site inspection form and the description will include species identification, count and location. Photos of organisms will be included as well.

Reporting

The timeline of actions/events with corresponding water surface elevations of Riffe Lake that was supplied to Ecology on November 12, 2019 will be updated bimonthly (every two weeks) and provided to Ecology.

A summary report will be provided to Ecology WQ Program within one month of BMP removal. The report will include additional water quality monitoring proposed during the time period before additional remediation of contaminated soil and groundwater begins. An additional or modified WQPP will be developed for the next phase of the project.

Appendices

Appendix A: HPA

Appendix B: NWP 38 letter of coverage

Appendix C: Timeline (November 12, 2019)

Appendix D: Site maps

Appendix E: Table of parameters, analytical methods, detection limits and quantitation levels

Appendix F: Table of project contacts

Appendix G: Site Inspection Form

Appendix A: Hydraulic Project Approval



HYDRAULIC PROJECT APPROVAL

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: December 06, 2019
Project End Date: January 24, 2020

Permit Number: 2019-5-129+01
FPA/Public Notice Number: N/A
Application ID: 20088

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
Tacoma Power ATTENTION: Matthew Peter 3628 S 35th St Tacoma, WA 98409-3115	

Project Name: Kosmos Mill Site Oil Seep

Project Description: Tacoma Power requests issuance of an Emergency HPA from Washington Department of Fish and Wildlife for the temporary capping of the Kosmos Mill Site Oil Seep. The Kosmos Oil seep exploratory project has grown and necessitates capping during the exploratory phase to assure the streambank is protected as Rainey Creek rises. In April of this year, Bunker C oil was discovered seeping out of an eroded bank along Rainey Creek near Riffe Lake adjacent an abandoned industrial sawmill site. At that time, Washington State Department of Ecology requested visual inspections of the site. Tacoma started the process to hire a consultant to perform a remedial investigation and feasibility study. At that time, the cleanup was not considered an emergency and the seeping was thought to be stable. Following the recreation season, the elevation of Riffe Lake dropped and the site was exposed. On October 4th, a sheen was discovered. Best Management Practices were installed to stabilize the oil, but these elements will not protect the environment sufficiently if they are inundated. As we move further into the rainy season, Power Management cannot guarantee lake levels that are required prevent inundation due to possible high inflows caused by storm events. Additional seeps have been discovered within the last several weeks along with some stress cracks along the top of the slope. Additional BMPs were deployed and a plan to temporarily cap the site was developed. The Kosmos Mill Oil Seep Cap is designed to protect Rainey Creek and Riffe Lake from Bunker C Oil, diesel, and gasoline that is seeping from an eroded bank of the creek. Tacoma has declared an emergency and the director has approved waiving the formal bidding process to mobilize a contractor to install stabilization measures immediately.

PROVISIONS

TIMING - PLANS - INVASIVE SPECIES CONTROL

1. TIMING LIMITATION: You may begin the project on November 26, 2019 and you must complete the project by January 24, 2020.

NOTIFICATION REQUIREMENTS

2. PHOTOGRAPHS: You, your agent, or contractor must take photographs of the job site before the work begins and after the work is completed. You must upload the photographs to the post-permit requirement page in the Aquatic Protection Permitting System (APPS) or mail them to Washington Department of Fish and Wildlife at Post Office Box 43234, Olympia, Washington 98504-3234 within 30-days after the work is completed.

3. FISH KILL/ WATER QUALITY PROBLEM NOTIFICATION: If a fish kill occurs or fish are observed in distress at the job site, immediately stop all activities causing harm. Immediately notify the Washington Department of Fish and Wildlife of the problem. If the likely cause of the fish kill or fish distress is related to water quality, also notify the



HYDRAULIC PROJECT APPROVAL

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: December 06, 2019
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Washington Military Department Emergency Management Division at 1-800-258-5990. Activities related to the fish kill or fish distress must not resume until the Washington Department of Fish and Wildlife gives approval. The Washington Department of Fish and Wildlife may require additional measures to mitigate impacts.

4. POST-EMERGENCY HPA ISSUANCE: You, your agent, or contractor must contact the Washington Department of Fish and Wildlife by e-mail at HPAapplications@dfw.wa.gov; mail to Post Office Box 43234, Olympia, Washington 98504-3234; or fax to (360) 902-2946 within ten calendar days after the expiration date of this emergency/imminent danger HPA to arrange a site visit. The notification must include the permittee's name, project location, starting date, and the Hydraulic Project Approval permit number. The Habitat Biologist will meet onsite with you or your agent or contractor to identify impacts that resulted from the emergency work that must be mitigated. The Department will require a mitigation plan and a memorandum of agreement if the mitigation actions will exceed the statutory time limitation of this HPA.

STAGING, JOB SITE ACCESS, AND EQUIPMENT

5. Establish staging areas (used for equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) in a location and manner that will prevent contaminants such as petroleum products, hydraulic fluid, fresh concrete, sediments, sediment-laden water, chemicals, or any other toxic or harmful materials from entering waters of the state.
6. This Hydraulic Project Approval authorizes the construction of new temporary access roads.
7. Design and locate new temporary access roads to prevent erosion and sediment delivery to waters of the state.
8. Clearly mark boundaries to establish the limit of work associated with site access and construction.
9. Retain all natural habitat features on the bed or banks including large woody material and boulders. You may move these natural habitat features during construction but you must place them near the preproject location before leaving the job site.
10. Station and operate equipment used for this project landward of the ordinary high water line.
11. Equipment used for this project may operate waterward of the ordinary high water line, provided the drive mechanisms (wheels, tracks, tires, etc.) do not enter or operate waterward of the ordinary high water line.
12. Remove soil or debris from the drive mechanisms (wheels, tires, tracks, etc.) and undercarriage of equipment prior to operating the equipment waterward of the ordinary high water line.
13. Check equipment daily for leaks and complete any required repairs in an upland location before using the equipment in or near the water.
14. Use environmentally acceptable lubricants composed of biodegradable base oils such as vegetable oils, synthetic esters, and polyalkylene glycols in equipment operated in or near the water.

CONSTRUCTION-RELATED SEDIMENT, EROSION AND POLLUTION CONTAINMENT

15. Protect all disturbed areas from erosion. Maintain erosion and sediment control until all work and cleanup of the job site is complete.
16. All erosion control materials that will remain onsite must be composed of 100% biodegradable materials.
17. Straw used for erosion and sediment control, must be certified free of noxious weeds and their seeds.
18. Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state.
19. Prevent project contaminants, such as petroleum products, hydraulic fluid, fresh concrete, sediments, sediment-laden water, chemicals, or any other toxic or harmful materials, from entering or leaching into waters of the state.
20. Route construction water (wastewater) from the project to an upland area above the limits of anticipated floodwater. Remove fine sediment and other contaminants before discharging the construction water to waters of the state.



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21. Deposit waste material from the project, such as construction debris, silt, excess dirt, or overburden, in an upland area above the limits of anticipated floodwater unless the material is approved by the Washington Department of Fish and Wildlife for reuse in the project.

22. Deposit all trash from the project at an appropriate upland disposal location.

STREAM BANK PROTECTION

23. Install the toe to protect the integrity of bank protection material.

24. Use clean angular rock to construct the bank protection. The rock must be large enough and installed to withstand wave action from the reservoir and stream flow. The rock shall be placed to a depth that will protect the underlying cap fabric and maintain slope stability.

25. Do not release overburden material into the waters of the state when resloping the bank.

26. Place bank protection or shoreline stabilization material and biodegradable filter blanket material from the bank or a barge. Dumping material onto the bank face may occur only if the toe is established and the material can be confined to the bank face.

27. Reslope the banks to a two foot horizontal and one foot vertical slope or less.

DEMOBILIZATION AND CLEANUP

28. Upon completion of the project, restore the disturbed bed, banks, and riparian zone to preproject condition to the extent possible.

29. Seed areas disturbed by construction activities with a native seed mix suitable for the site that has at least one quick-establishing plant species.

LOCATION #1:		Site Name: Kosmos Mill Site 100 Champion Haul Rd, Morton, WA				
WORK START:		November 26, 2019		WORK END:		January 24, 2020
<u>WRIA</u>		<u>Waterbody:</u>			<u>Tributary to:</u>	
26 - Cowlitz		Rainey Creek (rb)			Cowlitz River	
<u>1/4 SEC:</u>	<u>Section:</u>	<u>Township:</u>	<u>Range:</u>	<u>Latitude:</u>	<u>Longitude:</u>	<u>County:</u>
W 1/2	27	12 N	05 E	46.492841	-122.191316	Lewis
<u>Location #1 Driving Directions</u>						

APPLY TO ALL HYDRAULIC PROJECT APPROVALS



HYDRAULIC PROJECT APPROVAL

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This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW. Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person (s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in civil action against you, including, but not limited to, a stop work order or notice to comply, and/or a gross misdemeanor criminal charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

MINOR MODIFICATIONS TO THIS HPA: You may request approval of minor modifications to the required work timing or to the plans and specifications approved in this HPA unless this is a General HPA. If this is a General HPA you must use the Major Modification process described below. Any approved minor modification will require issuance of a letter documenting the approval. A minor modification to the required work timing means any change to the work start or end dates of the current work season to enable project or work phase completion. Minor modifications will be approved only if spawning or incubating fish are not present within the vicinity of the project. You may request subsequent minor modifications to the required work timing. A minor modification of the plans and specifications means any changes in the materials, characteristics or construction of your project that does not alter the project's impact to fish life or habitat and does not require a change in the provisions of the HPA to mitigate the impacts of the modification. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a minor modification through APPS. A link to APPS is at <http://wdfw.wa.gov/licensing/hpa/>. If you did not use APPS you must submit a written request that clearly indicates you are seeking a minor modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234, or by email to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.



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MAJOR MODIFICATIONS TO THIS HPA: You may request approval of major modifications to any aspect of your HPA. Any approved change other than a minor modification to your HPA will require issuance of a new HPA. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a major modification through APPS. A link to APPS is at <http://wdfw.wa.gov/licensing/hpa/>. If you did not use APPS you must submit a written request that clearly indicates you are requesting a major modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send your written request by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234. You may email your request for a major modification to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

APPEALS INFORMATION

If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

A. INFORMAL APPEALS: WAC 220-660-460 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee may conduct an informal hearing or review and recommend a decision to the Director or designee. If you are not satisfied with the results of the informal appeal, you may file a request for a formal appeal.

B. FORMAL APPEALS: WAC 220-660-470 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.



HYDRAULIC PROJECT APPROVAL

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A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS: If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

Habitat Biologist Scott.Brummer@dfw.wa.gov
Scott Brummer 360-785-0472

for Director
WDFW

Appendix B: Nationwide Permit Verification Letter



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, SEATTLE DISTRICT
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Regulatory Branch

November 26, 2019

Mr. Matt Peter
Tacoma Power
3628 South 35th Street
Tacoma, Washington 98409

Reference: NWS-2019-941-WRD
Tacoma Power
(Kosmos Oil Remediation)

Dear Mr. Peter:

We have reviewed your request to excavate 4,500 square feet of potentially contaminated soil and place in two temporary plastic-lined holding areas totaling 4.25 acres, place fill (quarry spalls, rip rap, sand, and reactive core matting) in 4,500 square feet of bank, and place fill (quarry spalls) over 7420 square feet (temporary access road) for the purpose of stabilization and containment (and facilitation of the containment) of an unknown source of Bunker C oil below the ordinary high water mark of Riffe Lake and Rainey Creek near Glenoma, Lewis County, Washington. Based on the information you provided to us, Nationwide Permit (NWP) 38, *Cleanup of Hazardous and Toxic Waste* (Federal Register January 6, 2017, Vol. 82, No. 4), authorizes your proposal as depicted on the enclosed drawings dated November 22, 2019.

In order for this authorization to be valid, you must ensure the work is performed in accordance with the enclosed *NWP 38, Terms and Conditions* and the following special conditions:

- a. You must implement and abide by the Endangered Species Act (ESA) requirements and/or agreements set forth in your request for emergency action transmitted by email on November 22, 2019 in its entirety. The U.S. Army Corps of Engineers (Corps) made a determination of No Effect for all species and critical habitat based on this document. Failure to comply with the commitments made in this document constitutes non-compliance with the ESA and your Corps permit.
- b. You must conduct the work in accordance with the attached *Water Quality Certification, Order #01SEASR-3367*.

We have reviewed your project pursuant to the requirements of the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act and the National Historic Preservation Act. We have determined this project complies with the requirements of these laws provided you comply with all of the permit general and special conditions.

The Federal Energy Regulatory Commission completed National Historic Preservation Act for the proposed activity. For the purpose of this Department of the Army authorization, we have determined this project will comply with the requirements of these laws provided you comply with all of the permit conditions.

As part of our permit application review process, we notified Native American tribes that have an interest in this area. The multiple tribes requested to be informed of inadvertent discoveries (as noted below) and to be informed of cultural resource monitoring efforts. Based on our coordination, you agreed to provide these reports to the tribes with interest in the area which include, but are not limited to the Chehalis Indian Tribe, Cowlitz Indian Tribe, Nisqually Tribe, Quinault Indian Nation, and Squaxin Island Tribe.

Please note that National General Condition 21, *Discovery of Previously Unknown Remains and Artifacts*, found in the *Nationwide Permit Terms and Conditions* enclosure, details procedures that must be followed should an inadvertent discovery occur. You must ensure that you comply with this condition during the construction of your project.

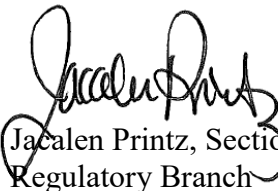
The authorized work complies with the Washington State Department of Ecology's (Ecology) Water Quality Certification (WQC) requirements as noted in Special Condition "b". No further coordination with Ecology for WQC is required.

You have not requested a jurisdictional determination for this proposed project. If you believe the U.S. Army Corps of Engineers does not have jurisdiction over all or portions of your project you may request a preliminary or approved jurisdictional determination (JD). If one is requested, please be aware that we may require the submittal of additional information to complete the JD and work authorized in this letter may not occur until the JD has been completed.

Our verification of this NWP authorization is valid until March 18, 2022, unless the NWP is modified, reissued, or revoked prior to that date. If the authorized work has not been completed by that date and you have commenced or are under contract to commence this activity before March 18, 2022, you will have until March 18, 2023, to complete the activity under the enclosed terms and conditions of this NWP. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act. You must also obtain all local, State, and other Federal permits that apply to this project.

Upon completing the authorized work, you must fill out and return the enclosed *Certificate of Compliance with Department of the Army Permit*. Thank you for your cooperation during the permitting process. We are interested in your experience with our Regulatory Program and encourage you to complete a customer service survey. These documents and information about our program are available on our website at www.nws.usace.army.mil, select "Regulatory Branch, Permit Information" and then "Contact Us." If you have any questions, please contact Mr. Daniel Krenz at daniel.a.krenz@usace.army.mil or (206) 316-3153.

Sincerely,

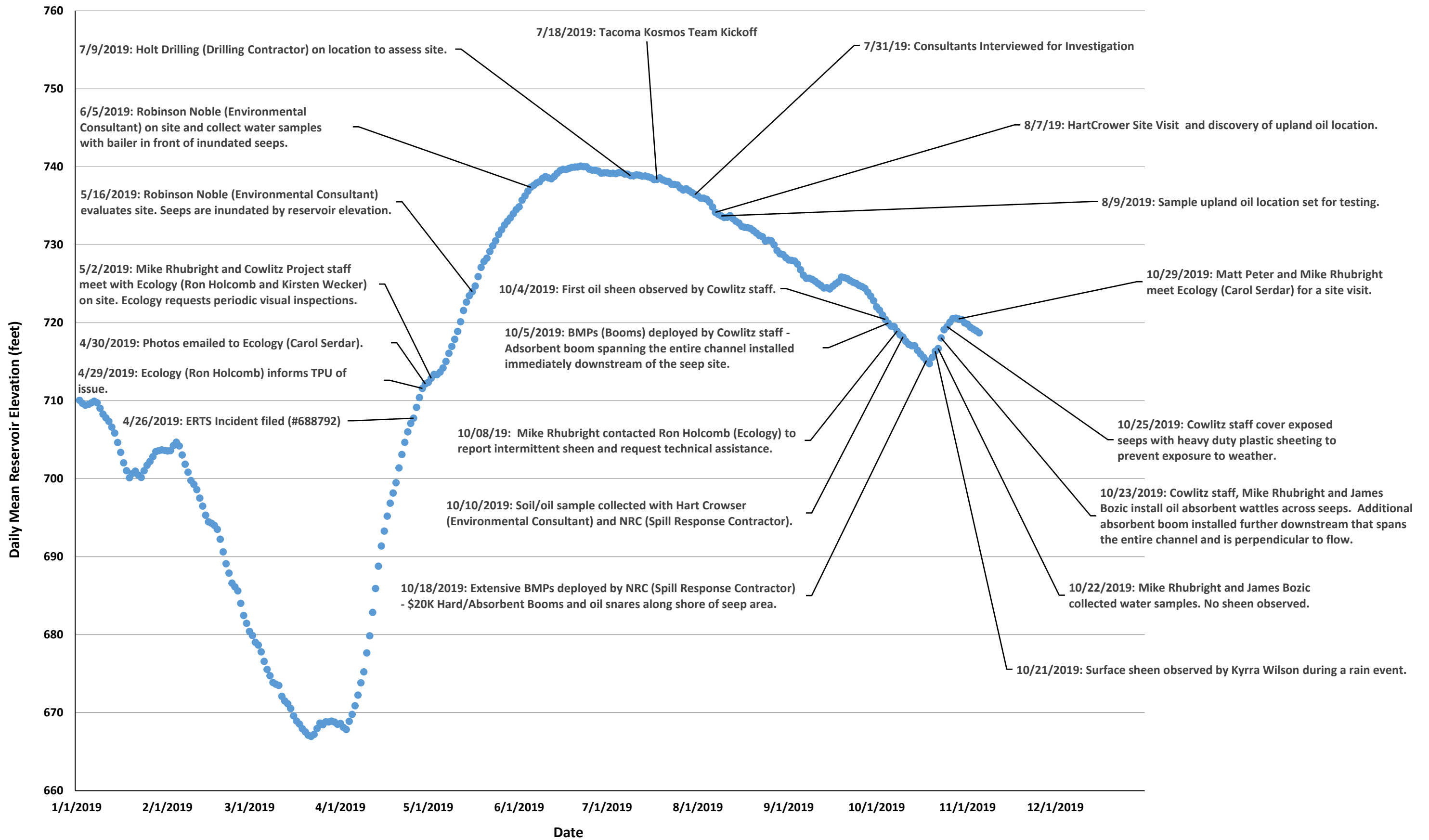


Jacalen Printz, Section Chief
Regulatory Branch

Enclosures

cc: letter only via email to Washington Department of Ecology, Federal Permit Coordinator at:
ecyrefedpermits@ecy.wa.gov

Appendix C: Timeline



Appendix D: Site Maps

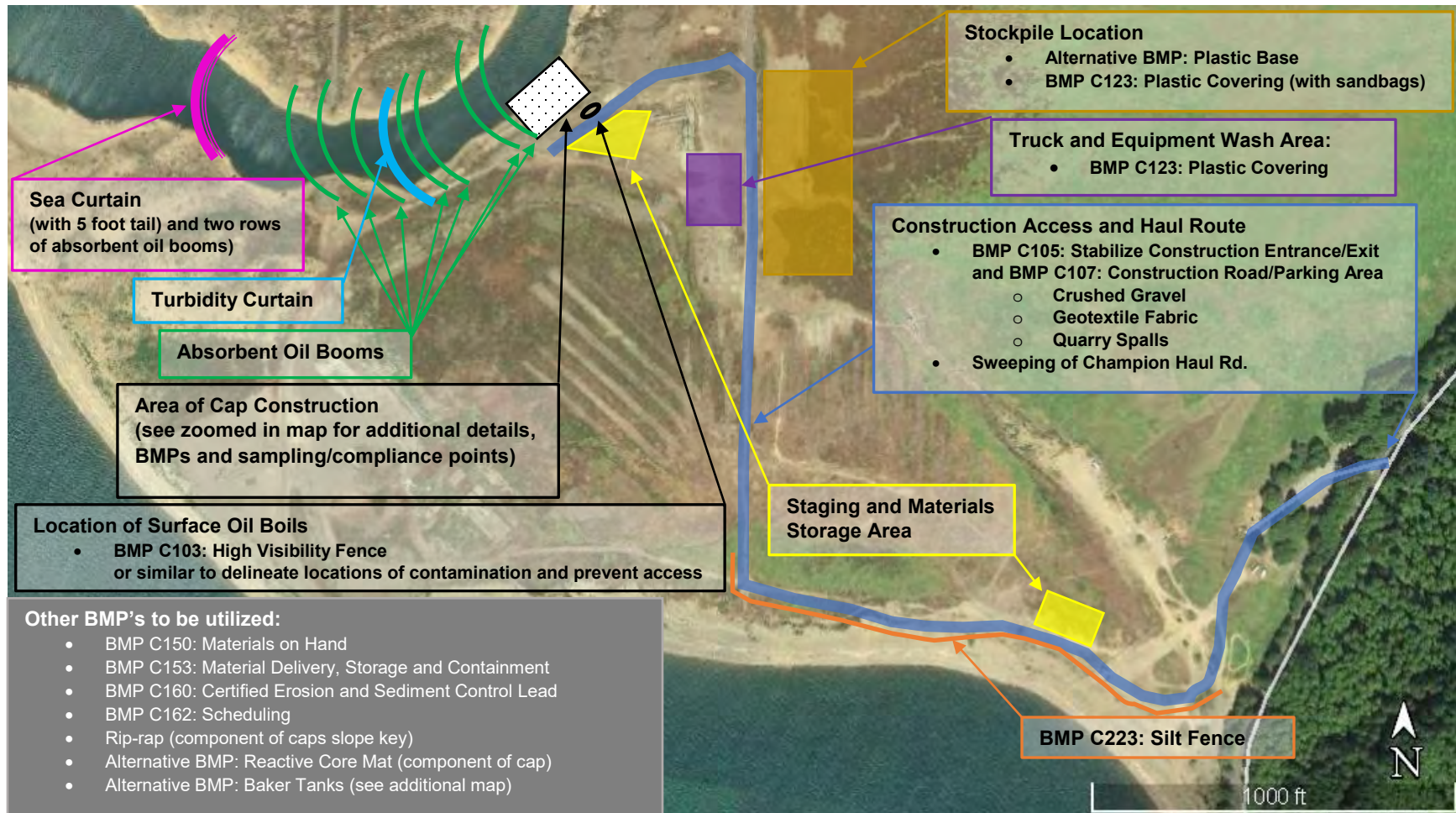


Figure 1. Generalized location of actions and associated Best Management Practices (BMPs).

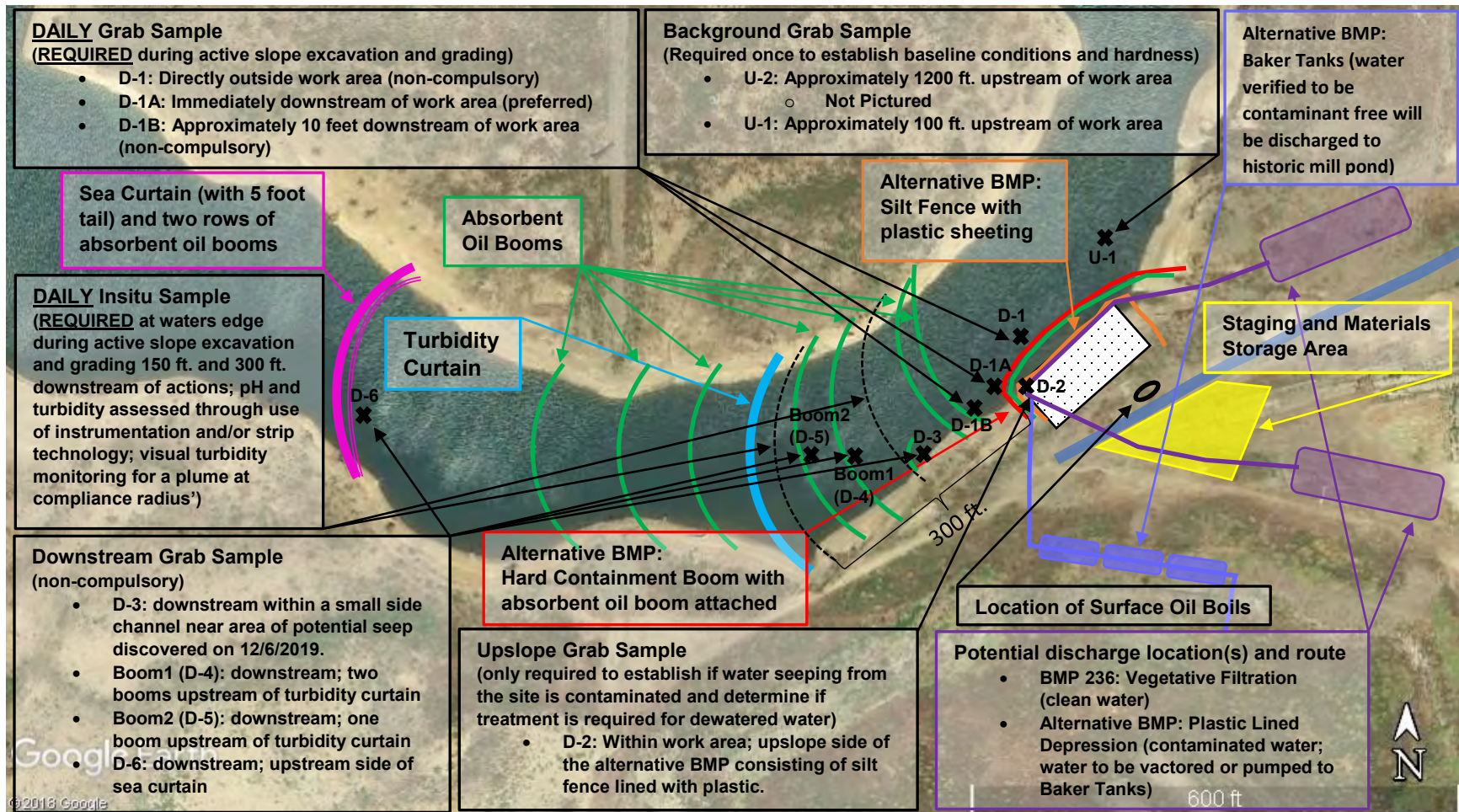


Figure 2. Zoomed in site locations of actions, BMPs and sampling/compliance points.

**Appendix E: Table of Parameters, Analytical Methods,
Detection Limits, and Quantitation Levels**

Table. Parameters, analytical methods, detection limits (DLs) and quantitation levels (QLs) shown below, shall be used for water quality monitoring. Other methods may be used but must produce measurable results in the sample and be an EPA-approved method in 40 CFR Part 136. If an alternative method is used that is not specified in an order or listed below the test method, DL, and QL will be defined in lab and/or monitoring reports. Indicator level values at or below those specified in the table are within compliance.

Pollutant & CAS No. (if available)	Sampling Frequency	Sample Type	Indicator Level, µg/L (unless noted)	Required Analytical Protocol	Detection Level, µg/L	Quantitation Level, µg/L
METALS						
Arsenic, Total (7440-38-2)	Daily*	Grab	360 ^a	200.8	0.1	0.5
Chromium, (hex) (18540-29-9)	Daily*	Grab	15 ^b	SM3500-Cr EC	0.3	1.2
Chromium, Total (7440-47-3)	Daily*	Grab	259 ^d	200.8	0.2	1.0
Lead, Total (7439-92-1)	Daily*	Grab	23.5 ^a	200.8	0.1	0.5
Cadmium (7440-43-9)	Daily*	Grab	1.5 ^a	200.8	0.05	0.25
Mercury (7439-97-6)	Daily*	Grab	2.10 ^a	1631E	0.0002	0.0005
Copper (7440-50-8)	Daily*	Grab	7.2 ^a	200.8	0.4	2.0
Nickel (7440-02-0)	Daily*	Grab	652 ^a	200.8	0.1	0.5
Zinc (7440-66-6)	Daily*	Grab	52.7 ^a	200.8	0.5	2.5
NONCONVENTIONAL POLLUTANTS						
BTEX (benzene + toluene + ethylbenzene + m, o, p xylenes)	Daily*	Grab	2.0	EPA SW 846 8021/8260	1.0	2.0
PETROLEUM HYDROCARBONS						
Gasoline-Range Hydrocarbons (NWTPH-Gx) ^c	Daily*	Grab	250 ^d	NWTPH-Gx	250	250
Diesel-Range Hydrocarbons (NWTPH-Dx) ^e	Daily*	Grab	250 ^d	NWTPH-Dx	250	250
Stormwater General Permit Benchmarks						
Parameter			Benchmark		Analytical Method	
Turbidity	Daily*	Grab	25 NTU		SM2130 ^f	
pH	Daily*	Grab	6.5 - 8.5 SU		SM4500-H ⁺ B	

a	Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240); metals for receiving waterbody of hardness value = 40. Hardness will need to be verified through sampling and criteria adjusted accordingly. Heavy metal toxicity general decreases in freshwater as hardness increases.
b	Indicator Level total chromium is actually for hexavalent chromium using Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240), National Toxics Rule (40 CFR 131.36).
c	NWTPH-Gx = Northwest Total Petroleum Hydrocarbons –Volatile petroleum products (includes aviation and automotive gasolines, mineral spirits, Stoddard solvent and naphtha).
d	No surface water standard, value is laboratory quantitation level.
e	NWTPH-Dx = Northwest Total Petroleum Hydrocarbons – Semi-volatile (“diesel”) for diesel range organics and heavy oils (includes jet fuels, kerosene, diesel-oils, hydraulic fluids, mineral oils, lubricating oils, and fuel oils).
f	Or equivalent.
*	Sampling to occur daily during active slope excavation and grading. Frequency and parameters assessed will be modified following cap completion.

Appendix F: Table of Project Contacts

Relevant Project Contacts

Table. Project contacts for actions associated with the Kosmos Oil Seep Exploration and Capping.

Title	Name	Phone Contact	Email Contact
Project Manager	Jessica Knickerbocker	Office: 253-502-8250 Cell: 253-389-8044	jknicker@cityoftacoma.org
Water Quality Contact	Matt Peter	Office: 253-502-8726 Cell: 253-740-8609	mpeter@cityoftacoma.org
Field Crew Lead	Willy Kroll (CESCL)	Office: 253-441-4463 Cell: 253-405-4245	wkroll@cityoftacoma.org
Ecology Contact	Carol Serdar	Office: 360-407-6269 Cell: 360-742-9751	cser461@ecy.wa.gov
Emergency Owner Contact	Chad Chalmers	Office: 253-779-7557 Cell: 360-520-0598	cchalmers@cityoftacoma.org
Monitoring Personnel	Willy Kroll (CESCL)	Office: 253-441-4463 Cell: 253-405-4245	wkroll@cityoftacoma.org

Appendix G: Site Inspection Form



Inspection Report

Inspections to be completed daily, after storm events, or to follow up on BMP effectiveness

DATE: _____

TIME: _____

PROJECT NAME: Kosmos Mill Oil Cleanup

TYPE OF INSPECTION: Weekly Post Storm Event

WEATHER CONDITION: Clear Cloudy Mist Rain Wind Fog Temperature

Approx. rainfall in last 24hrs (in inches)

Approx. rainfall since last inspection

OBSERVATIONS:

Inspection of runoff water for obvious signs of oil sheen, suspended sediment, turbidity, or discoloration plume.

- Nothing visibly discharging from the site
- Nothing visible 150 feet downstream
- Nothing visible 300 feet downstream

Inspection of BMPs for performance as intended.

- Booms are in complete contact with water
- Booms are functioning and not discharging oil

Inspection of slope for new oil seeps.

- No seep observed

Note size and location:

Inspection of slope for obvious signs erosion. Note size and location:

- No erosion damage over 2 inches deep

Contact Environmental if:

- Oil sheen is observed outside/downstream of BMPs
- Oil present in new sweeps/location/greater volume
- Presents of suspended sediment, turbidity, or discoloration in water is observed outside/downstream of BMPs

Other Observations:

INSERT PHOTOS:



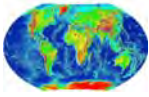
Inspection Report

Inspections to be completed daily, after storm events, or to follow up on BMP effectiveness

REQUIRED ACTION:	
Prepared By: _____	Representing: _____
Others Present: _____	Representing: _____

Saved: Ebuilder [Documents](#) \ [C Permit Management](#) \ [02 Inspections and Monitoring](#) \ Visual Inspections

APPENDIX E
Global Geophysics, LLC GPR and EM61 Report



November 19, 2019

Our Ref.: 109-1108.000

Hart Crowser, Inc.
3131 Elliot Avenue Suite 600
Seattle, WA 98121

Attention: Ms. Angie Goodwin

**RE: REPORT ON THE GEOPHYSICAL SURVEYS COSMOS MILL, MORTON,
WA**

Dear Ms. Goodwin:

Global Geophysics conducted geophysical surveys on November 12th and 15th, 2019 at Cosmos Mill, near Morton, WA. The proposed objective of the geophysical investigation is to assist in locating potential buried tanks.

METHODOLOGY AND INSTRUMENTATION

EM61 and GPR were used for this study. The following paragraphs describe the methods and field procedures.

Time Domain Electromagnetic (EM61)

The time-domain electromagnetic system is capable of detecting buried metal objects. It transmits a pulsed electromagnetic field into the ground, which induces eddy currents in buried metallic objects. These eddy currents generate secondary electromagnetic fields that are detected by the system. The time duration or decay rate, of the secondary EM field is related to the electrical conductivity characteristics of the buried object.

A four-channel (gate) high sensitivity metal detector, Geonics EM61 Mk2, was used to collect the data along the traverses at 2.5 ft interval. The low channel number (1) represents anomalies produced by shallow objects and the high channel number (4) represents anomalies produced by deeper objects. The subsurface depth range is from approximately 1 to 15 feet. The data was stored digitally and downloaded after the survey for analysis and mapping.

Ground Penetrating Radar

The GPR method uses electromagnetic pulses, emitted at regular intervals by an antenna to map subsurface features. The electromagnetic pulses are reflected where changes in electrical properties of materials occur such as changes in lithology or where underground

utilities are present. The reflected electromagnetic energy is received by an antenna, converted into an electrical signal, and recorded on the GPR unit. The data is recorded and viewed in real time on a graphical display that depicts a continuous profile or cross-section image of the subsurface directly beneath the path of the antenna.

The depth of penetration of the GPR signal varies according to antenna frequency and the conductivity of the subsurface material. The depth of subsurface penetration with GPR decreases with an increase in the frequency of the antenna and an increase in soil conductivity. Low frequency antennas (50 to 500 MHz) provide the best compromise between obtaining good subsurface penetration and resolution.

The data were collected along the transects at 5 ft interval using Geophysical Survey Systems, Inc. (GSSI) SIR 2000 GPR system with antennas having a center frequency of 200 MHz. The data was digitally recorded for post processing.

RESULTS

1. Area 1: 150 ft in EW direction and 250 ft in NS direction.
 - The EM61 data are contoured and presented in Figure 1. 2D GPR profiles are shown in Figures 2 -12. There are 5 high EM response areas: Area A to Area E. Area A has a lot of surface metal objects and possible buried metal objects. Area B has concrete slabs. Area C and Area D probably have buried metal objects. Area D has two metal objects either small UST or broken pipes.
2. Area 2: along foundation of an abandoned structure (Figure 13).
 - The EM61 and GPR profiles are presented in Figures 14-16. One large EM anomaly locate between ST 148-156 between points E and F may be a UST or concrete slab. GPR anomalies are between ST138-146 and a possible trench.

LIMITATIONS OF THE GEOPHYSICAL METHOD

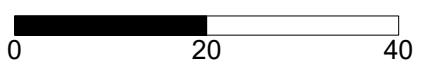
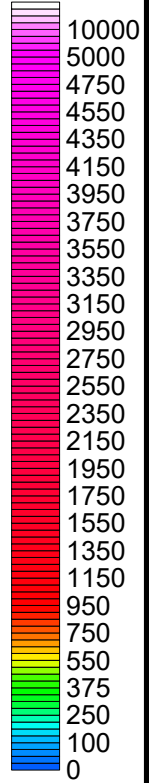
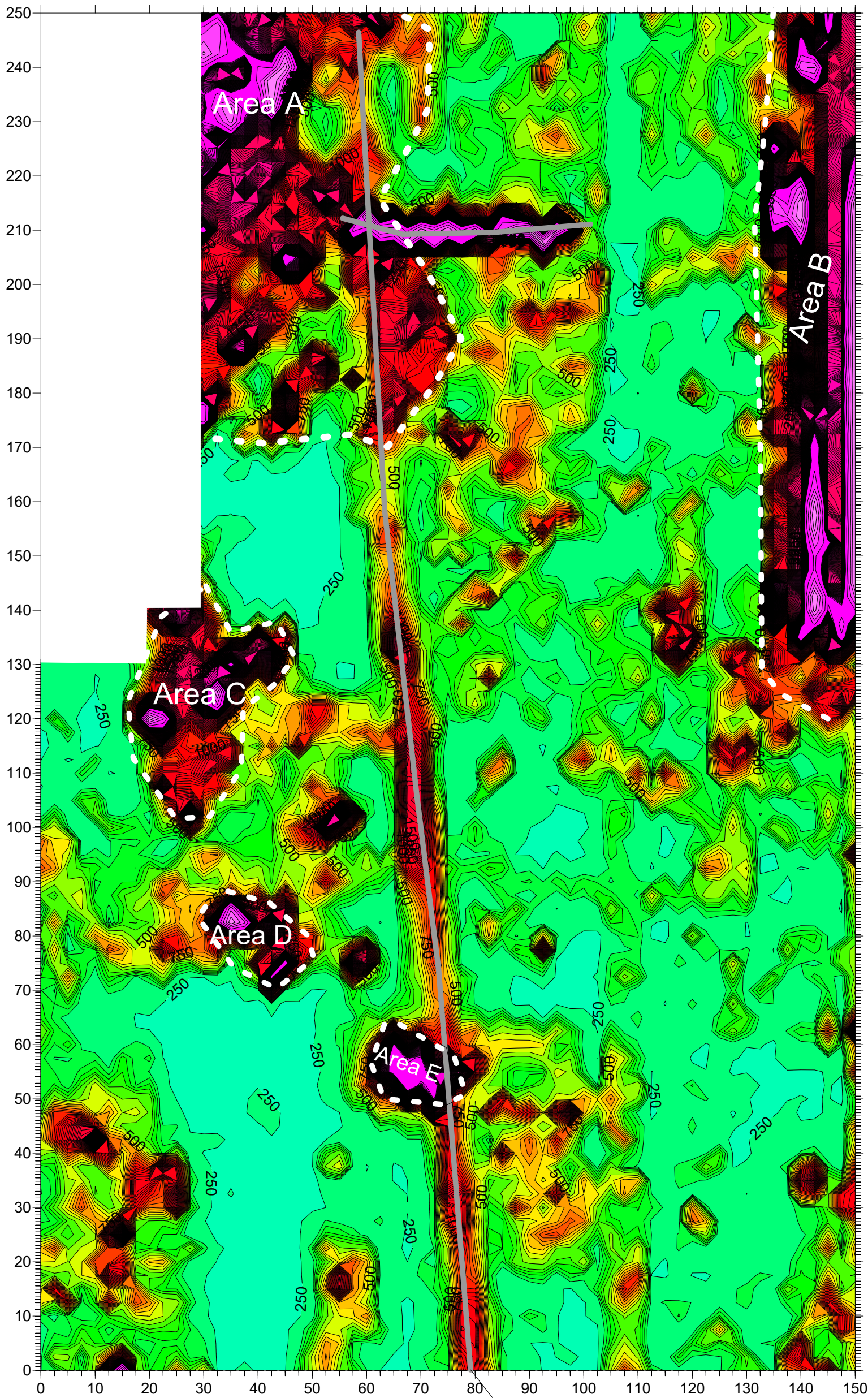
Global geophysics services are conducted in a manner consistent with the level of care and skill ordinarily exercised by other members of the geophysical community currently practicing under similar conditions subject to the time limits and financial and physical constraints applicable to the services. GPR and EM61 are remote sensing geophysical methods that may not detect all subsurface conditions due to the limitations of the methods, soil conditions, size of the features and their depths.

Sincerely,

Global Geophysics

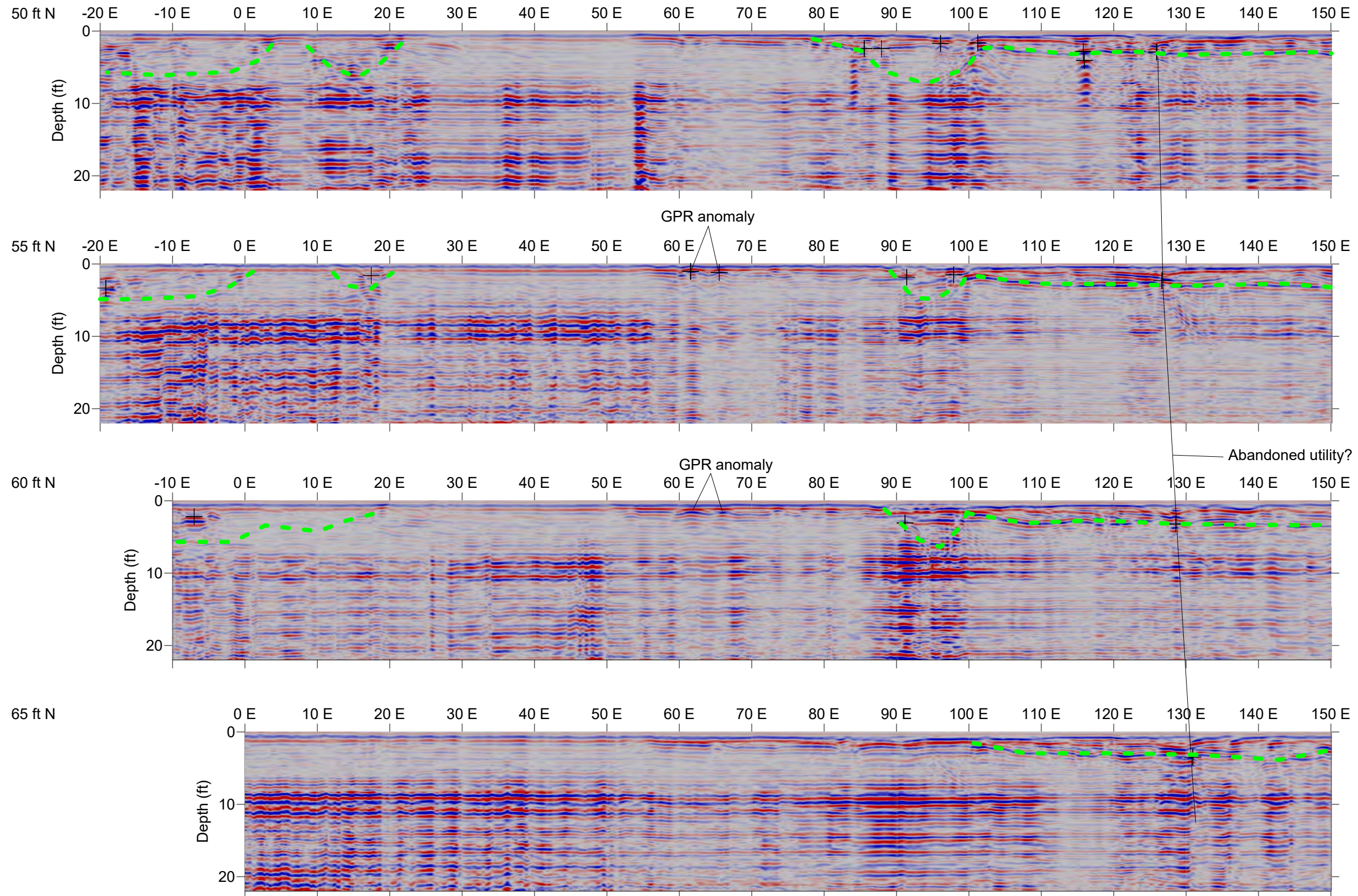


John Liu, Ph.D., R.G.
Principal Geophysicist




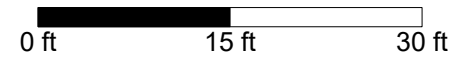
Metal pipe

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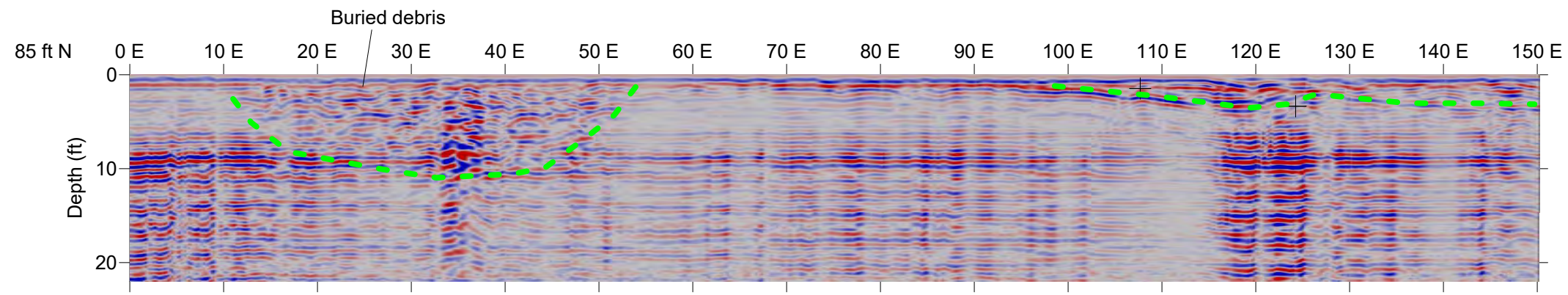
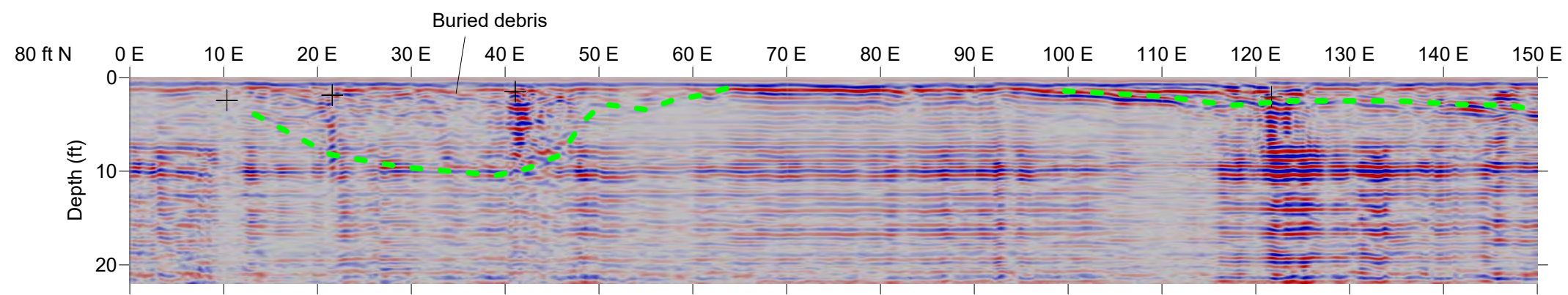
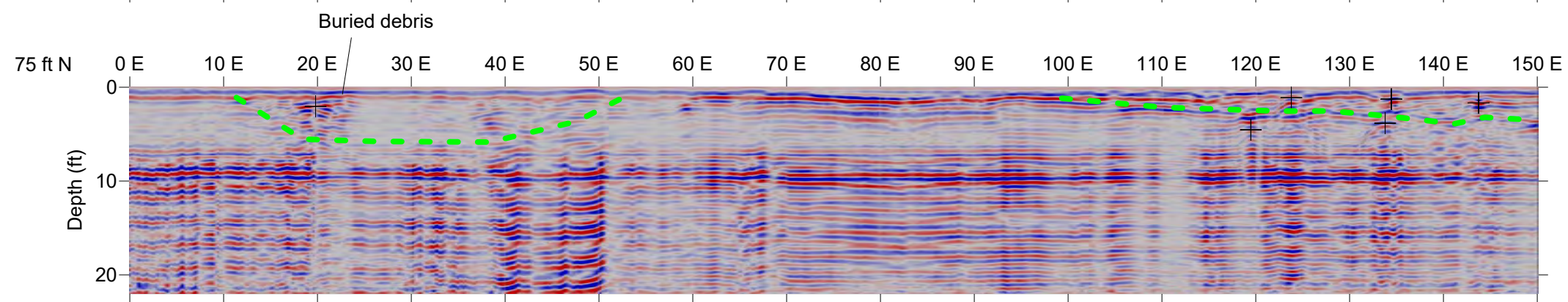
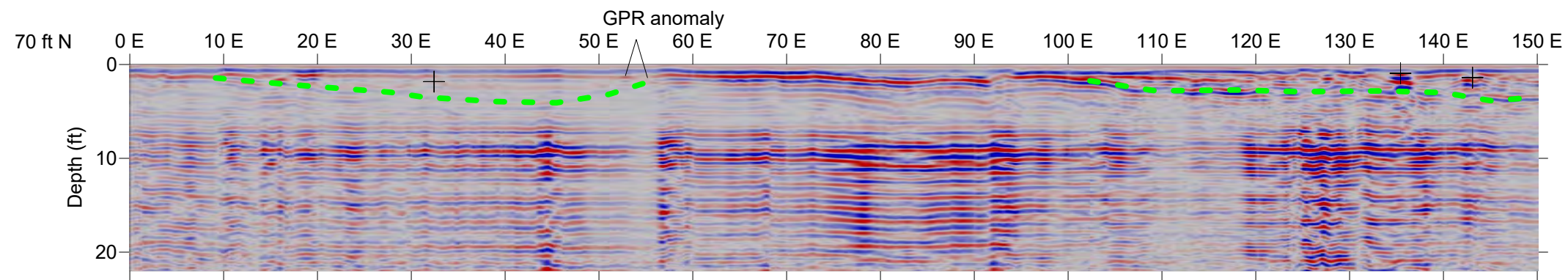



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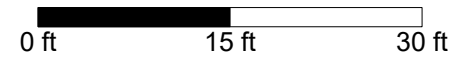
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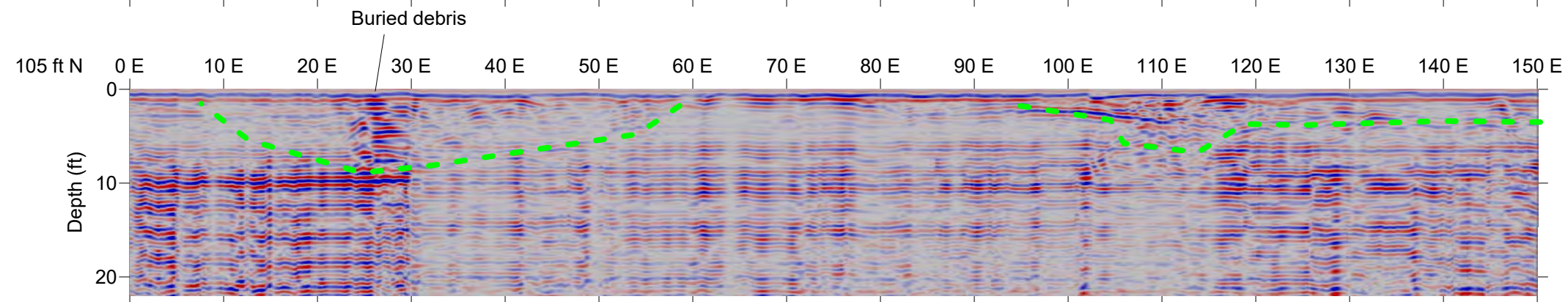
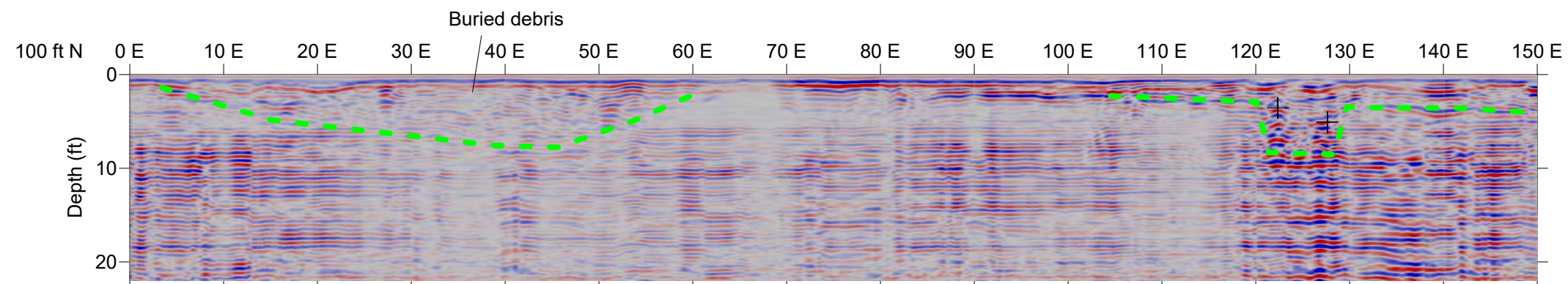
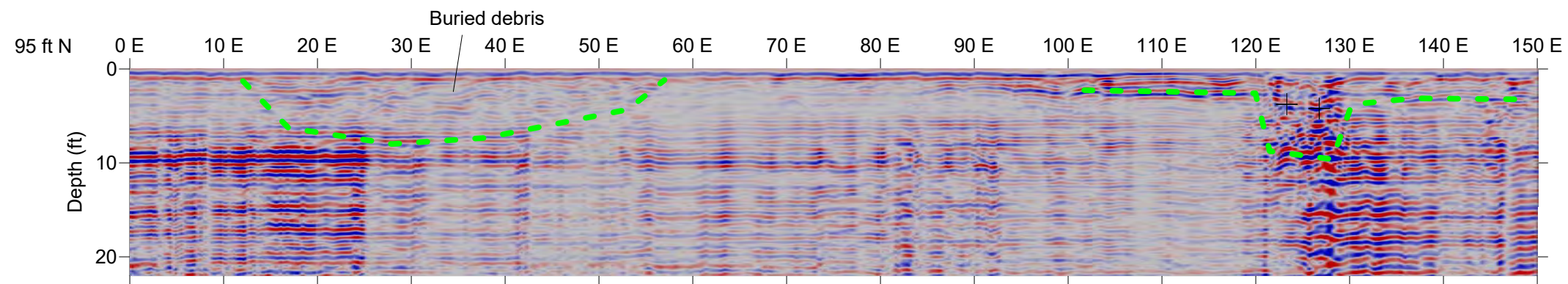
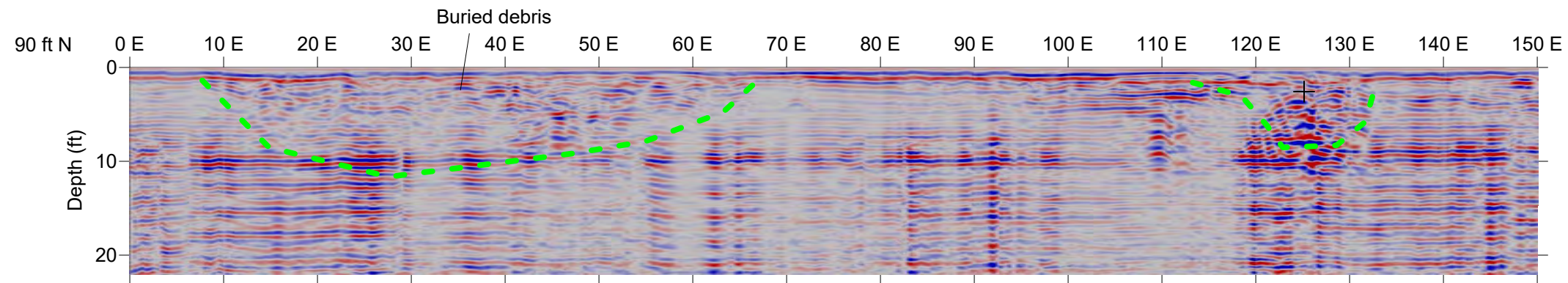
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	REVIEW	--		FIGURE 2



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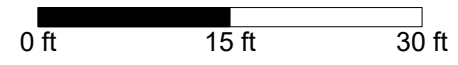


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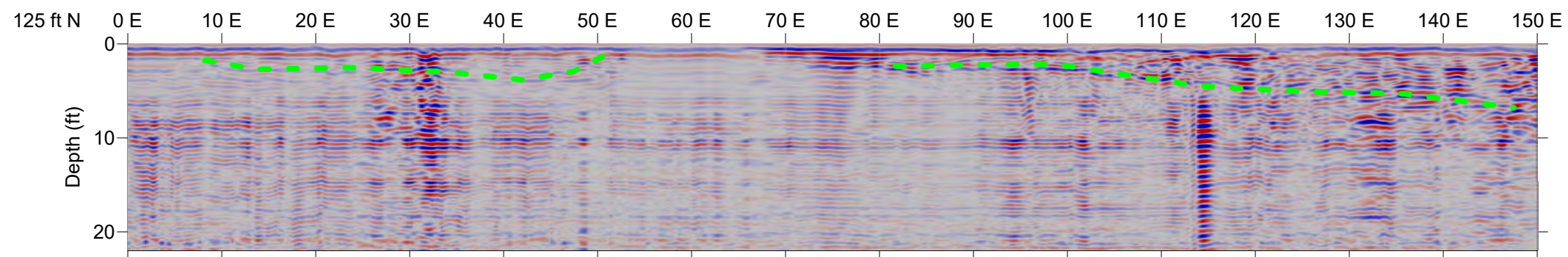
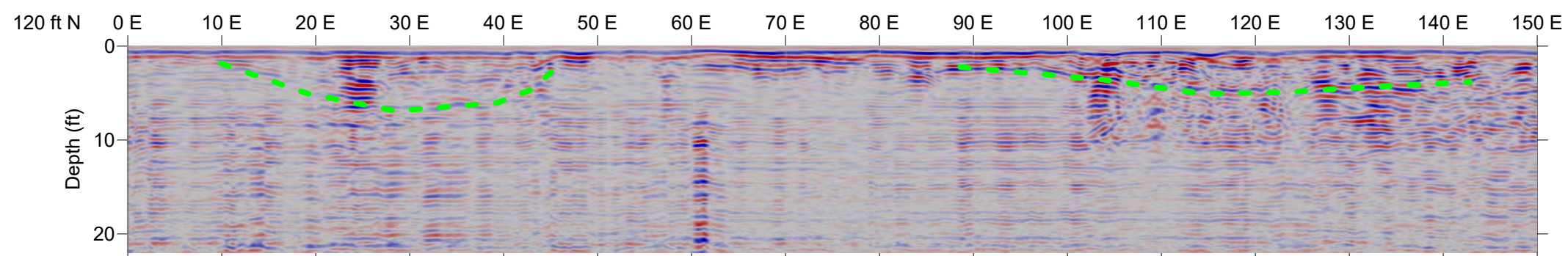
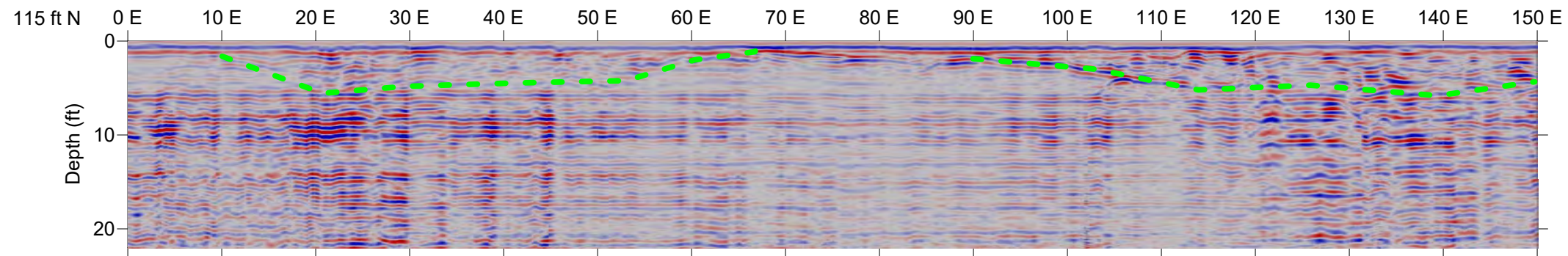
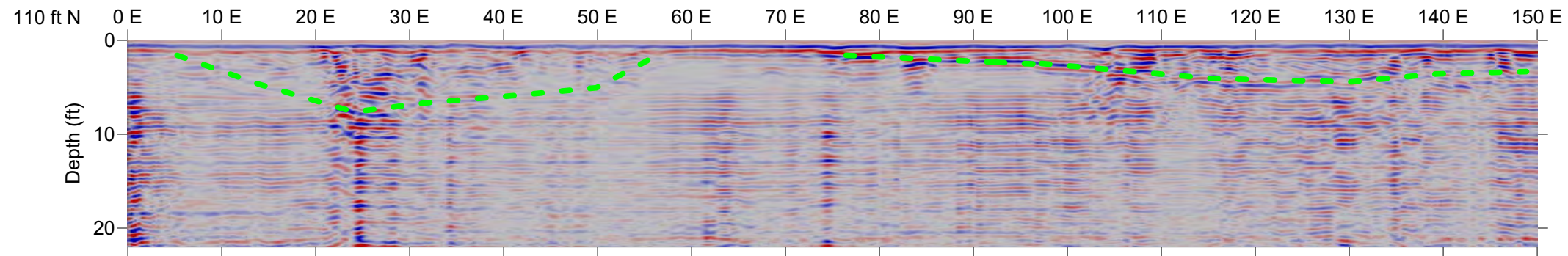


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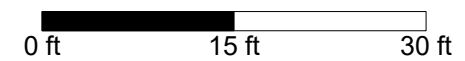


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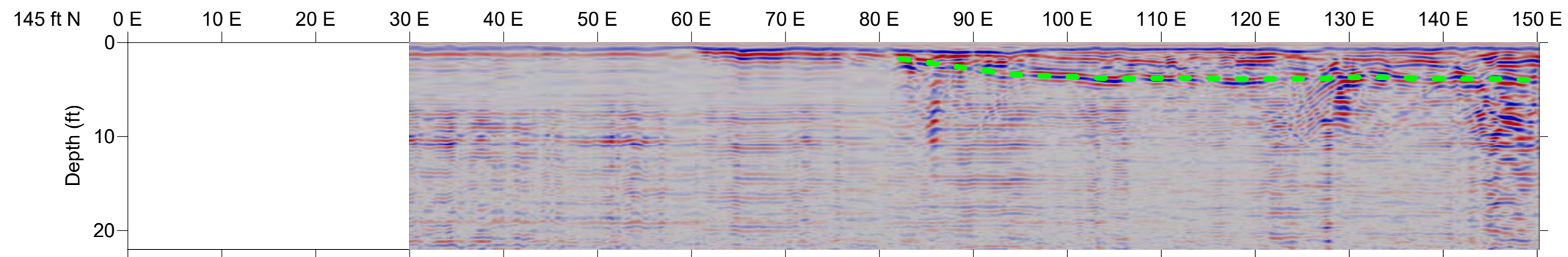
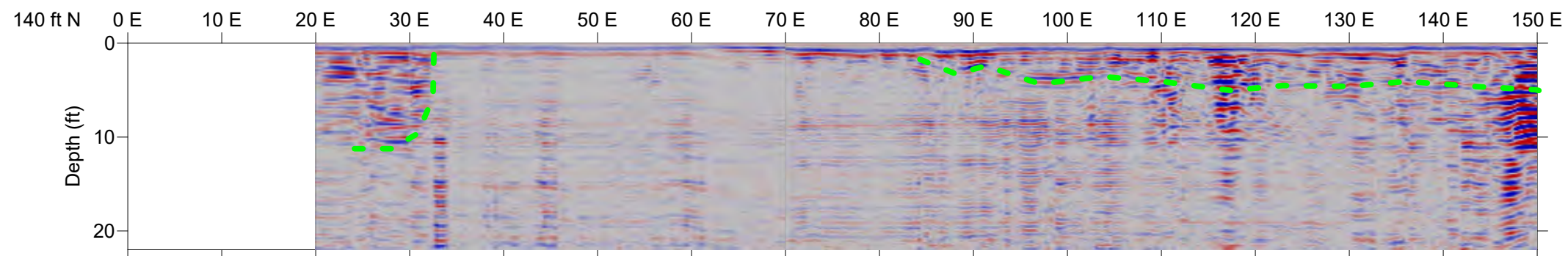
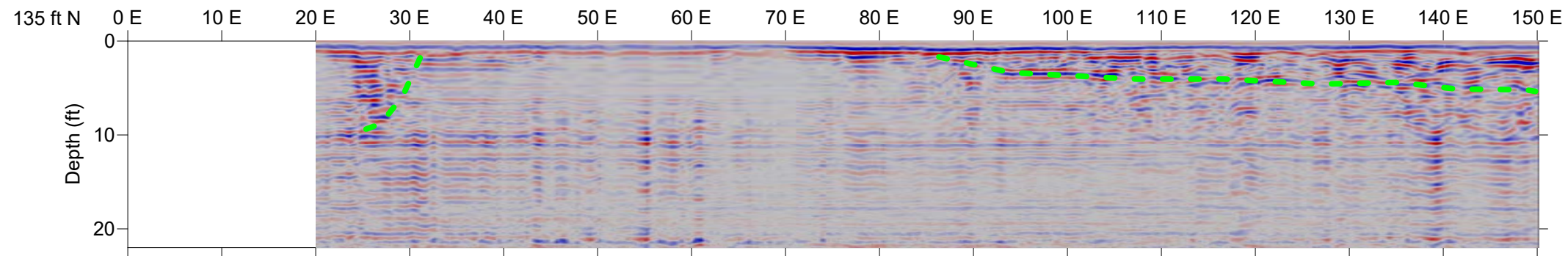
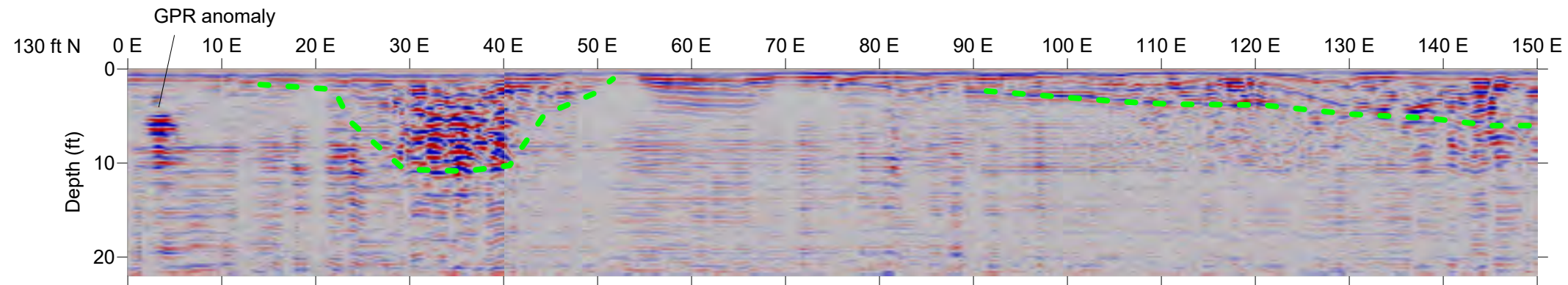


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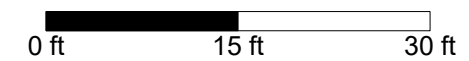


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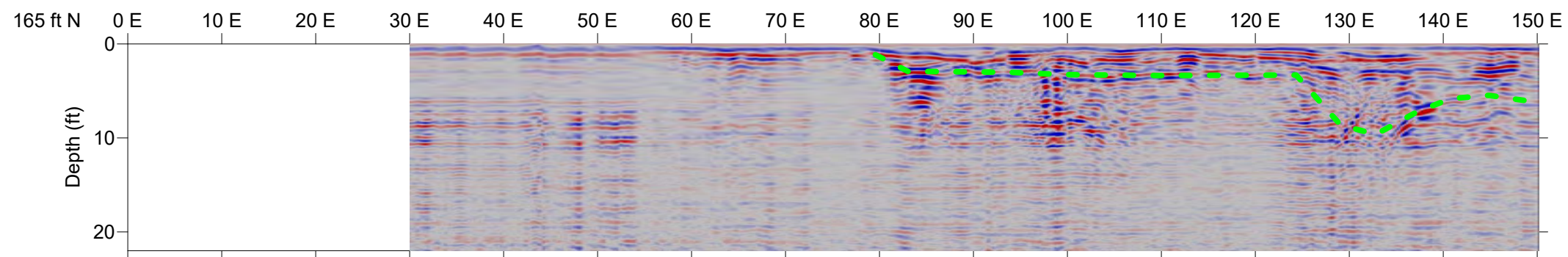
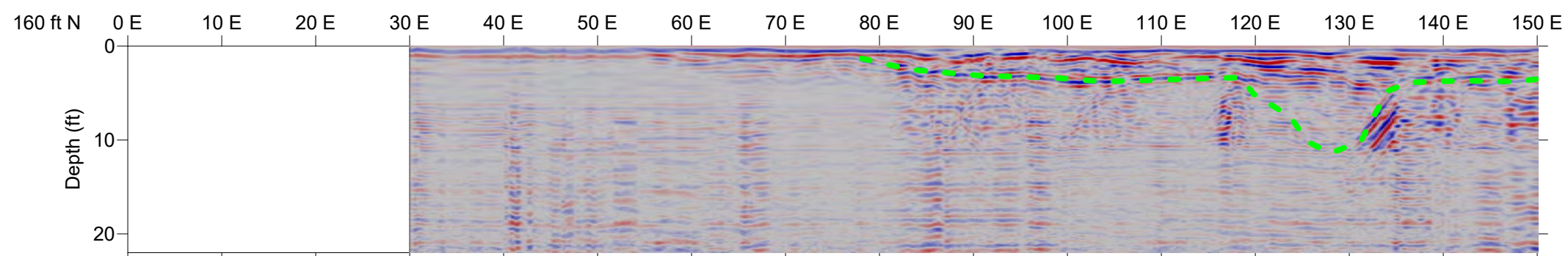
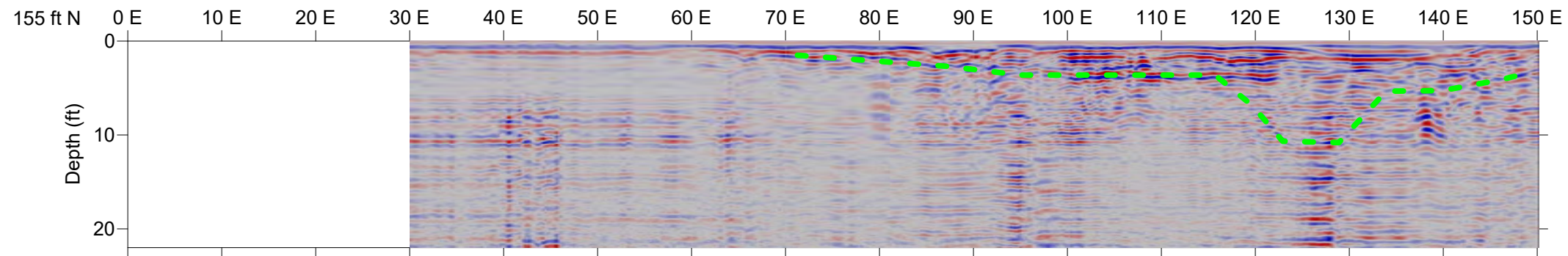
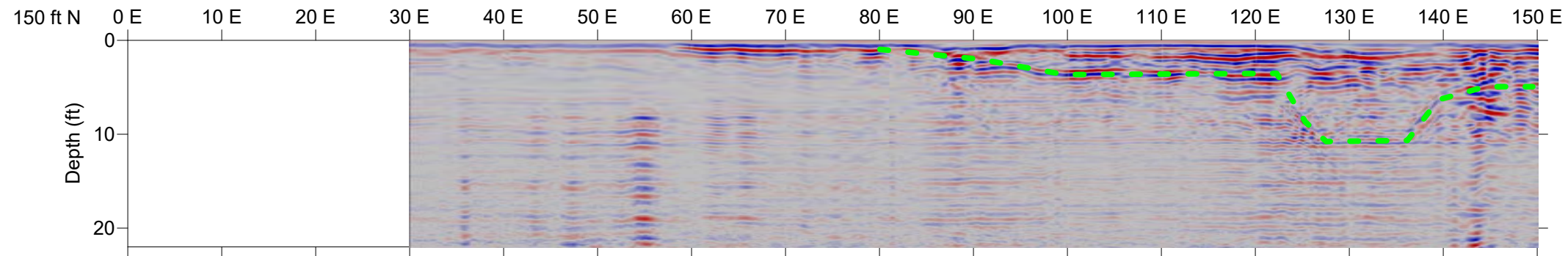


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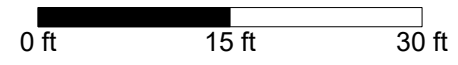


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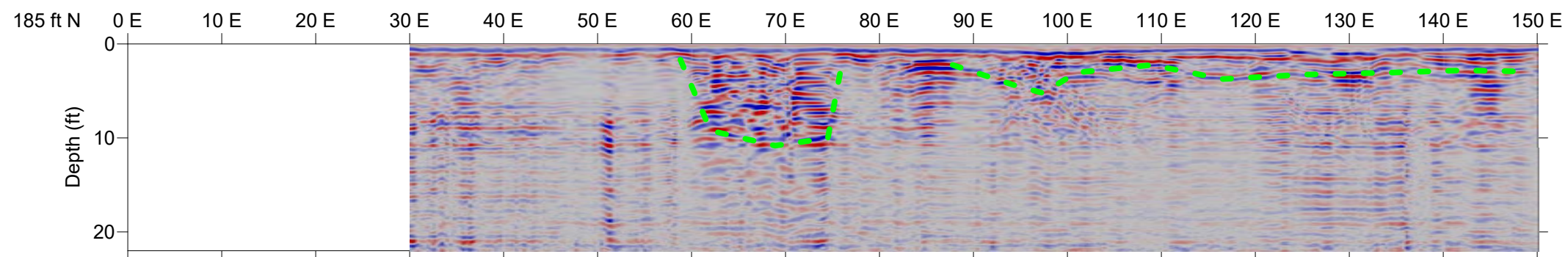
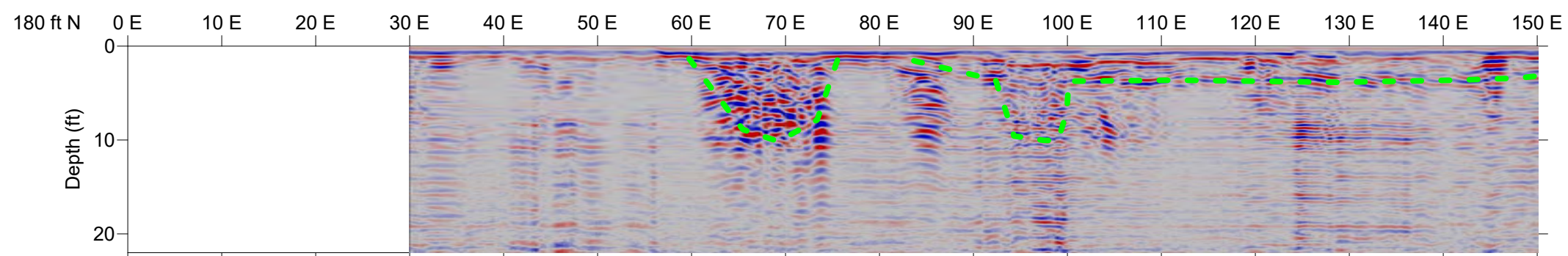
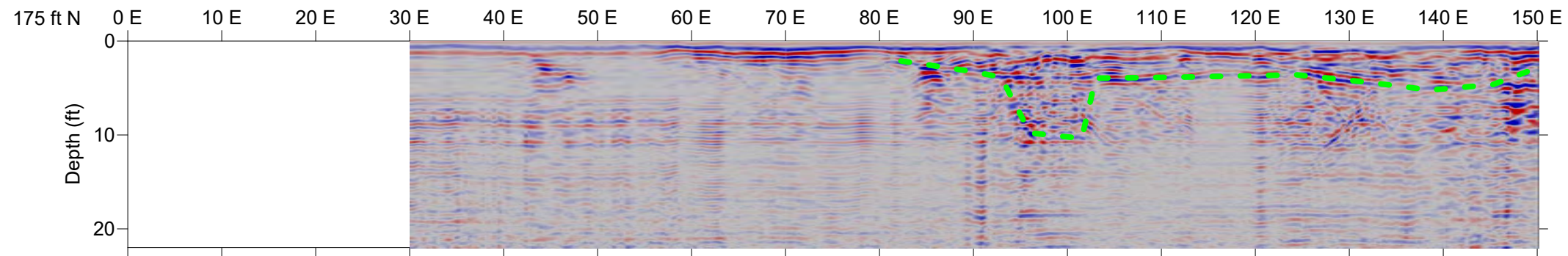
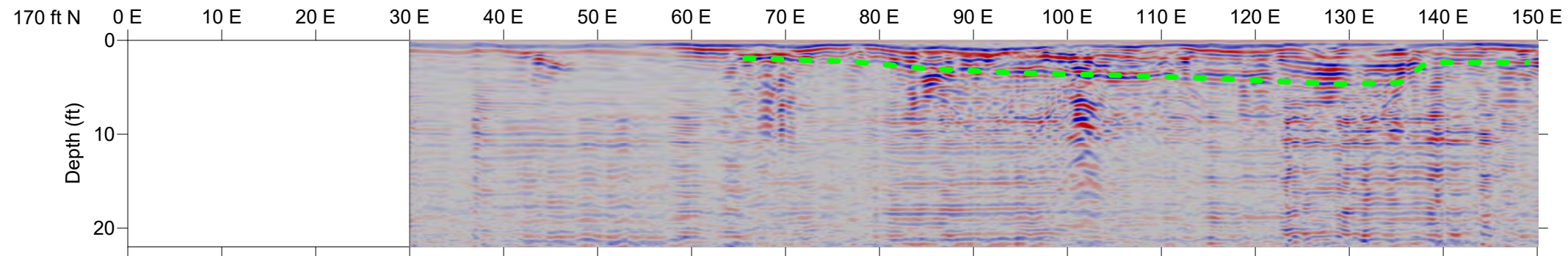


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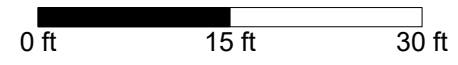


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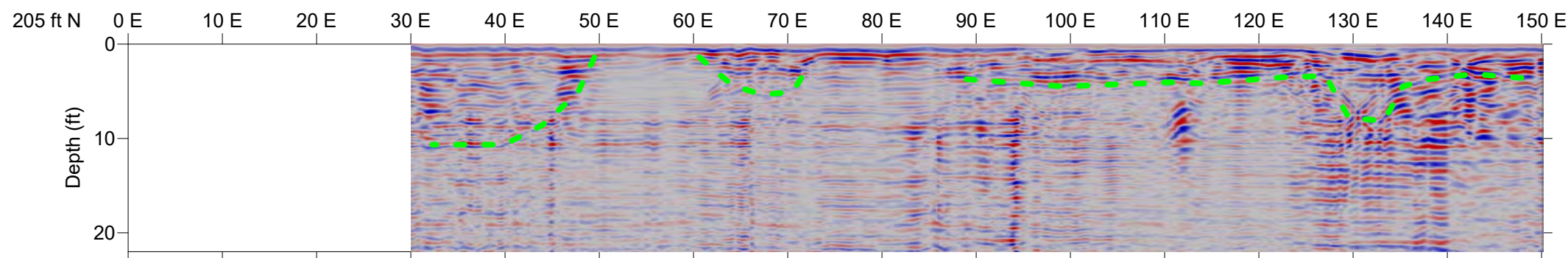
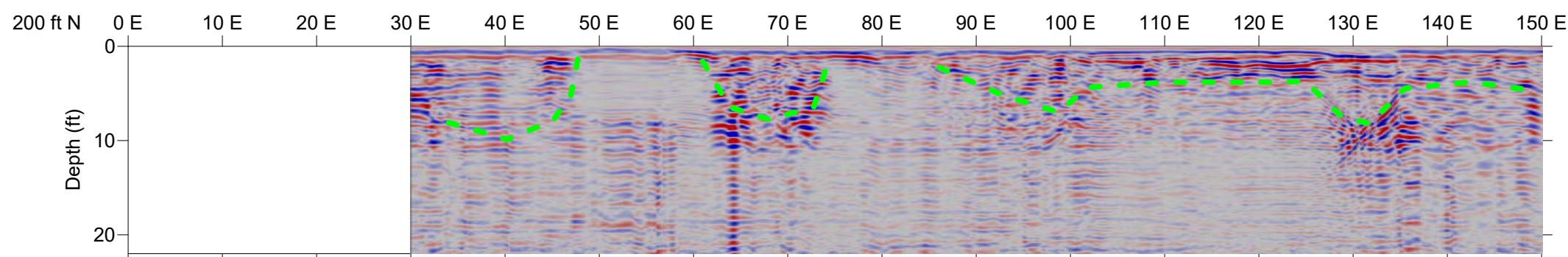
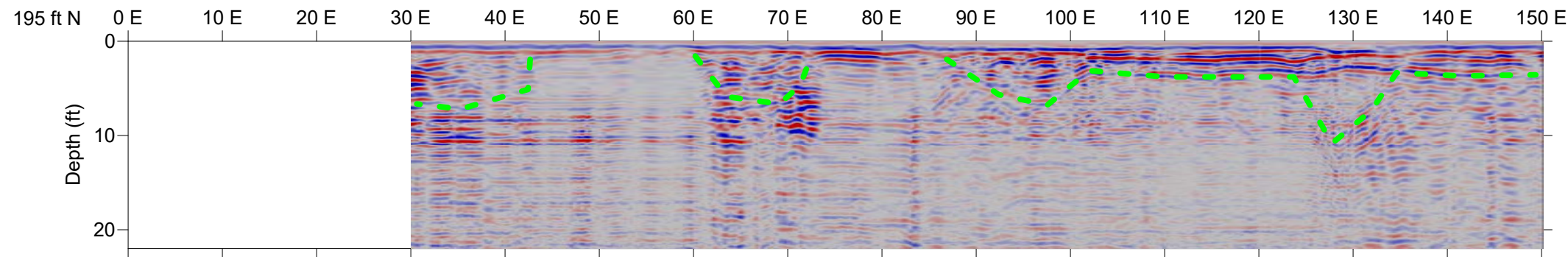
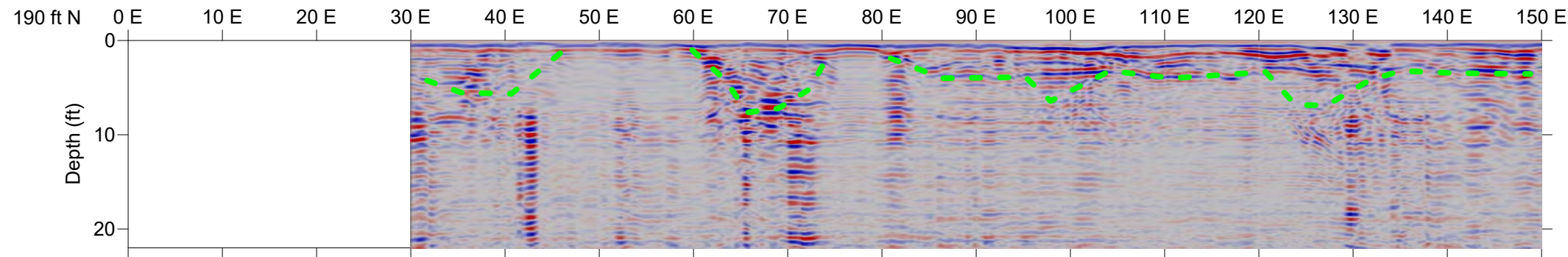


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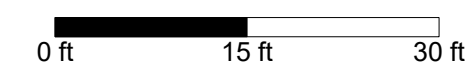


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Global Geophysics P.O. Box 2229 Redmond, WA 98073-2229 Tel: 425-890-4321	Project #:		FILE No.	
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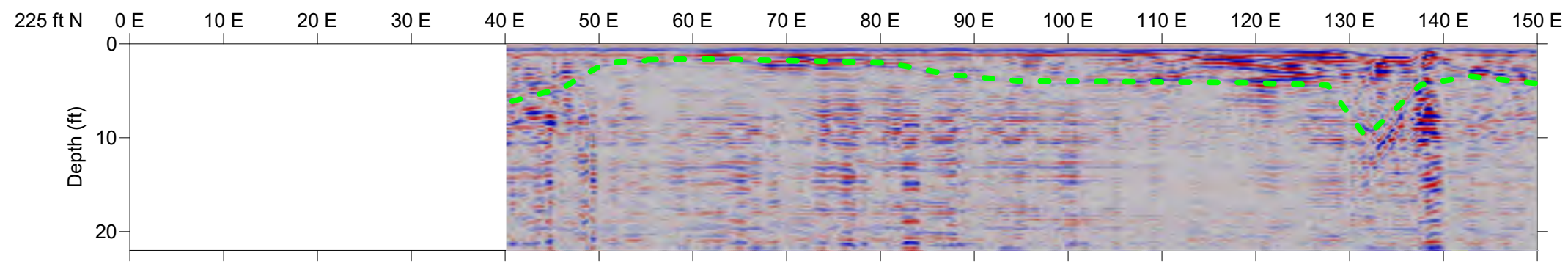
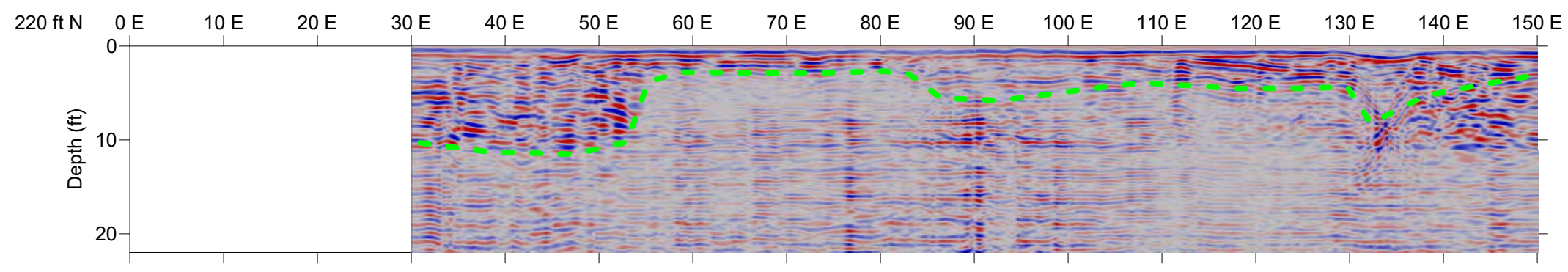
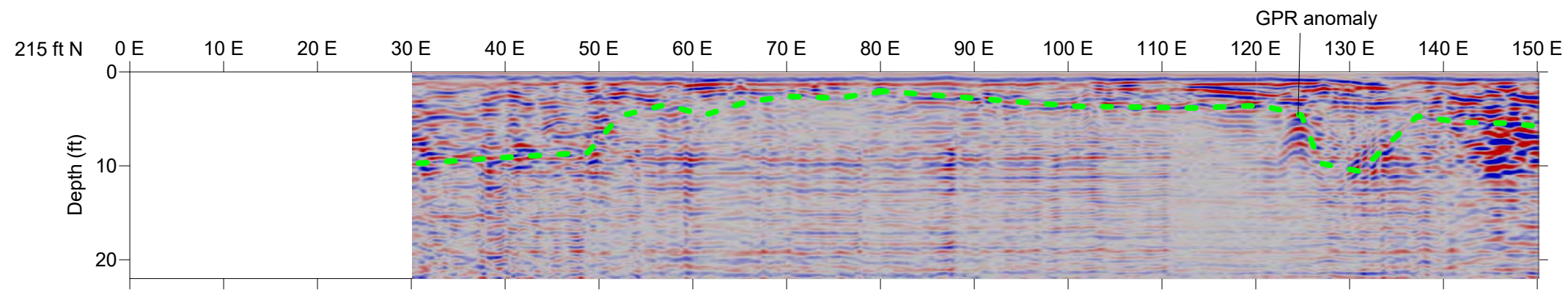
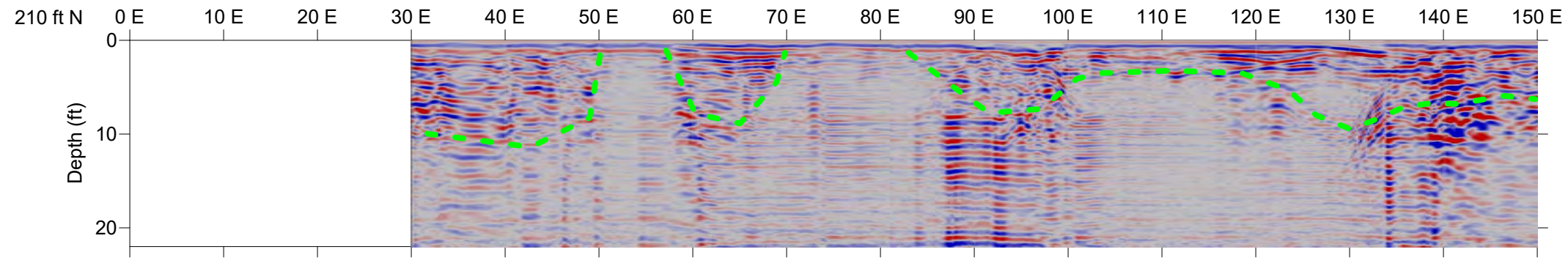


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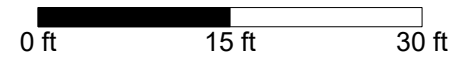
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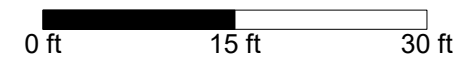
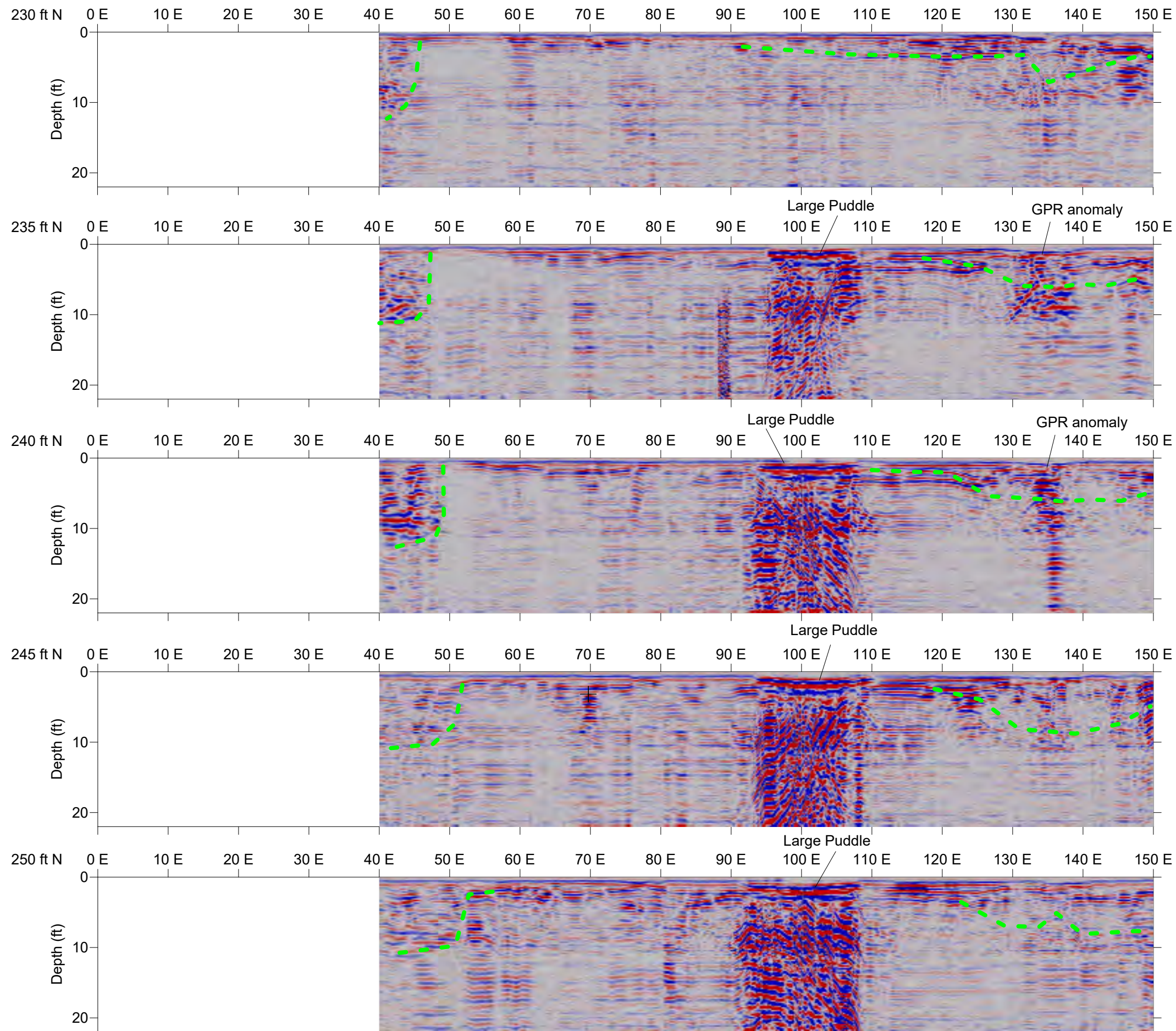
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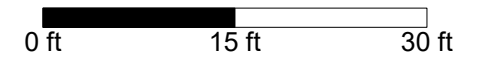
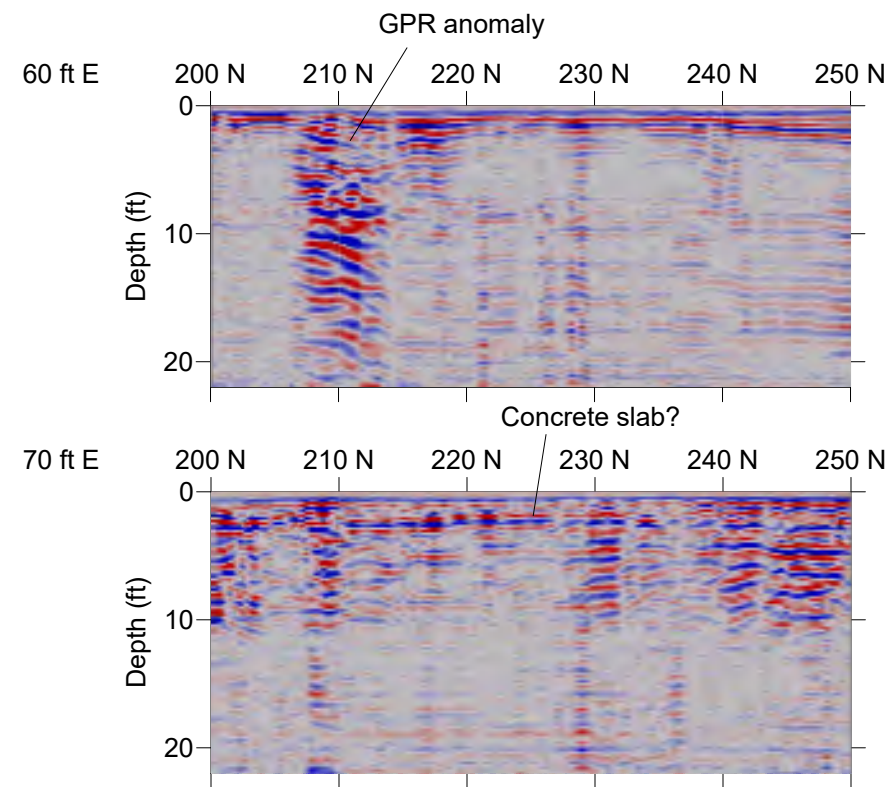
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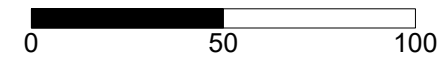
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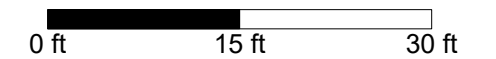
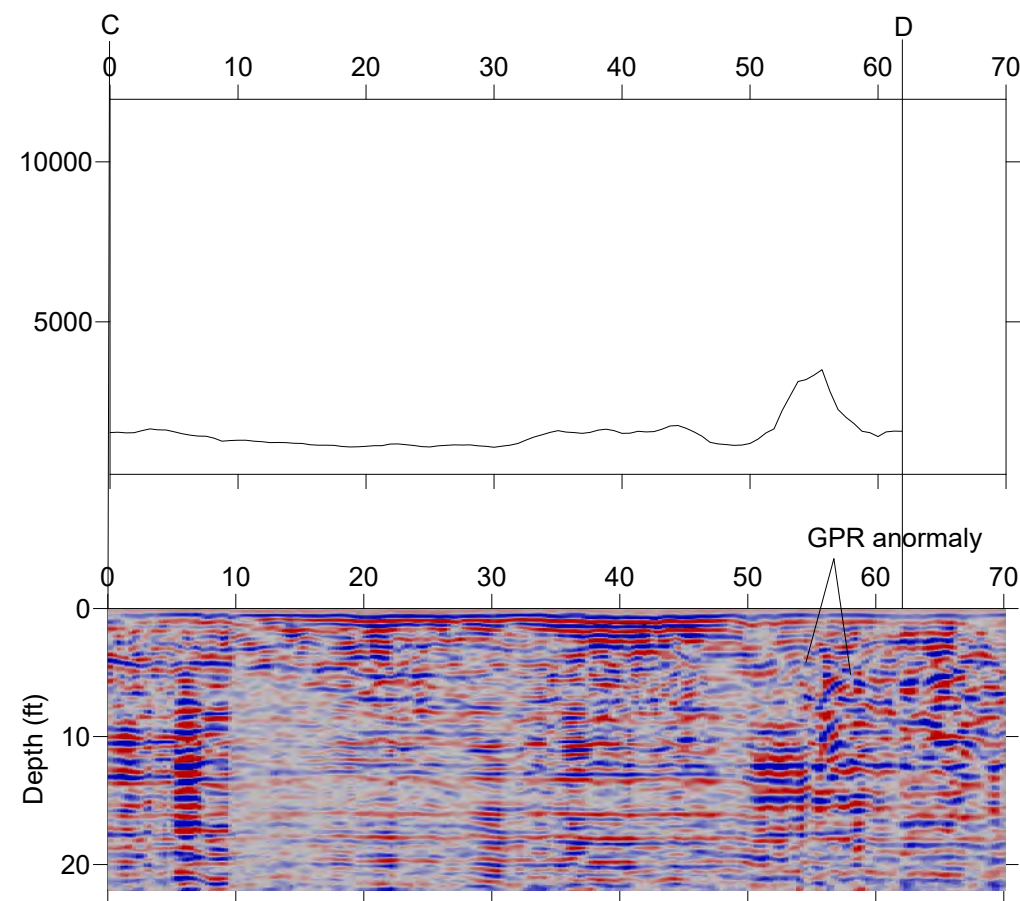
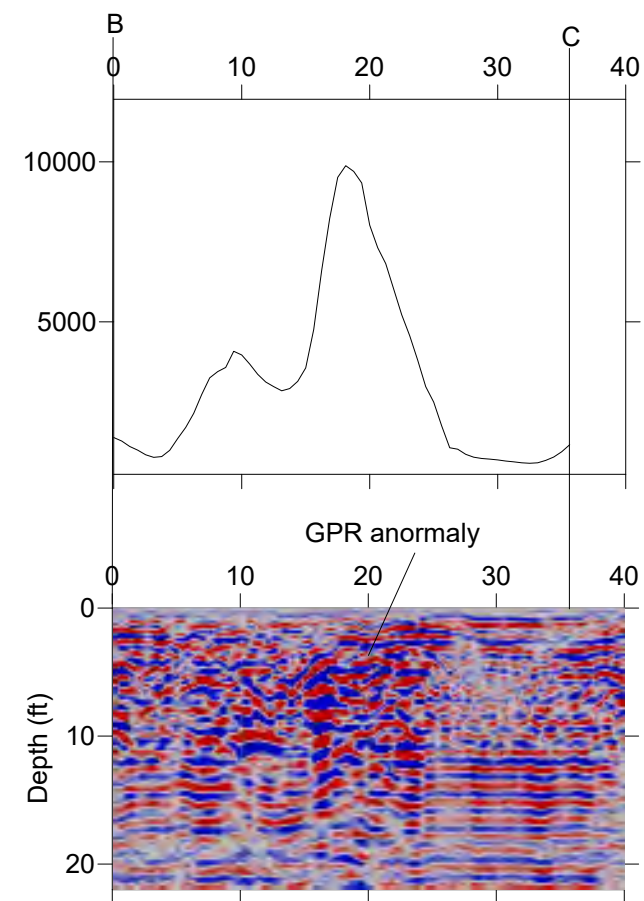
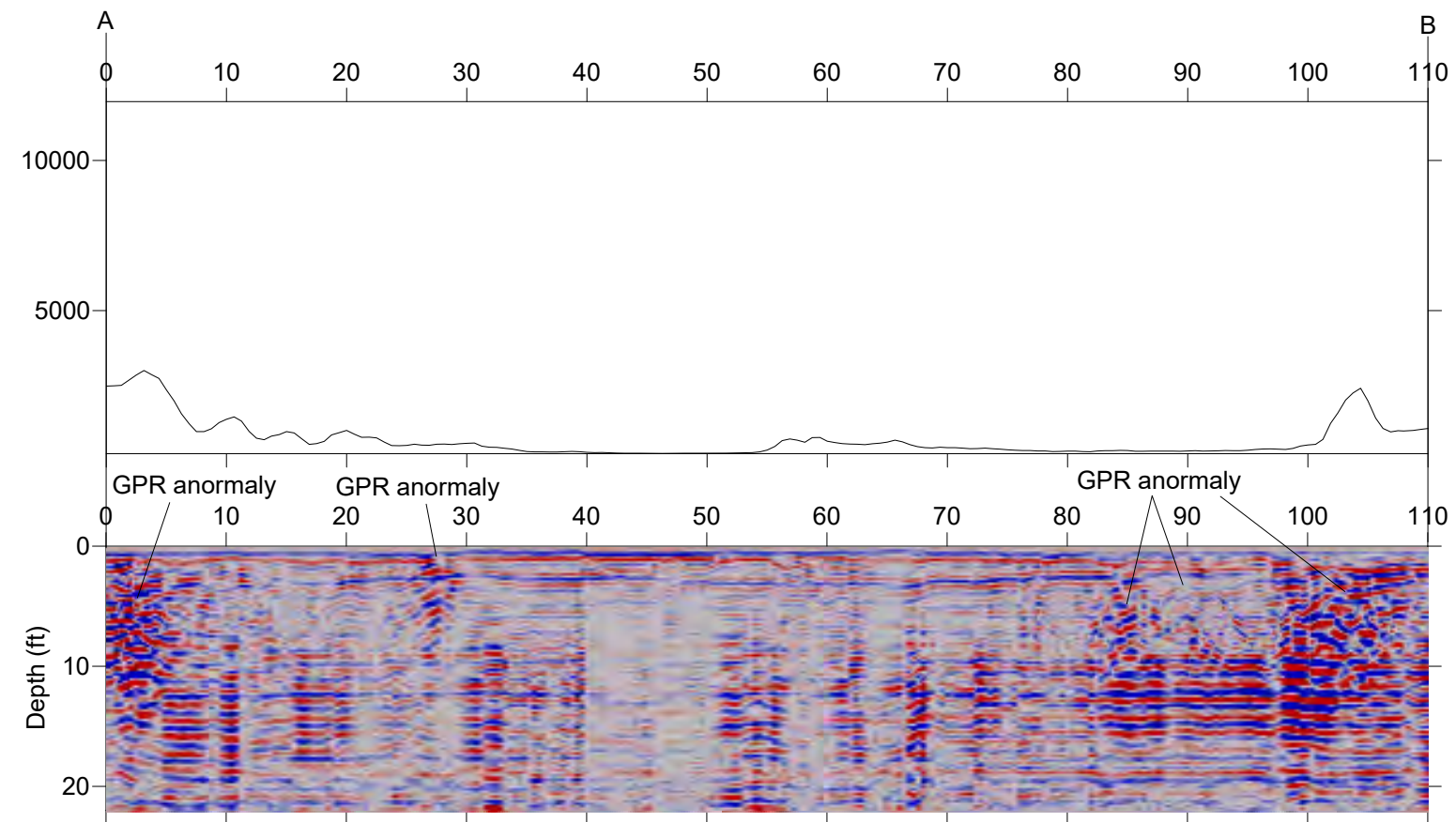
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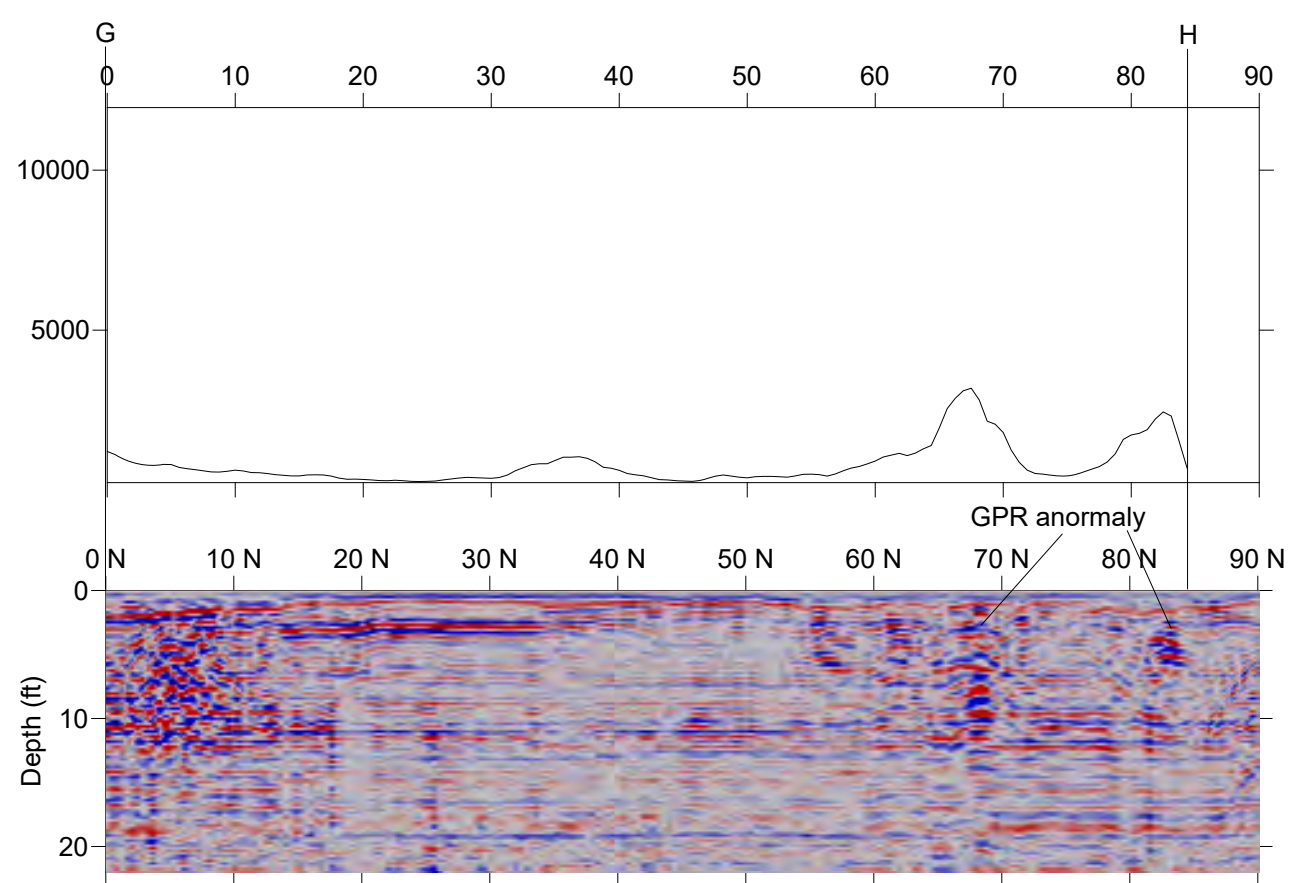
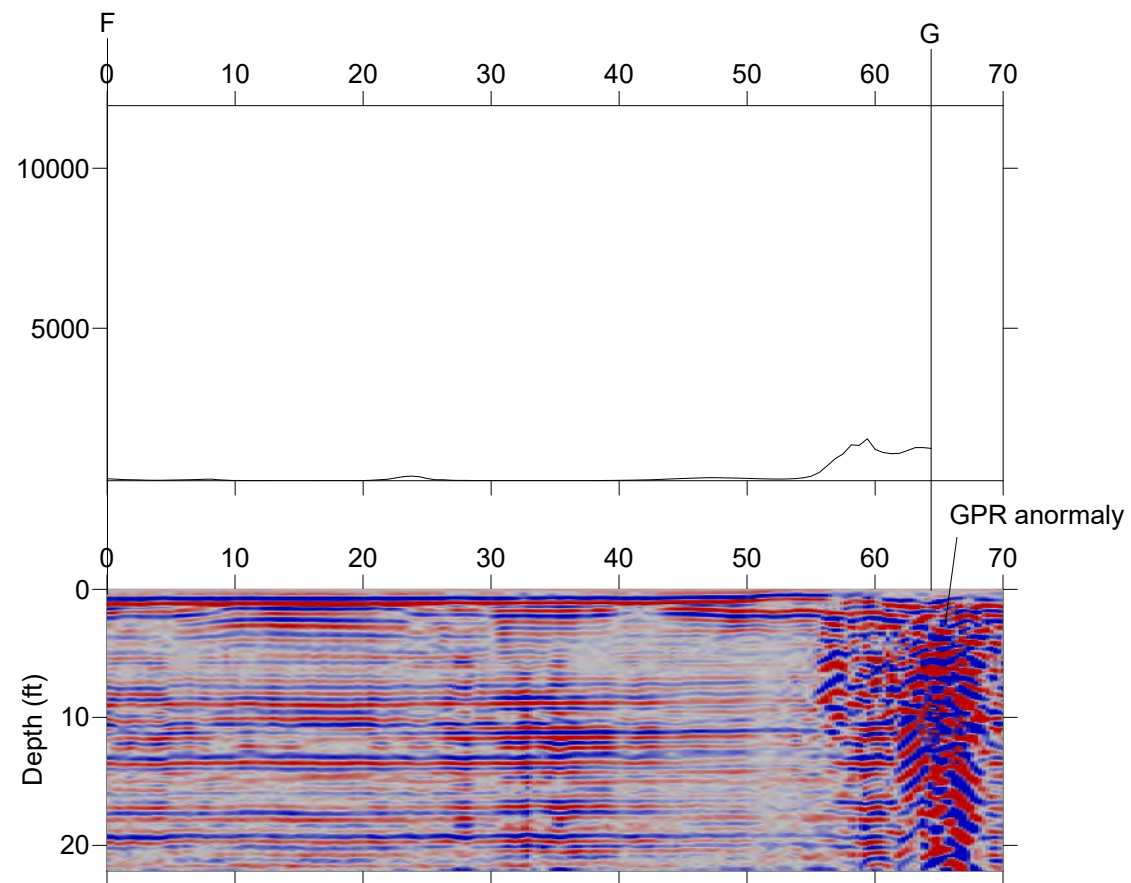
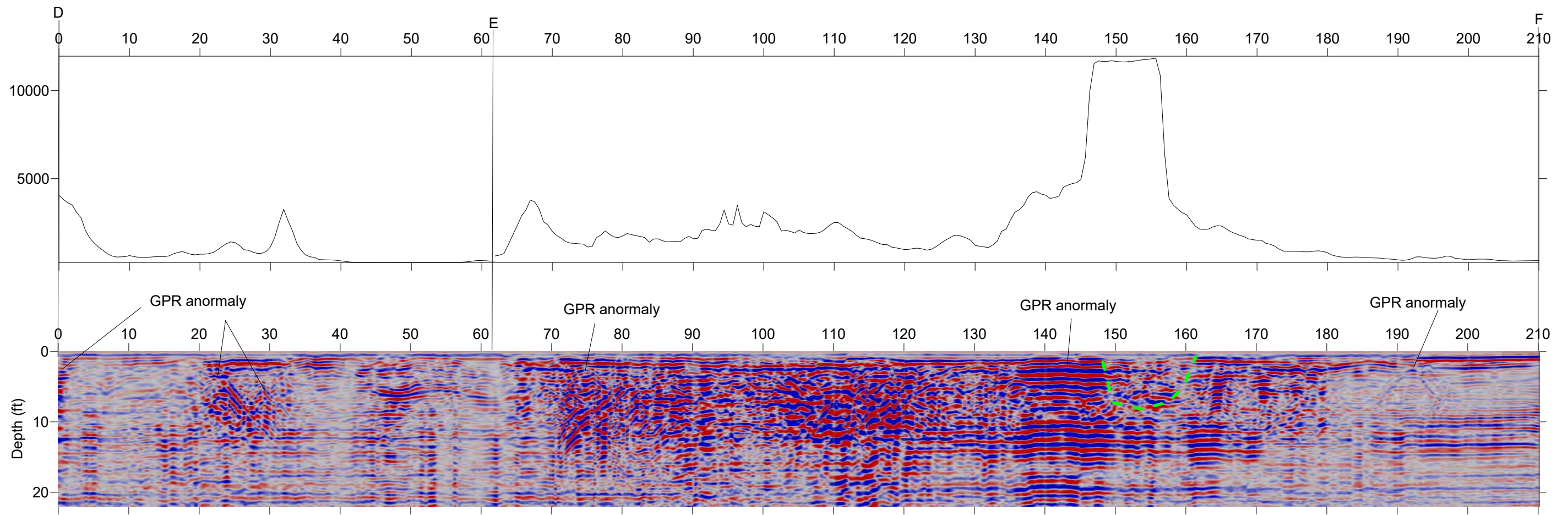
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Global Geophysics P.O. Box 2229 Redmond, WA 98073-2229 Tel: 425-890-4321	Project #:		FILE No.
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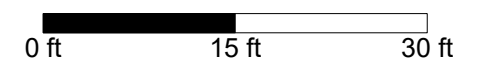


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Global Geophysics P.O. Box 2229 Redmond, WA 98073-2229 Tel: 425-890-4321	Project #:		FILE No.:	
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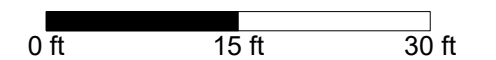
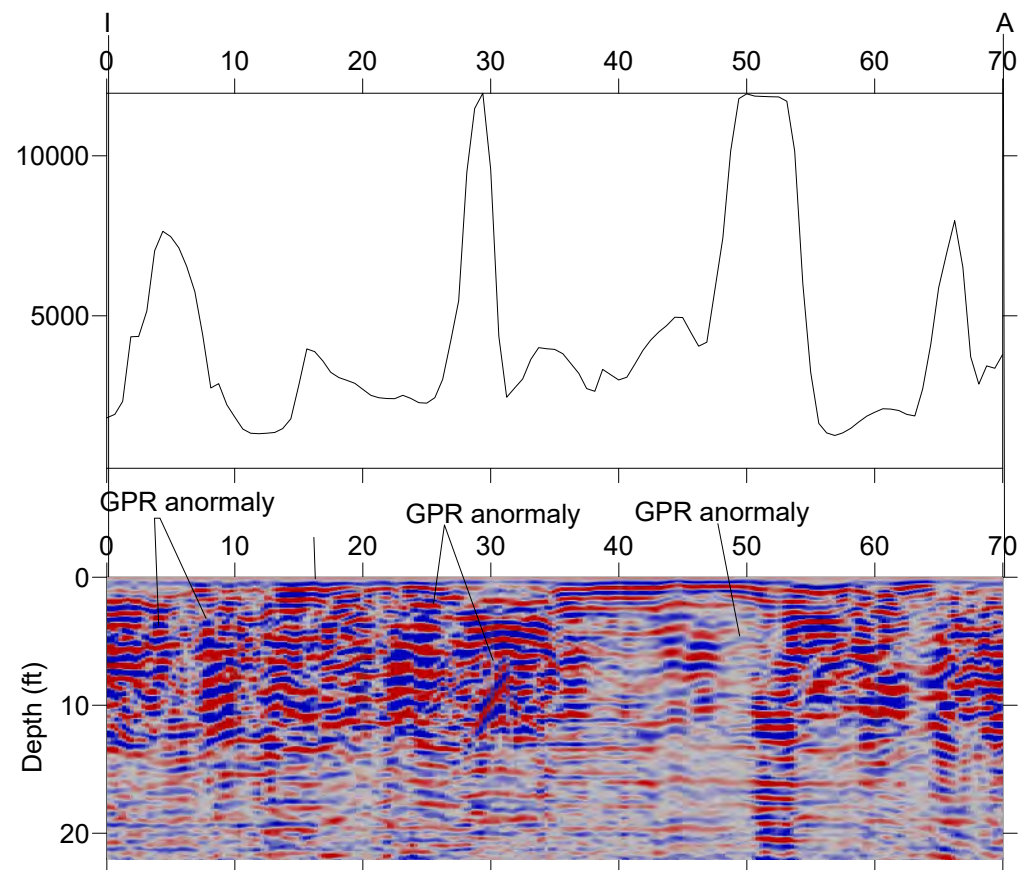
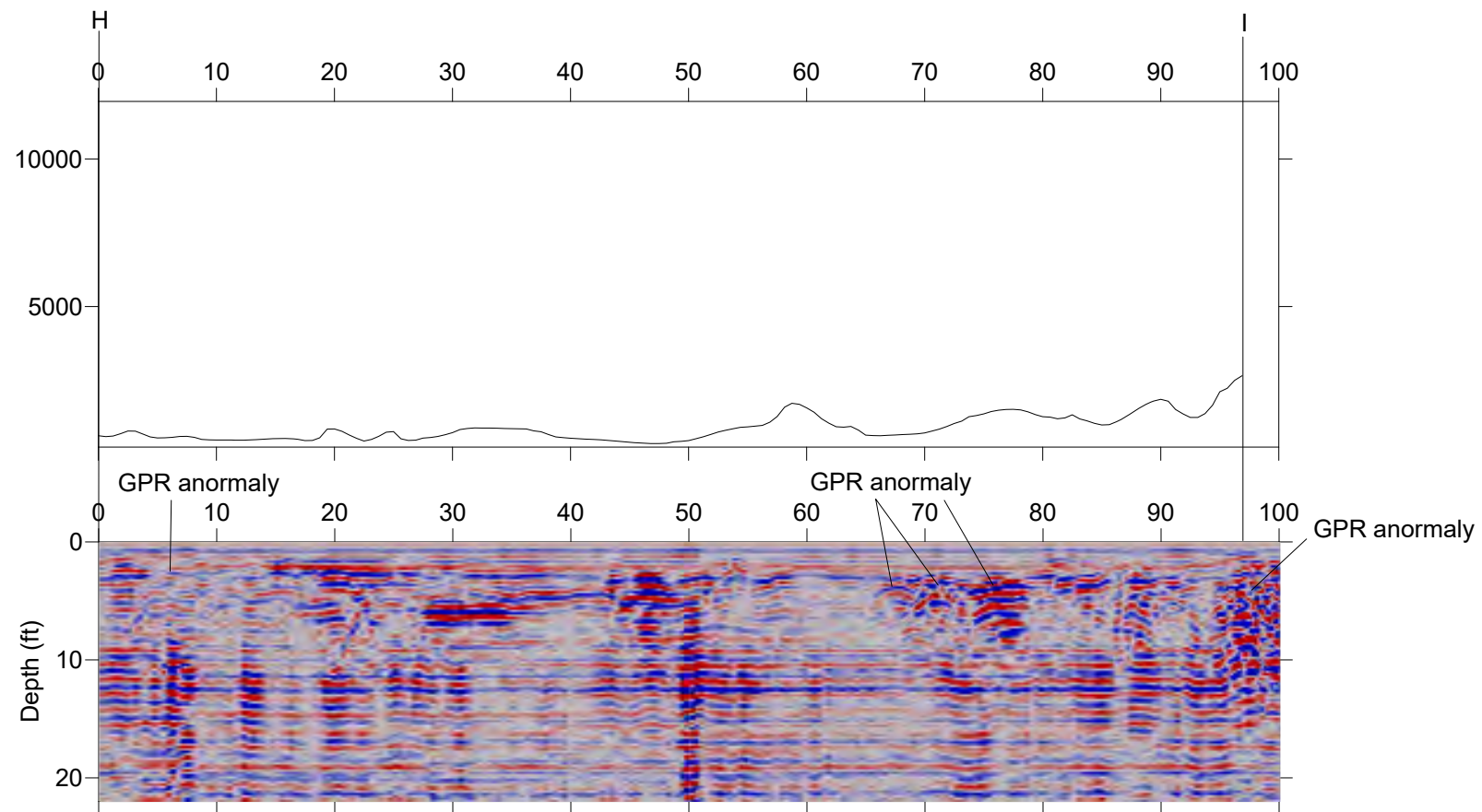


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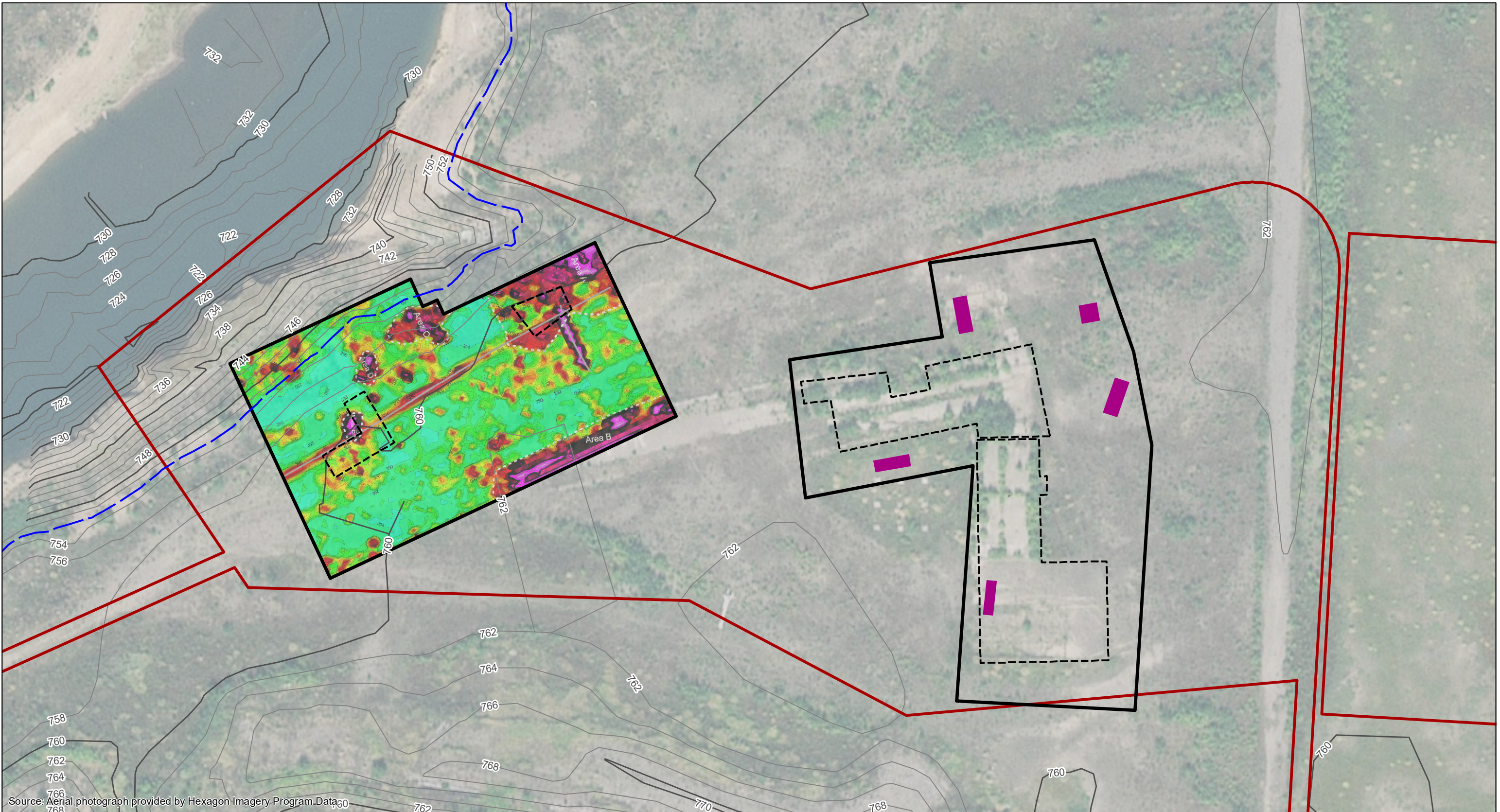


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	REVIEW	--		



PROJECT	UST Locate at Kosmos Mill Morton, WA		
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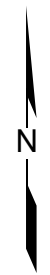
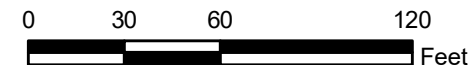
Source: Aerial photograph provided by Hexagon Imagery Program Data

Legend

- Typical Reservoir Level (~751')
- Metallic
- GPR Survey
- Original APE
- Old/Abandoned Building Slab

Notes:

1. Elevation contours, aerial photograph, and site features/locations provided by the City of Tacoma Public Utilities.
2. Contours derived from aerial 'flyover' done April 1998 when reservoir was at elevation 750.7 (NGVD '88).
3. Feature locations are approximate.



Kosmos Mill
Morton, Washington

GPR Overlay

19499-00

11/20



Figure
E-1

APPENDIX F
Field Exploration Methods
and Exploration Logs

APPENDIX F

FIELD EXPLORATION METHODS AND EXPLORATION LOGS

This appendix documents the field exploration methods we used to further assess the environmental quality of the soil and groundwater at the Site. The sections are:

- Explorations and Their Location;
- Sonic Borings;
- Test Pits;
- Soil Sampling Procedures;
- Soil Screening and Analysis;
- Groundwater Level Measurements;
- Groundwater Sampling Procedures;
- Sample Handling and Laboratory Analysis; and
- Investigation-Derived Waste Storage and Disposal.

Explorations and Their Location

Subsurface explorations for the Site investigation and characterization were sonic borings and test pits. Grab groundwater samples were collected from four of the borings. Exploration logs in this appendix show our interpretation of the sampling and testing data. The logs indicate the depth at which the physical characteristics of soils change; however, the change may be gradual. In the field, we classified the samples taken from the explorations according to the methods on Figure F-1 – Key to Exploration Logs. This figure’s legend explains the symbols and abbreviations used in the logs.

Figure 3 shows where the explorations were located.

Sonic Borings

Ten sonic borings (B-1 through B-10) were drilled to depths of 40 to 50 feet bgs on December 10, 11, and 12, 2019. The borings were advanced with an approximately 8-inch diameter sonic drill using a mobile tracked rig by a licensed driller (Holt Service, Inc.) subcontracted to Hart Crowser. An environmental engineer from Hart Crowser continuously observed the drilling. We obtained soil samples at 5-foot depth intervals. All soil samples were classified in accordance with American Society for Testing and Materials (ASTM) Method D2488, and pertinent characteristics of the subsurface conditions were recorded on boring logs. Detailed logs for each boring are presented at the end of this appendix.

The sonic drill was steam cleaned between borings to prevent cross-contamination.

Test Pits

Four test pits were excavated to depths of 9 to 14 feet bgs on November 11, 2019. Nine test pits were excavated to depths of 5 to 20 feet bgs between December 6 and 9, 2019. The test pits were excavated using an excavator by a licensed operator (AEC) contracted to Tacoma Power. An environmental engineer from Hart Crowser continuously observed the excavation. We obtained soil samples at 2.5 to 5-foot depth

intervals. All soil samples were classified in accordance with American Society for Testing and Materials (ASTM) Method D2488, and pertinent characteristics of the subsurface conditions were recorded on boring logs. Detailed logs for each boring are presented at the end of this appendix.

Soil Sampling Procedures

Soil samples were collected for chemical analysis directly from the sonic drill sleeve with a clean stainless-steel spoon and/or clean disposable nitrile gloves and placed in pre-cleaned, laboratory-supplied glass sample jars and 40-milliliter (ml) volatile organics analysis (VOA) bottles supplied by the laboratory. Sufficient soil was removed to overfill the 4-ounce glass sample jars. VOA bottles were filled with a 5-gram soil plug according to Environmental Protection Agency (EPA) Method 5035 procedures. The jars were sealed and labeled. Filled sample jars were stored in an ice-chilled cooler and submitted to the analytical laboratory under chain-of-custody protocols.

Soil Screening and Analysis

Field screening results were used as a general guideline to identify potential chemical constituents in soil samples. In addition, field screening results were used as a basis for selecting soil samples for chemical analysis.

Soil samples were field screened at 2.5- to 5-foot depth intervals for evidence of volatile organic compounds (VOCs)-related impacts using (1) visual and olfactory observations, (2) sheen screening, and (3) headspace vapor screening using a MiniRAE PID. The effectiveness of field screening varies with temperature, moisture content, organic content, soil type, and age of the constituents. Visual examination consists of inspecting the soil for evidence of discoloration, staining, and/or abnormal components. Visual screening is generally more effective when impacts are related to heavy petroleum hydrocarbons, such as motor or hydraulic oil, or when hydrocarbon concentrations are high.

We tested water sheen by placing a small volume of soil in a pan of water and observing the water surface for signs of sheen. Sheens were classified as follows:

No sheen (NS)	No visible sheen on water surface.
Slight sheen (SS)	Light colorless film, spotty to globular; spread is irregular, not rapid; areas of no sheen remain; film dissipates rapidly.
Moderate sheen (MS)	Light to heavy film, may have some color or iridescence; globular to stringy; spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy sheen (HS)	Heavy colorful film with iridescence; stringy; spread is rapid; sheen flows off the sample; most of the water surface may be covered with sheen.

Headspace vapor screening is intended to indicate the presence of volatile organic vapors; it involves placing a soil sample in a plastic sample bag. Air is captured in the bag and the bag is shaken to expose the soil to the air trapped in the bag. The PID probe is then inserted in the bag and the instrument measures the concentration of organic vapors in the sample headspace. The highest vapor reading for each sample is then recorded on the boring log. The PID measures concentrations in ppm, is calibrated to isobutylene, and can typically quantify organic vapor concentrations in the range of 0 to 1,000 ppm.

All field screening observations were recorded on the boring logs, and this information was used to select which samples to submit for chemical analysis. In general, samples with the highest readings were selected for analysis.

Groundwater Level Measurements

Water level measurements were recorded before groundwater samples were collected on December 11 and 12, 2019. Depth to water was measured using a water level indicator or oil-water interface probe. The probe was cleaned between measurements to prevent cross-contamination of wells.

Grab Groundwater Sampling Procedures

Grab groundwater samples were collected from four borings (B-4, B-6, B-7, and B-9) on December 11 and 12, 2019, and samples were submitted for chemical analysis. Grab groundwater samples were collected from temporary wells installed in each borehole location. This consisted of placing a 2-inch diameter, schedule-40 slotted screen (0.01-inch or 0.02-inch machine-slotted screen) with polyvinyl chloride (PVC) riser into the boring and allowing the system to rest until the water levels stabilize. A temporary well was installed by lowering a five-foot screen section to a depth of 45 to 50 feet below ground surface.

Prior to sampling, field personnel recorded the depth to water in the borings using a water level indicator. Due to the high turbidity encountered in the temporary wells, low-flow sampling was not conducted. The low-flow pump was silting up and a more powerful Whale[®] submersible pump was used. Wells were purged at pumping rates were between approximately 0.5 to 1 gallon per minute and sampled at approximately 47.5 feet bgs (the middle of the 5-foot temporary well screen of each boring). Water quality parameters were measured using a YSI meter with a flow-through cell. The temporary well was purged until conventional parameters (temperature, pH, and conductivity) varied by less than 10 percent. Approximately 2 to 4 gallons of water were purged from each temporary well except at boring B-4. The temporary well in boring B-4 was not purged prior to the collection of grab groundwater sample because of concerns of available groundwater and the boring location was in the active area of cap construction.

Grab groundwater samples were collected directly from the polyethylene tubing (3/8 inch) into the pre-cleaned containers provided by the analytical laboratory. The containers were sealed, labeled, and stored in an ice-chilled cooler and submitted to the chemistry laboratory under chain-of-custody protocols.

To prevent cross-contamination of the wells, disposable polyethylene tubing was discarded after each use and the pump was refitted with new tubing at each grab groundwater location. The water level indicator

and pump were decontaminated between well locations using a non-phosphate-based cleaner and de-ionized water. Decontamination generally consisted of the following:

- Tap-water rinse (may consist of an equivalent high-pressure hot-water rinse). Visible soil to be removed by scrubbing.
- Non-phosphate detergent wash, consisting of a dilute mixture of Liqui-Nox® (or equivalent) and tap water.
- Distilled-water rinse.

Sample Handling and Laboratory Analysis

At the time of collection, soil and grab groundwater samples were placed in an ice-chilled cooler and submitted to the laboratory using chain-of-custody protocols. Soil and grab groundwater samples were submitted to Friedman and Bruya, Inc. (F&B) of Seattle, Washington, for chemical analysis. F&B subcontracted groundwater analyses for Low Level Mercury and hexavalent chromium to Fremont Analytical, Inc. (Fremont) in Seattle, Washington.

Investigation-Derived Waste Storage and Disposal

Soil cuttings generated during exploration activities were placed alongside soil stockpiled from the protective cap excavation and disposed along with the petroleum-impacted soil after the construction was completed. Purge water generated during grab groundwater sampling activities was placed in the baker tank being used by the contractor during the protective cap construction and disposed of off-site.

Exploration Logs

Sample Description

Identification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. ASTM D 2488 visual-manual identification methods were used as a guide. Where laboratory testing confirmed visual-manual identifications, then ASTM D 2487 was used to classify the soils.

Relative Density/Consistency

Soil density/consistency in borings is related primarily to the standard penetration resistance (N). Soil density/consistency in test pits and probes is estimated based on visual observation and is presented parenthetically on the logs.

SAND or GRAVEL Relative Density	N (Blows/Foot)	SILT or CLAY Consistency	N (Blows/Foot)
Very loose	0 to 4	Very soft	0 to 1
Loose	5 to 10	Soft	2 to 4
Medium dense	11 to 30	Medium stiff	5 to 8
Dense	31 to 50	Stiff	9 to 15
Very dense	>50	Very stiff	16 to 30
		Hard	>30

Moisture

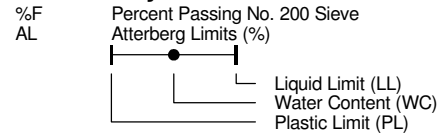
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Minor Constituents

Estimated Percentage

Sand, Gravel	
Trace	<5
Few	5 - 15
Cobbles, Boulders	
Trace	<5
Few	5 - 10
Little	15 - 25
Some	30 - 45

Soil Test Symbols



CA	Chemical Analysis
CAUC	Consolidated Anisotropic Undrained Compression
CAUE	Consolidated Anisotropic Undrained Extension
CBR	California Bearing Ratio
CIDC	Consolidated Drained Isotropic Triaxial Compression
CIUC	Consolidated Isotropic Undrained Compression
CK0DC	Consolidated Drained k0 Triaxial Compression
CK0DSS	Consolidated k0 Undrained Direct Simple Shear
CK0UC	Consolidated k0 Undrained Compression
CK0UE	Consolidated k0 Undrained Extension
CRSCN	Constant Rate of Strain Consolidation
DS	Direct Shear
DSS	Direct Simple Shear
DT	In Situ Density
GS	Grain Size Classification
HYD	Hydrometer
ILCN	Incremental Load Consolidation
K0CN	k0 Consolidation
kc	Constant Head Permeability
kf	Falling Head Permeability
MD	Moisture Density Relationship
OC	Organic Content
OT	Tests by Others
P	Pressuremeter
PID	Photoionization Detector Reading
PP	Pocket Penetrometer
SG	Specific Gravity
TRS	Torsional Ring Shear
TV	Torvane
UC	Unconfined Compression
UUC	Unconsolidated Undrained Triaxial Compression
VS	Vane Shear
WC	Water Content (%)

USCS Soil Classification Chart (ASTM D 2487)

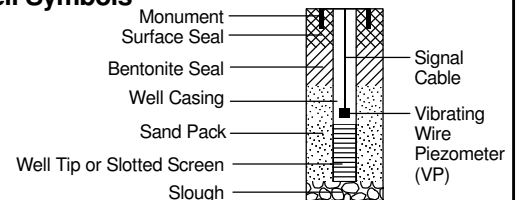
Major Divisions		Symbols		Typical Descriptions
		Graph	USCS	
Coarse Grained Soils More than 50% of Material Retained on No. 200 Sieve	Gravel and Gravelly Soils More than 50% of Coarse Fraction Retained on No. 4 Sieve	Clean Gravels (<5% fines)	GW	Well-Graded Gravel; Well-Graded Gravel with Sand
		Gravels (5-12% fines)	GP	Poorly Graded Gravel; Poorly Graded Gravel with Sand
			GW-GM	Well-Graded Gravel with Silt; Well-Graded Gravel with Silt and Sand
			GW-GC	Well-Graded Gravel with Clay; Well-Graded Gravel with Clay and Sand
			GP-GM	Poorly Graded Gravel with Silt; Poorly Graded Gravel with Silt and Sand
		GP-GC	Poorly Graded Gravel with Clay; Poorly Graded Gravel with Clay and Sand	
	Silty Gravel; Silty Gravel with Sand	GM		
		GC	Clayey Gravel; Clayey Gravel with Sand	
		Sands with few Fines (<5% fines)	SW	Well-Graded Sand; Well-Graded Sand with Gravel
			SP	Poorly Graded Sand; Poorly Graded Sand with Gravel
Sand and Sandy Soils More than 50% of Coarse Fraction Passing No. 4 Sieve	Sands (5-12% fines)	SW-SM	Well-Graded Sand with Silt Well-Graded Sand with Silt and Gravel	
		SW-SC	Well-Graded Sand with Clay; Well-Graded Sand with Clay and Gravel	
	Sands with Fines (>12% fines)	SP-SM	Poorly Graded Sand with Silt; Poorly Graded Sand with Silt and Gravel	
		SP-SC	Poorly Graded Sand with Clay; Poorly Graded Sand with Clay and Gravel	
	SM	Silty Sand; Silty Sand with Gravel		
	SC	Clayey Sand; Clayey Sand with Gravel		
Fine Grained Soils More than 50% of Material Passing No. 200 Sieve	Silt	ML	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt	
		MH	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt	
	Silty Clay (based on Atterberg Limits)	CL-ML	Silty Clay; Silty Clay with Sand or Gravel; Gravelly or Sandy Silty Clay	
		Clays	CL	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
	CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay	
Organics	OL/OH	Organic Soil; Organic Soil with Sand or Gravel; Sandy or Gravelly Organic Soil		
Highly Organic (>50% organic material)	PT	Peat - Decomposing Vegetation - Fibrous to Amorphous Texture		

Groundwater Indicators

	Groundwater Level on Date or At Time of Drilling (ATD)
	Groundwater Level on Date Measured in Piezometer
	Groundwater Seepage (Test Pits)

Sample Symbols

Well Symbols



KEY TO EXP. LOGS (SOIL ONLY) - J:\GINT\HC_LIBRARY_GLB - 10/15/20 19:50 - \\SEAFS\PROJECTS\nOTEBOOKS\1949900_KOSMOS_MILL_OIL_CLEANUP\FIELD DATA\PERM_GINT FILES\1949900-BL.GPJ - kzi

Date Started: 12/11/19 Date Completed: 12/11/19 Contractor/Crew: Holt Services, Inc.
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 427,060.05 E: 1,214,354.89 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 785.53 feet (NAVD 88) Total Depth: 40 feet Depth to Groundwater: Not Identified
 Comments: GS Elev in ft (Tacoma City Light Datum): 781.57

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Elevation (feet)	Depth (feet)	Type	Recovery Length (inches)	Number Tests	Sheen	Graphic Log	Material Description	Well Construction	Depth (feet)	
785	0						SILT WITH GRAVEL (ML), moist, dark gray, frequent black hydrocarbon staining.		0	
			60in.	B-1-5 Slight petroleum odor	SS		SILT WITH SAND (ML), moist, brown. [FILL]			
	5		30in.	B-1-10 No odor	NS		CLAYEY SAND WITH GRAVEL (SC), moist, brown. [FILL]		5	
	10		60in.	B-1-15 No odor	NS		SILTY GRAVEL WITH SAND (GM), some cobbles, moist, black hydrocarbon staining at 13 feet. [FILL]		10	
	15		60in.	B-1-20 No odor	NS		POORLY GRADED GRAVEL WITH SAND (GP), some cobbles, moist, brown.		15	
	20		60in.	B-1-25 No odor	NS		SILTY GRAVEL WITH SAND (GM), moist, dark brown to gray.		20	
	25		60in.	B-1-30 No odor	NS		POORLY GRADED GRAVEL WITH SAND (GP), moist, gray-brown.		25	
	30		60in.	B-1-35 No odor	NS		SILTY GRAVEL (GM), moist, gray.		30	
	35		60in.	B-1-40 No odor	NS				35	
	40	Bottom of Borehole at 40.0 feet.								40
	45								45	

General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

Date Started: 12/10/19 Date Completed: 12/10/19
 Logged by: A. Nakahara Checked by: C. Kroskie
 Location: N: 427,117.94 E: 1,214,428.27 (WGS 84)
 Ground Surface Elevation: 759.40 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 755.44
 Temporary well. Unable to collect groundwater sample.

Contractor/Crew: Holt Services, Inc.
 Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Hole Diameter: 8 inches Casing Diameter: NA
 Total Depth: 50 feet Depth to Groundwater: Not Identified

Elevation (feet)	Depth (feet)	Sample Data					Material Description	Well Construction	Depth (feet)
		Type	Recovery Length (inches)	Number Tests	PID (ppm)	Sheen			
755	0						SILTY SAND (SM), moist to wet, gray. [FILL]		0
755	60	60in.	60	B-2-5 Slight petroleum odor	0.6	SS			
750	5						SILTY GRAVEL WITH SAND (GM), some cobbles, moist, brown. [FILL]		5
750	60	60in.	60	B-2-10 No odor	0.1	NS			
745	10						POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM), some cobbles, moist, dark brown to brown. [FILL]		10
745	60	60in.	60	B-2-15 No odor	<0.1	NS			
740	15						SILTY GRAVEL WITH SAND (GM), some cobbles, moist, gray-brown. [FILL]		15
740	60	60in.	60	B-2-20 No odor	<0.1	NS	Frequent black hydrocarbon staining.		
735	20						Becomes brown.		20
735	60	60in.	60	B-2-25 No odor	<0.1	NS	Becomes dark brown to gray with frequent black hydrocarbon staining.		
730	25								25
730	60	60in.	60	B-2-30 No odor	<0.1	NS			
725	30						Becomes gray-brown.		30
725	60	60in.	60	B-2-35 No odor	<0.1	NS	SILTY GRAVEL WITH SAND (GM), some cobbles, moist, gray-brown.		35
720	35								35
720	60	60in.	60	B-2-40 No odor	<0.1	SS			
715	40						POORLY GRADED SAND WITH GRAVEL (SP), wet, gray, coarse sand.		40
715	60	60in.	60	B-2-45 No odor	<0.1	NS			
710	45								45
710	60	60in.	60	B-2-50 No odor	<0.1	NS			

General Notes: Bottom of Borehole at 50.0 feet.

1. Refer to Figure F-1 for explanation of descriptions and symbols.
2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
5. Location and ground surface elevations are approximate.

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Date Started: 12/10/19 Date Completed: 12/10/19
 Logged by: A. Nakahara Checked by: C. Kroskie
 Location: N: 427,146.23 E: 1,214,486.05 (WGS 84)
 Ground Surface Elevation: 759.76 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 755.80

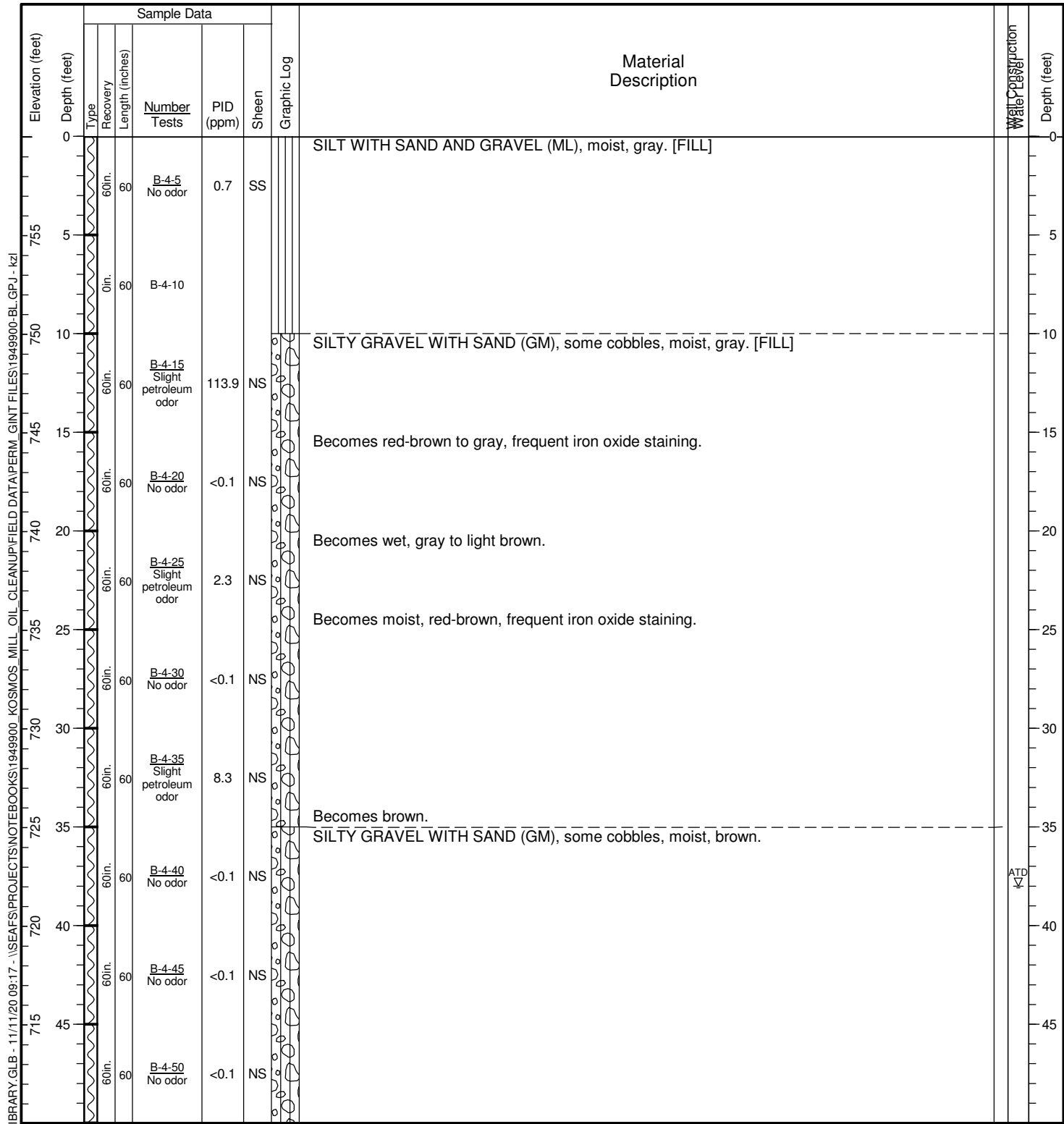
Contractor/Crew: Holt Services, Inc.
 Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Hole Diameter: 8 inches Casing Diameter: NA
 Total Depth: 40 feet Depth to Groundwater: Not Identified

Elevation (feet)	Depth (feet)	Sample Data					Material Description	Well Construction	Depth (feet)
		Type	Recovery Length (inches)	Number Tests	PID (ppm)	Sheen			
755.80	0						SILTY GRAVEL (GM), some cobbles, moist, dark brown to light brown. [FILL]		0
755	5	60in.	60	B-3-5 No odor	<0.1	NS	No recovery.		5
750	10	0in.	60	B-3-10					10
745	15	60in.	60	B-3-15 No odor	<0.1	SS	POORLY GRADED GRAVEL WITH SAND (GP), few cobbles, moist, light brown. [FILL] SILT WITH GRAVEL (ML), moist, dark gray, frequent black hydrocarbon staining. [FILL]		15
740	20	60in.	60	B-3-20 No odor	<0.1	NS	SILTY GRAVEL WITH SAND (GM), some cobbles, moist, gray. [FILL] Frequent iron oxide staining. Frequent black hydrocarbon staining.		20
735	25	60in.	60	B-3-25 No odor	<0.1	NS	SILTY GRAVEL WITH SAND (GM), some cobbles, moist, dark brown.		25
730	30	60in.	60	B-3-30 No odor	<0.1	NS			30
725	35	60in.	60	B-3-35 No odor	<0.1	NS			35
720	40	60in.	60	B-3-40 No odor	<0.1	NS			40
Bottom of Borehole at 40.0 feet.									40
715	45								45

General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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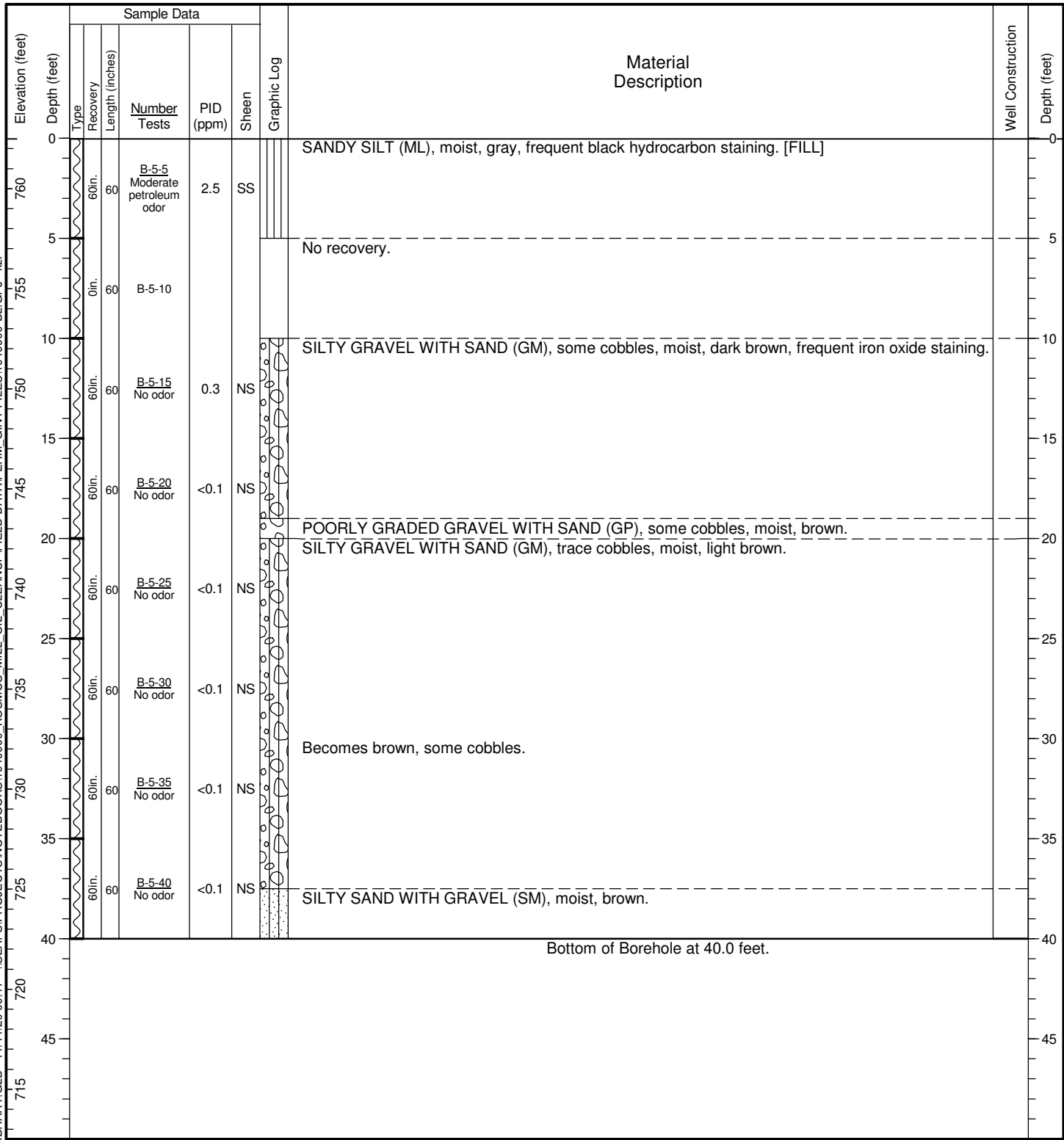
Date Started: 12/11/19 Date Completed: 12/11/19 Contractor/Crew: Holt Services, Inc.
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 427,205.95 E: 1,214,574.98 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 760.04 feet (NAVD 88) Total Depth: 50 feet Depth to Groundwater: 38 feet
 Comments: GS Elev in ft (Tacoma City Light Datum): 756.08
 Temporary well (B-4-W) Grab groundwater was collected from a temporary well screened from a depth of 45 to 50 feet.



General Notes: Bottom of Borehole at 50.0 feet.

- Refer to Figure F-1 for explanation of descriptions and symbols.
- Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
- USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
- Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
- Location and ground surface elevations are approximate.

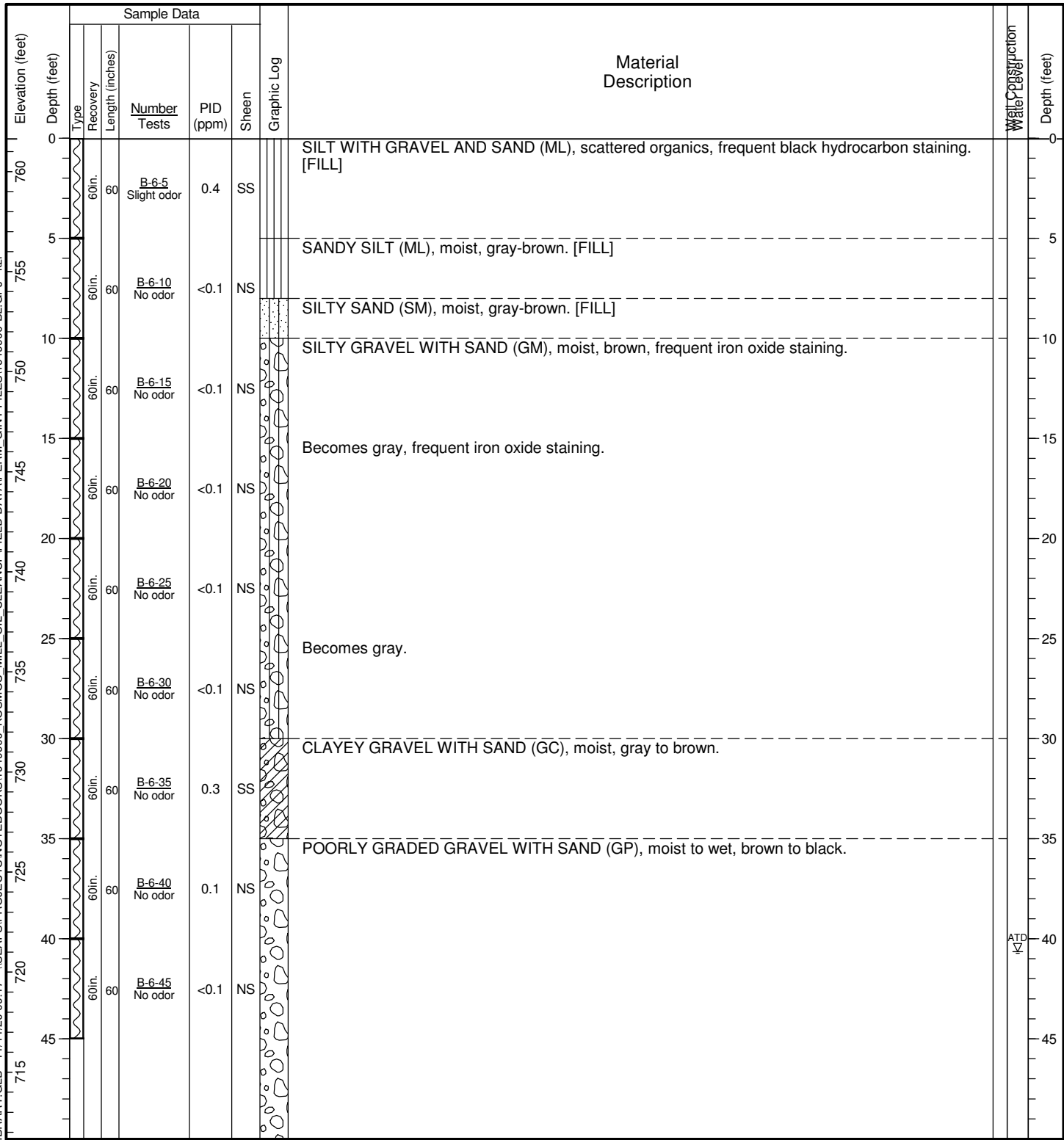
Date Started: 12/11/19 Date Completed: 12/11/19 Contractor/Crew: Holt Services, Inc.
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 427,043.54 E: 1,214,529.15 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 762.52 feet (NAVD 88) Total Depth: 40 feet Depth to Groundwater: Not Identified
 Comments: GS Elev in ft (Tacoma City Light Datum): 758.56



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 12/12/19 Date Completed: 12/12/19 Contractor/Crew: Holt Services, Inc.
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 427,078.44 E: 1,214,685.99 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 761.67 feet (NAVD 88) Total Depth: 50 feet Depth to Groundwater: 40.65 feet
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.71
 Temporary well (B-6-W) Grab groundwater was collected from a temporary well screened from a depth of 45 to 50 feet.

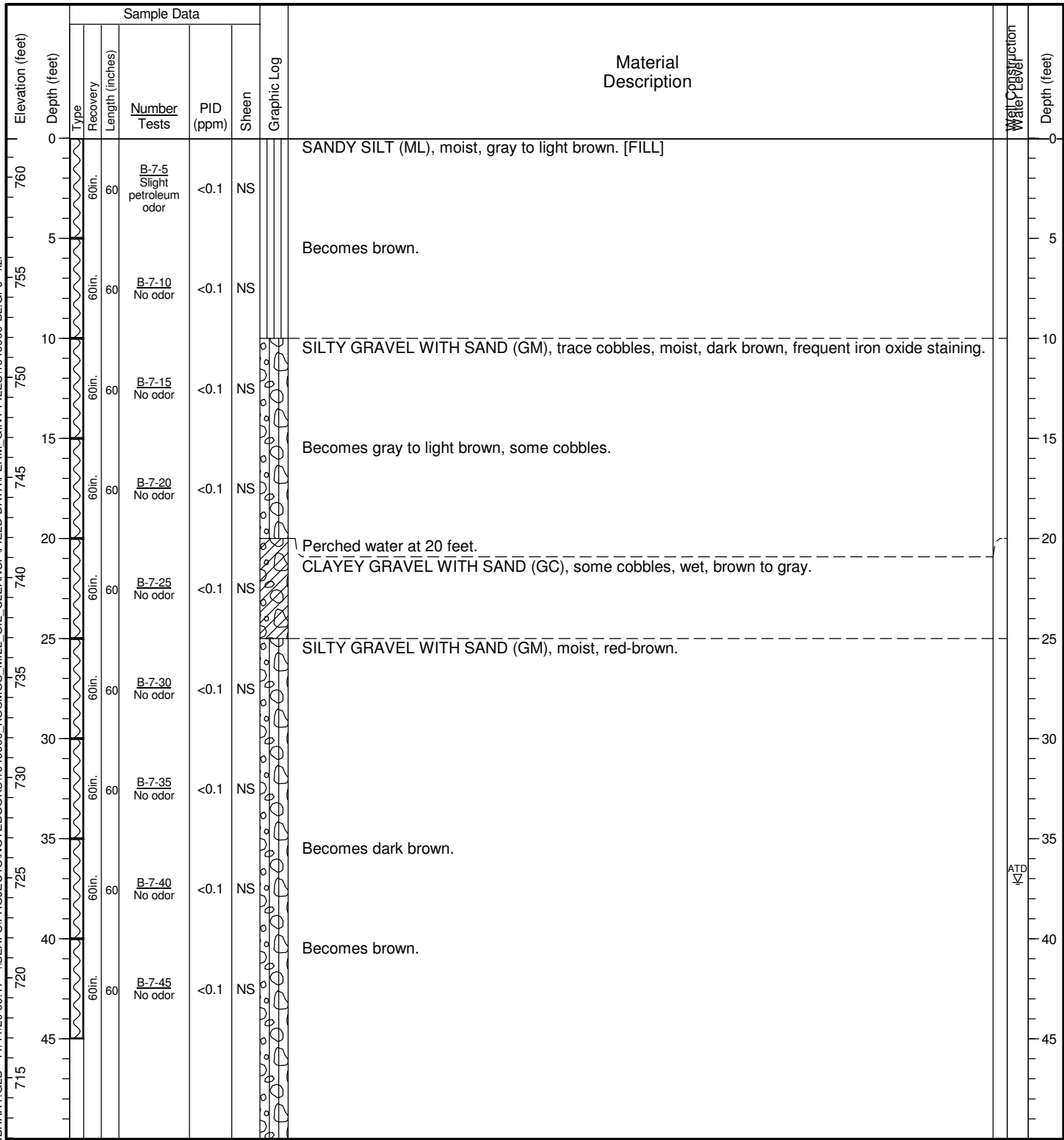


General Notes: Bottom of Borehole at 50.0 feet.

- Refer to Figure F-1 for explanation of descriptions and symbols.
- Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
- USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
- Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
- Location and ground surface elevations are approximate.

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Date Started: 12/12/19 Date Completed: 12/12/19 Contractor/Crew: Holt Services, Inc.
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 426,972.13 E: 1,214,776.20 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 761.95 feet (NAVD 88) Total Depth: 50 feet Depth to Groundwater: 37.2 feet
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.99
 Temporary well (B-7-W) Grab groundwater was collected from a temporary well screened from a depth of 45 to 50 feet.



General Notes: Bottom of Borehole at 50.0 feet.

- Refer to Figure F-1 for explanation of descriptions and symbols.
- Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
- USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
- Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
- Location and ground surface elevations are approximate.

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Date Started: 12/10/19 Date Completed: 12/10/19
 Logged by: A. Nakahara Checked by: C. Kroskie
 Location: N: 427,076.55 E: 1,214,805.23 (WGS 84)
 Ground Surface Elevation: 761.43 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.47

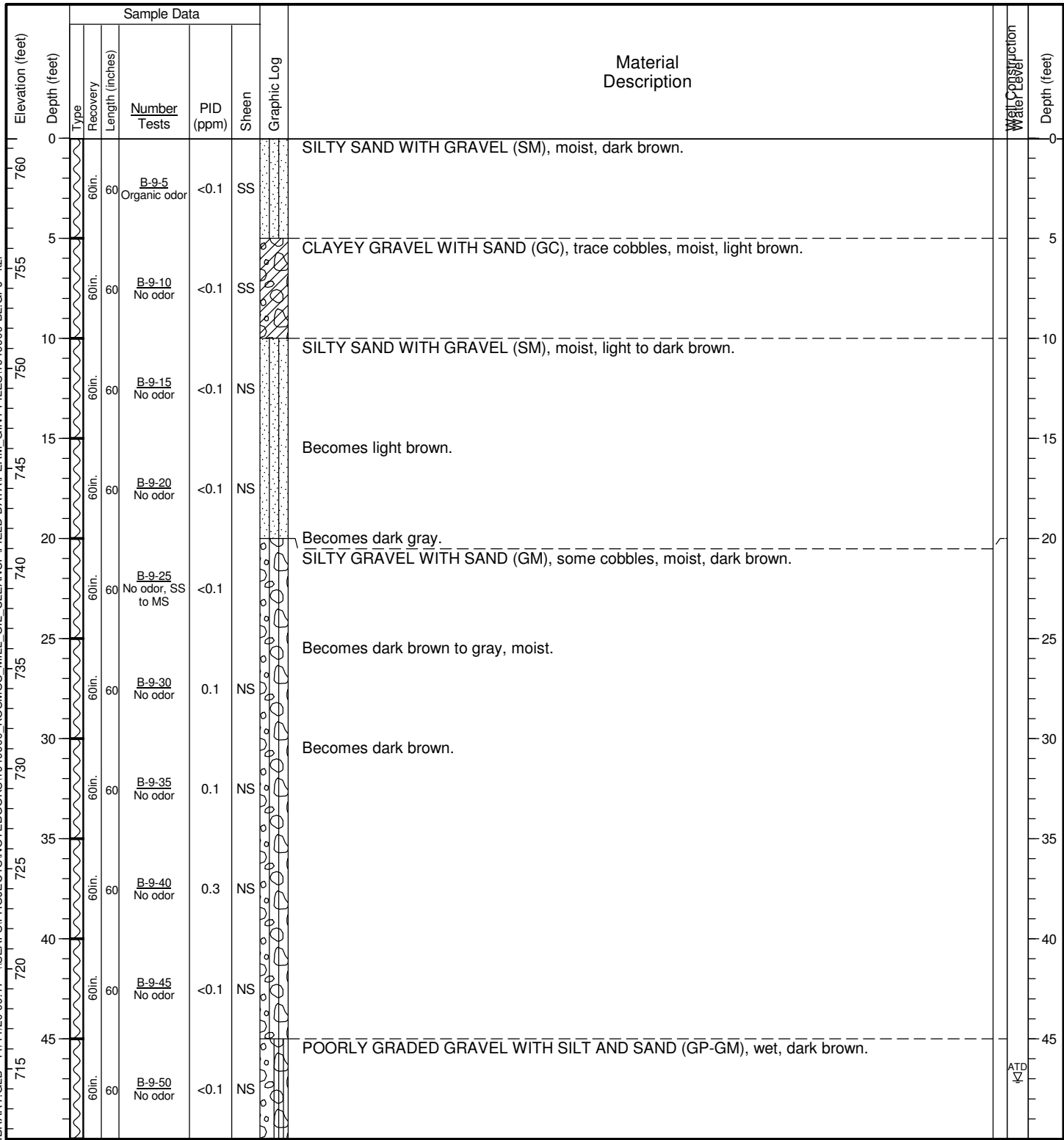
Contractor/Crew: Holt Services, Inc.
 Rig Model/Type: TSI 150CC / Track-mounted drill rig
 Hole Diameter: 8 inches Casing Diameter: NA
 Total Depth: 40 feet Depth to Groundwater: Not Identified

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Elevation (feet)	Depth (feet)	Sample Data					Material Description	Well Construction	Depth (feet)
		Type	Recovery Length (inches)	Number Tests	PID (ppm)	Sheen			
760	0						SILTY GRAVEL WITH SAND (GM), moist, dark brown. [FILL]		0
	60		60 in.	B-8-5 No odor	<0.1	SS	SILT WITH SAND (ML), moist, light brown. [FILL]		
755	5		60 in.	B-8-10 Organic odor	<0.1	SS	SILTY GRAVEL WITH SAND (GM), trace cobbles, moist, light brown to gray. [FILL]		5
	10		60 in.	B-8-15 No odor	<0.1	NS	POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM), some cobbles, moist, light brown. [FILL]		10
745	15		60 in.	B-8-20 No odor	<0.1	NS			15
	20		60 in.	B-8-25 No odor	<0.1	NS	SILTY GRAVEL WITH SAND (GM), moist, dark brown. [FILL]		20
740	25		60 in.	B-8-30 No odor	<0.1	NS	Concrete debris at 25 feet.		25
735	30		60 in.	B-8-35 No odor	<0.1	NS			30
730	35		60 in.	B-8-40 No odor	<0.1	NS	Becomes light brown.		35
725	40	Bottom of Borehole at 40.0 feet.							40
720	45								45
715									

- General Notes:
1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

Date Started: 12/12/19 Date Completed: 12/12/19 Contractor/Crew: Holt Services, Inc.
 Logged by: J. Higgins Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 427,161.94 E: 1,214,808.90 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 761.5 feet (NAVD 88) Total Depth: 50 feet Depth to Groundwater: 47.1 feet
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.54
 Temporary well (B-9-W) Grab groundwater was collected from a temporary well screened from a depth of 45 to 50 feet.

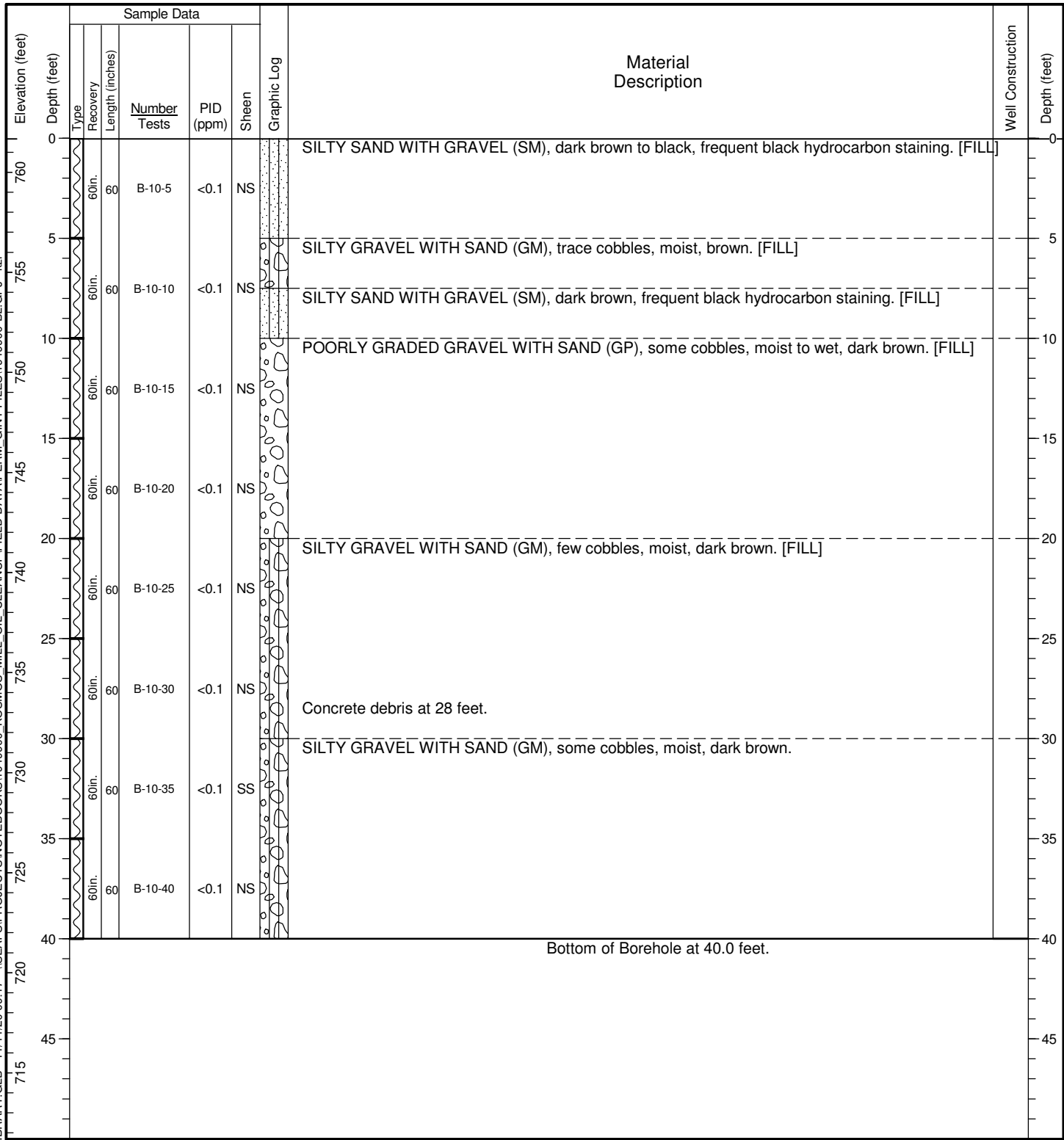


General Notes: Bottom of Borehole at 50.0 feet.

1. Refer to Figure F-1 for explanation of descriptions and symbols.
2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
5. Location and ground surface elevations are approximate.

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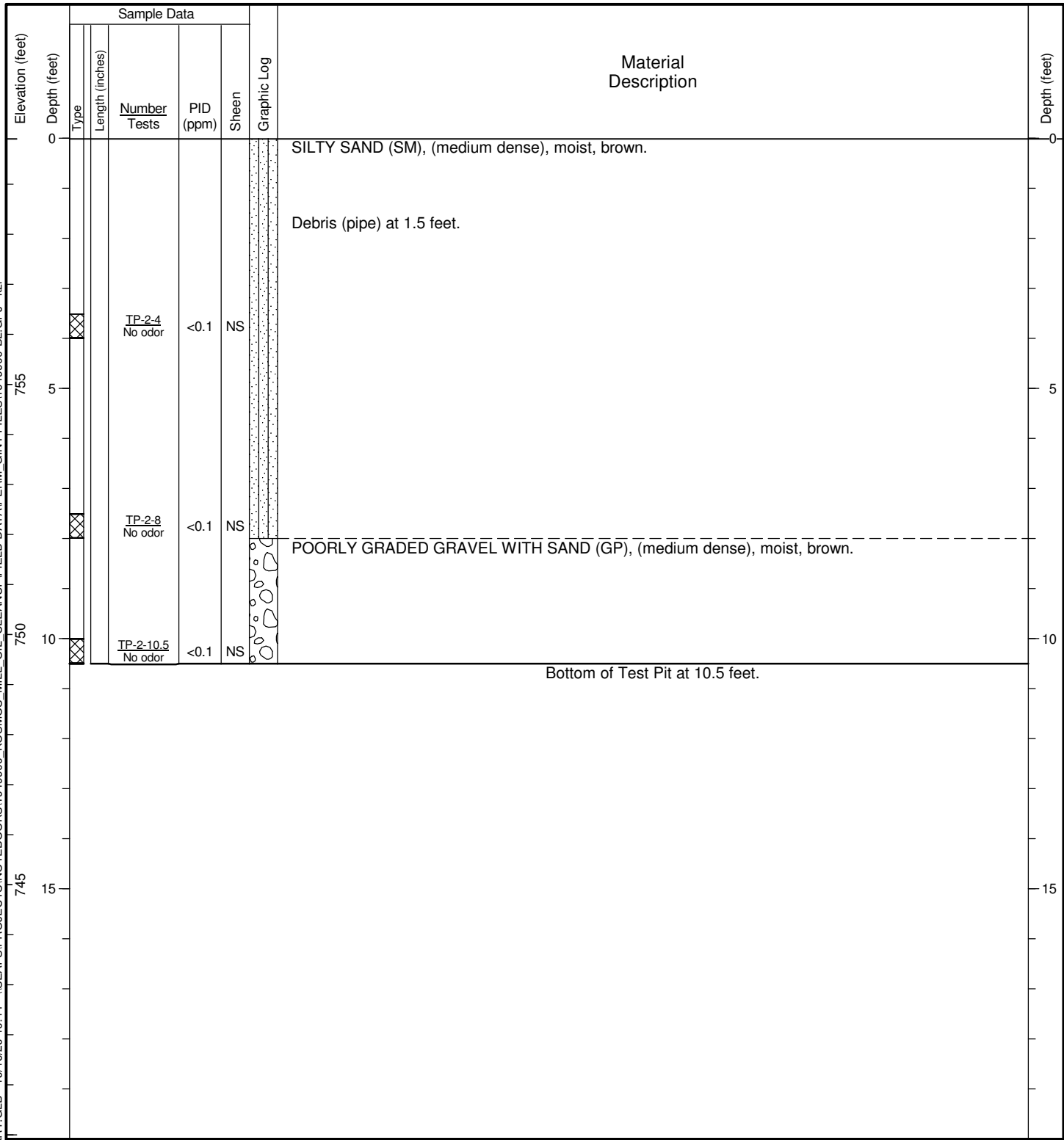
Date Started: 12/10/19 Date Completed: 12/10/19 Contractor/Crew: Holt Services, Inc.
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type: TSi 150CC / Track-mounted drill rig
 Location: N: 427,204.00 E: 1,214,904.28 (WGS 84) Hole Diameter: 8 inches Casing Diameter: NA
 Ground Surface Elevation: 761.7 feet (NAVD 88) Total Depth: 40 feet Depth to Groundwater: Not Identified
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.74



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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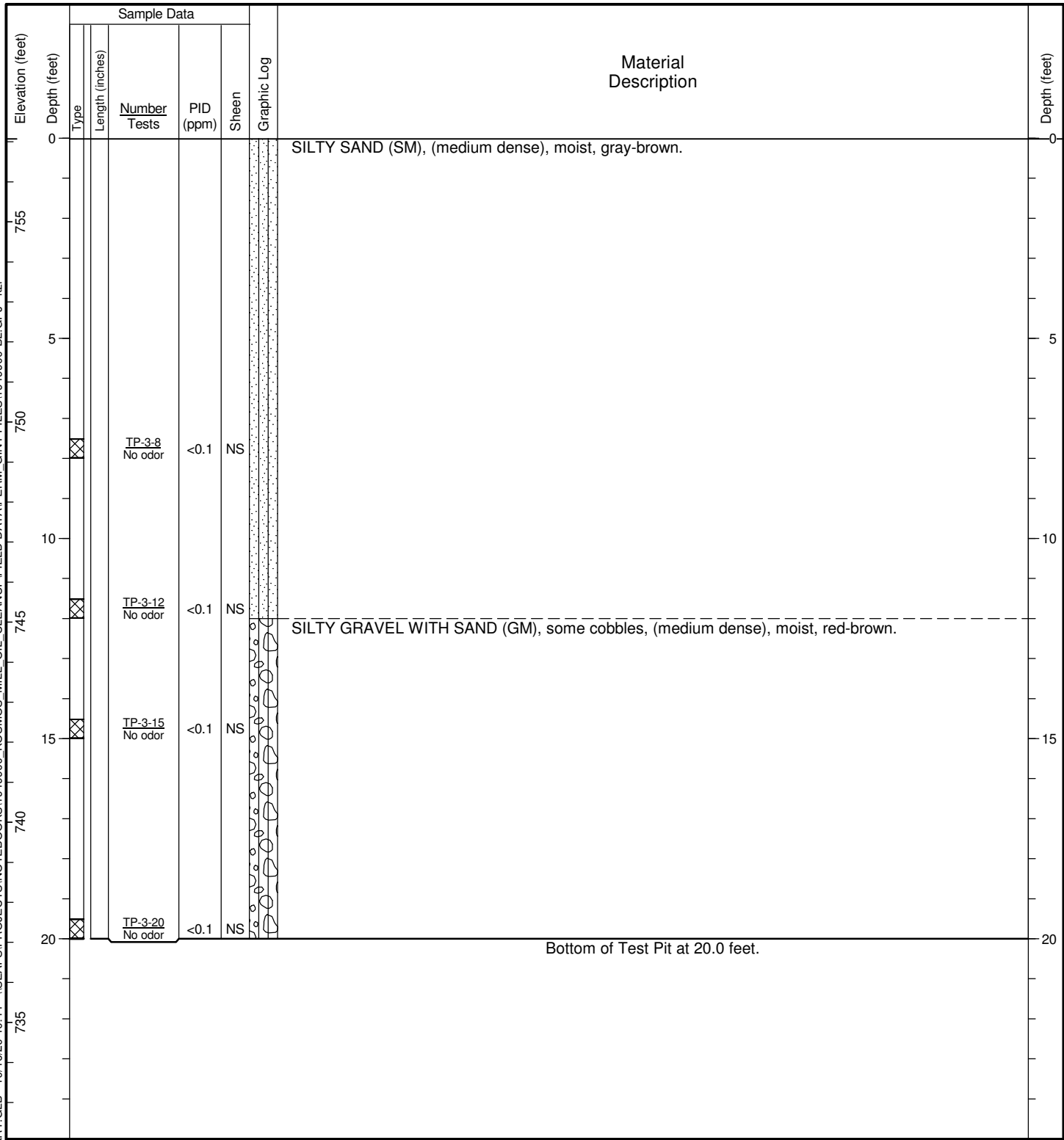
Date Started: 11/26/19 Date Completed: 11/26/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins Checked by: C. Kroskie Rig Model/Type:
 Location: N: 427,097.36 E: 1,214,403.78 (WGS 84) Total Depth: 10.5 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 759.92 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 755.96
 7' x 13'



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 12/5/19 Date Completed: 12/5/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,136.76 E: 1,214,407.47 (WGS 84) Total Depth: 20 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 757.09 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 753.13
 5' x 10'

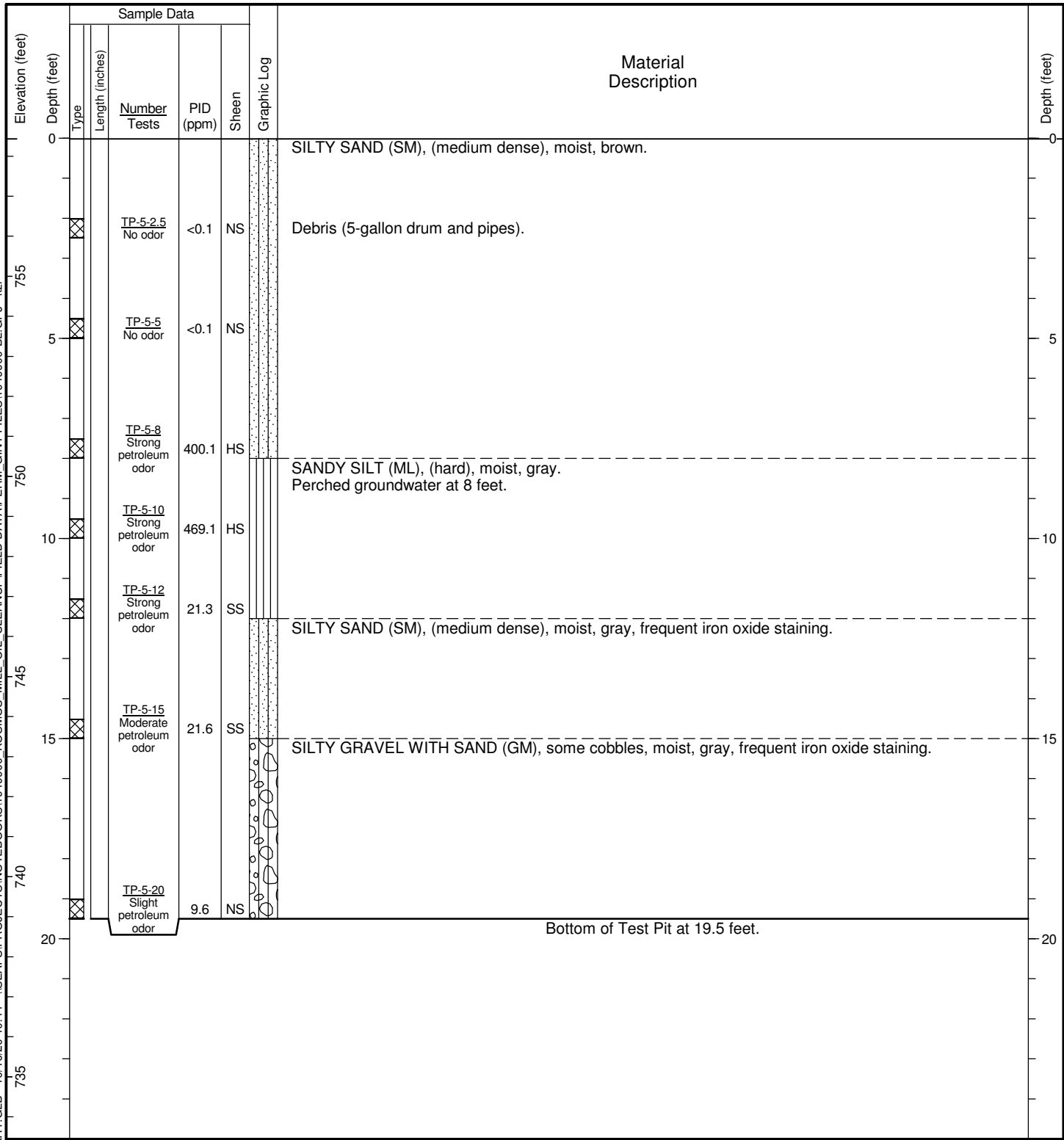


General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 12/5/19 Date Completed: 12/5/19
 Logged by: J. Higgins/A. Nakahara Checked by: C. Kroskie
 Location: N: 427,213.76 E: 1,214,548.19 (WGS 84)
 Ground Surface Elevation: 758.45 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 754.49
 5' x 20'

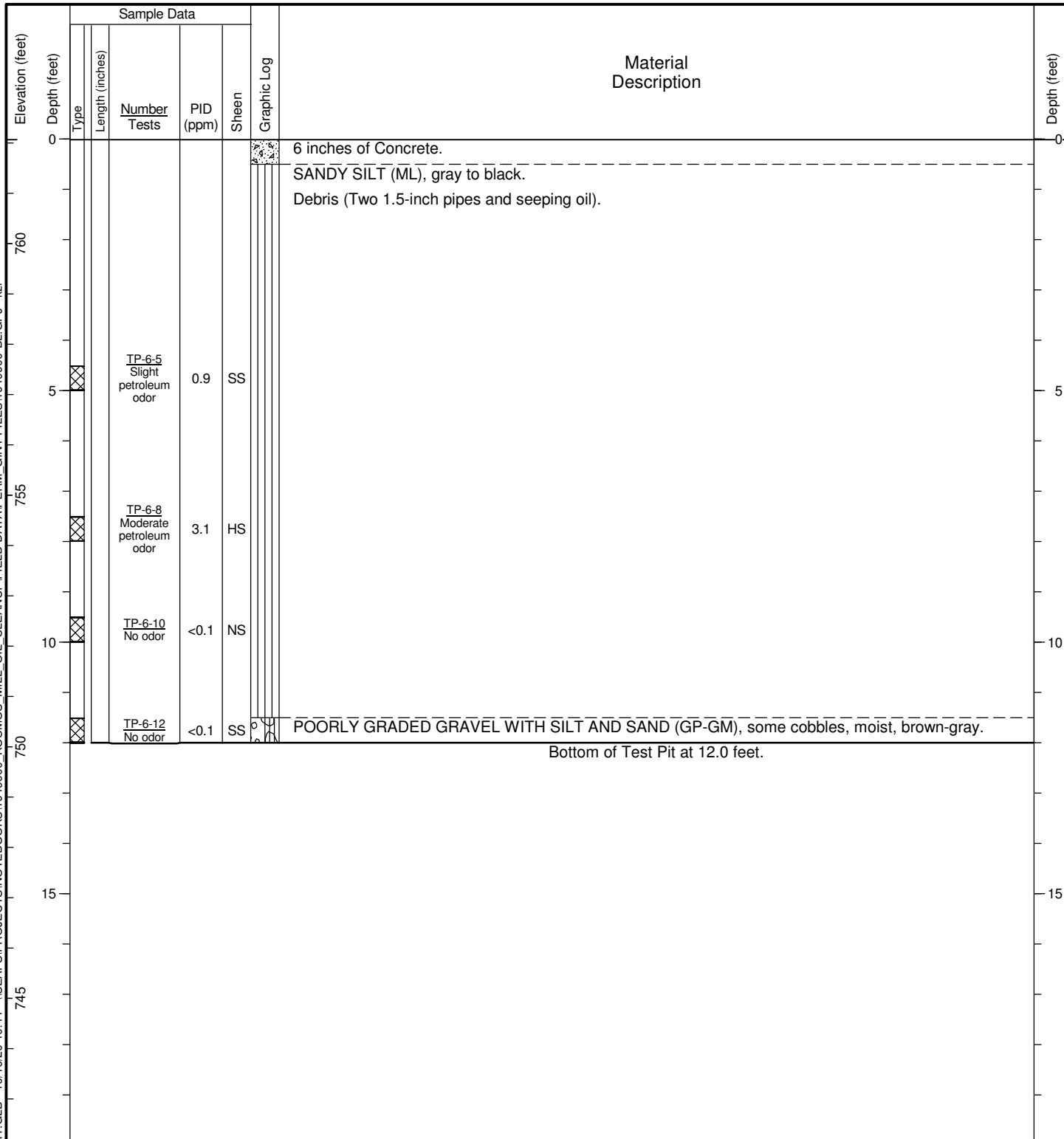
Contractor/Crew: Anderson Environmental Contracting, LLC
 Rig Model/Type:
 Total Depth: 19.5 feet Depth to Seepage: Not Encountered



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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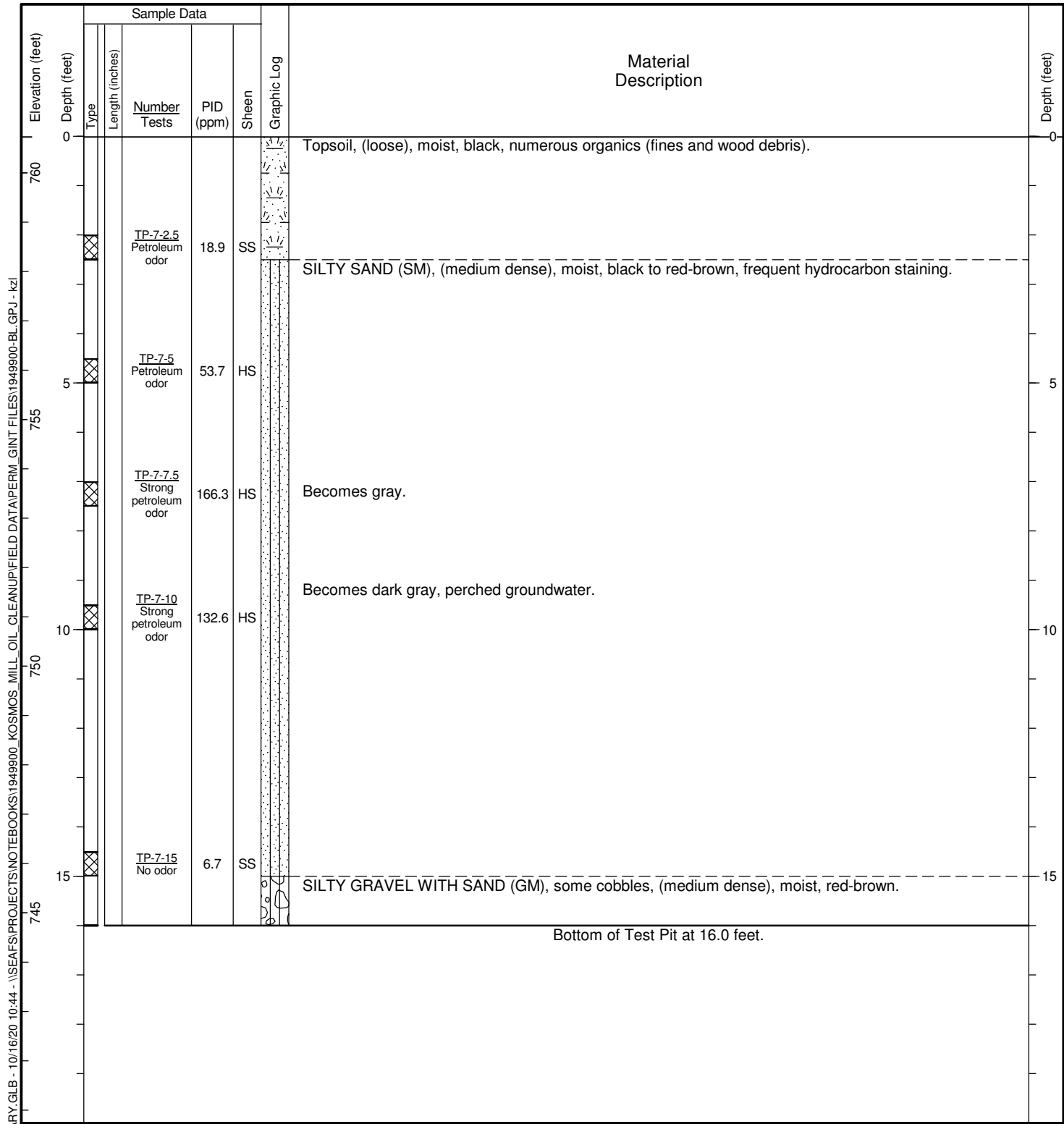
Date Started: 12/6/19 Date Completed: 12/6/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: A. Nakahara Checked by: C. Kroskie Rig Model/Type:
 Location: N: 427,103.39 E: 1,214,546.89 (WGS 84) Total Depth: 12 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 762.08 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 758.12
 Two pipes were discovered, one below the oil boil and one below the 6-inch concrete slab. Pipes run east-west.



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

Date Started: 12/6/19 Date Completed: 12/6/19
 Logged by: J. Higgins/A. Nakahara Checked by: C. Kroskie
 Location: N: 427,160.69 E: 1,214,556.65 (WGS 84)
 Ground Surface Elevation: 760.74 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 756.78
 4' x 16'

Contractor/Crew: Anderson Environmental Contracting, LLC
 Rig Model/Type:
 Total Depth: 16 feet Depth to Seepage: Not Encountered



General Notes:

1. Refer to Figure F-1 for explanation of descriptions and symbols.
2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
5. Location and ground surface elevations are approximate.



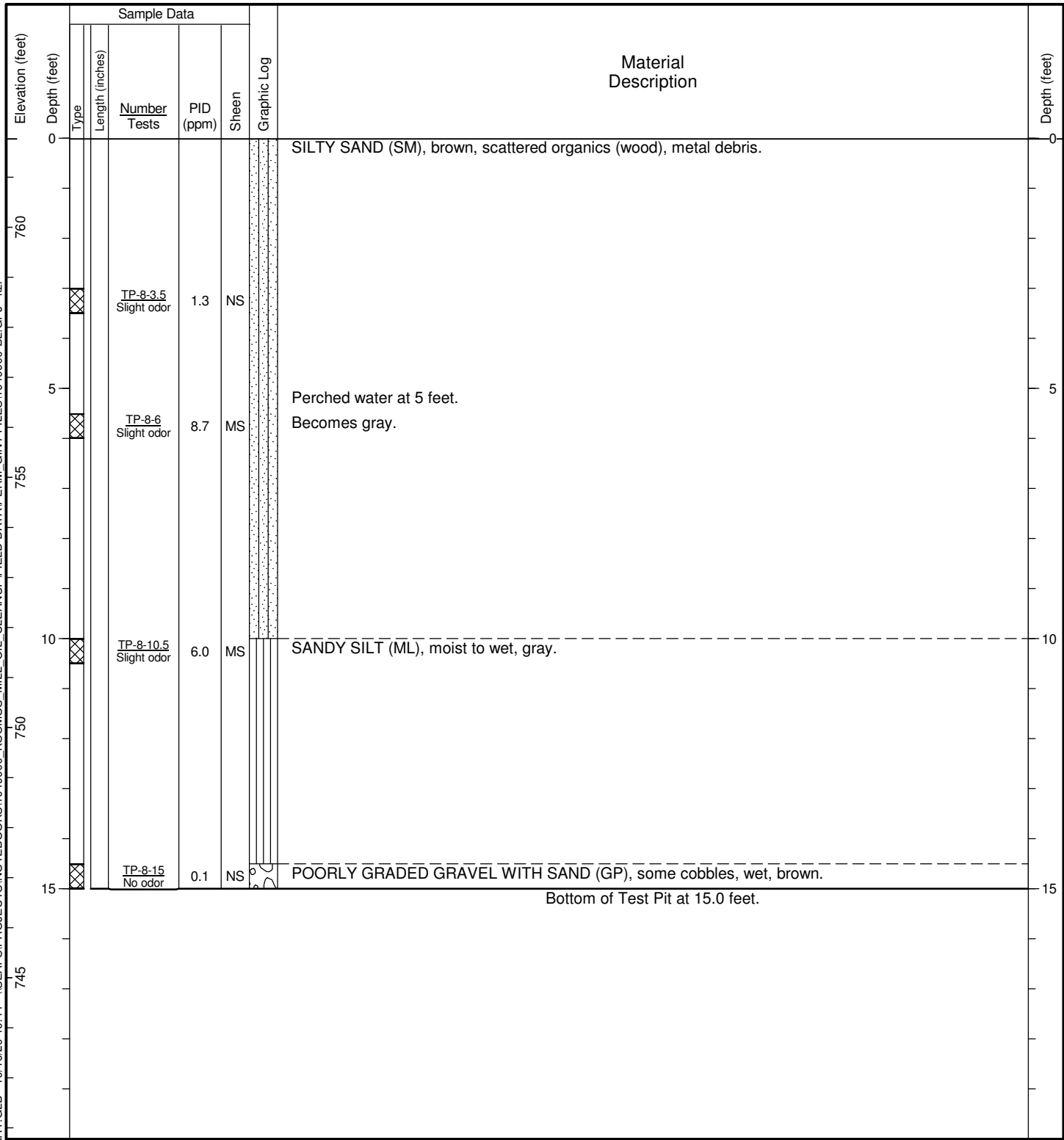
Project: Kosmos Mill Oil Cleanup
 Location:
 Project No.: 19499-00

Test Pit Log
TP-7

Figure **F-16**
 Sheet **1 of 1**

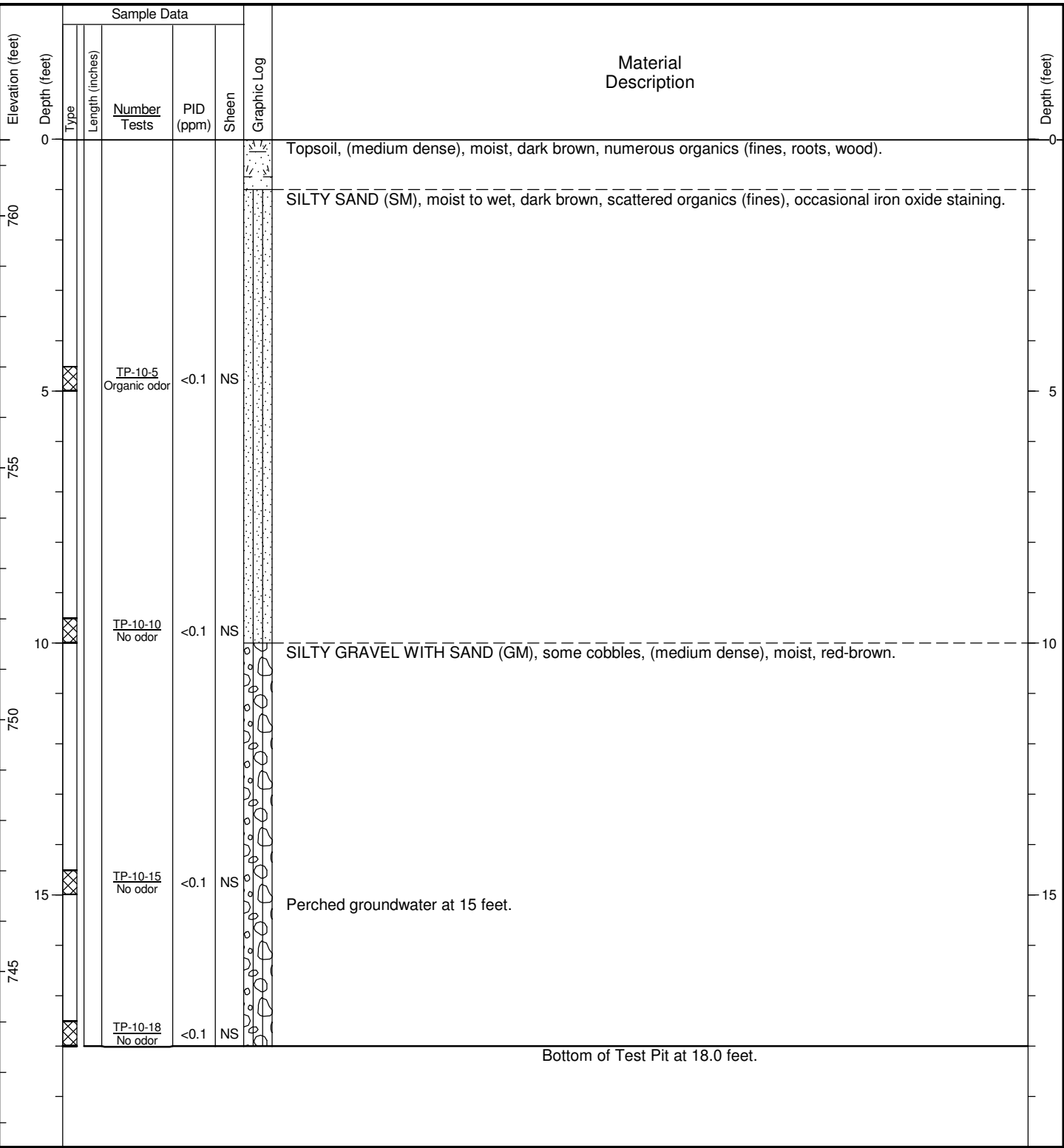
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Date Started: 12/6/19 Date Completed: 12/6/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins/A. Nakahara Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,038.81 E: 1,214,590.54 (WGS 84) Total Depth: 15 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 761.78 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.82



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

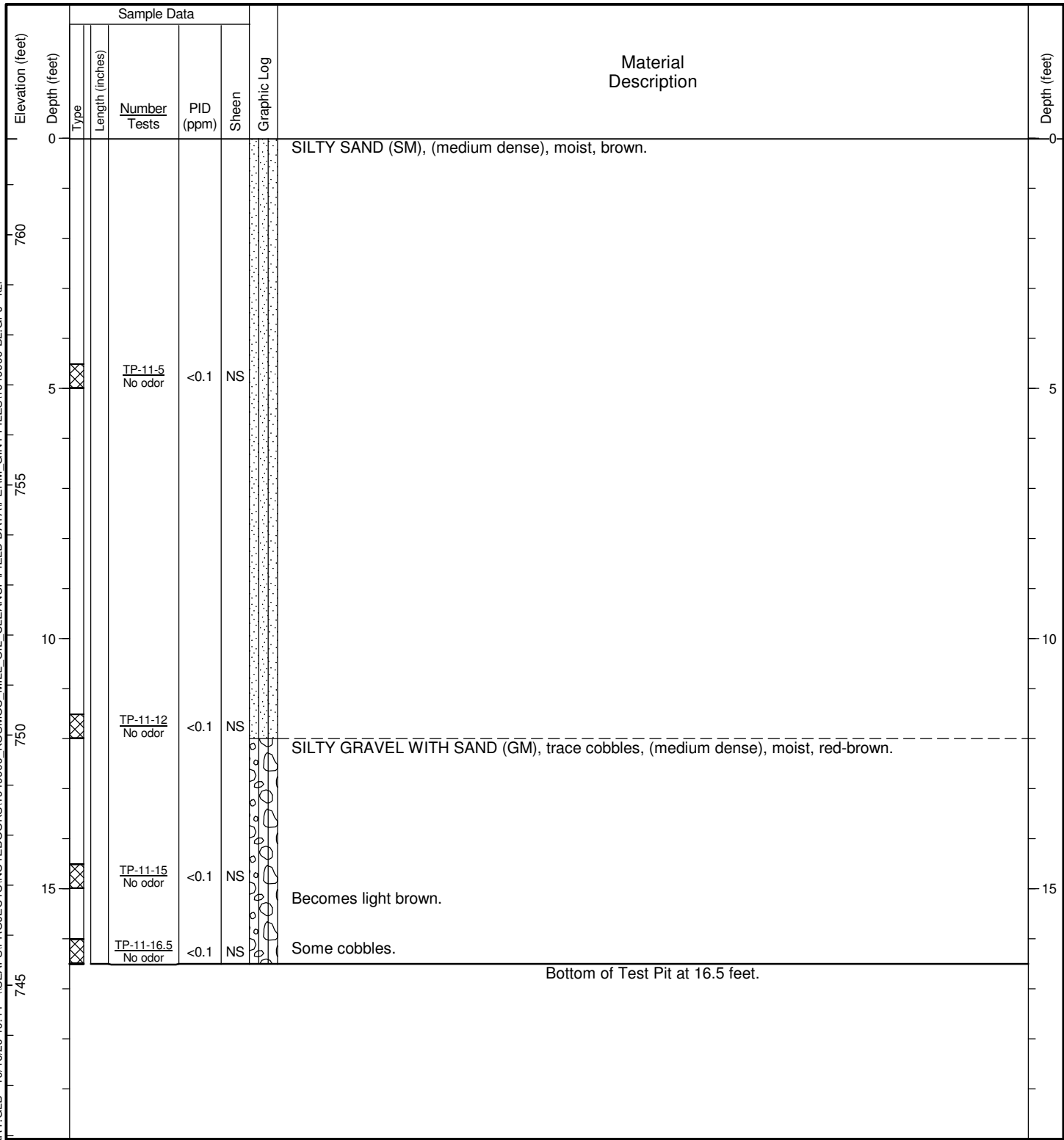
Date Started: 12/9/19 Date Completed: 12/9/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins/A. Nakahara Checked by: C. Kroskie Rig Model/Type:
 Location: N: 427,070.47 E: 1,214,772.03 (WGS 84) Total Depth: 18 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 761.52 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.56
 4' x 15'



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 12/9/19 Date Completed: 12/9/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins/A. Nakahara Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,032.54 E: 1,214,816.23 (WGS 84) Total Depth: 16.5 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 761.93 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.97



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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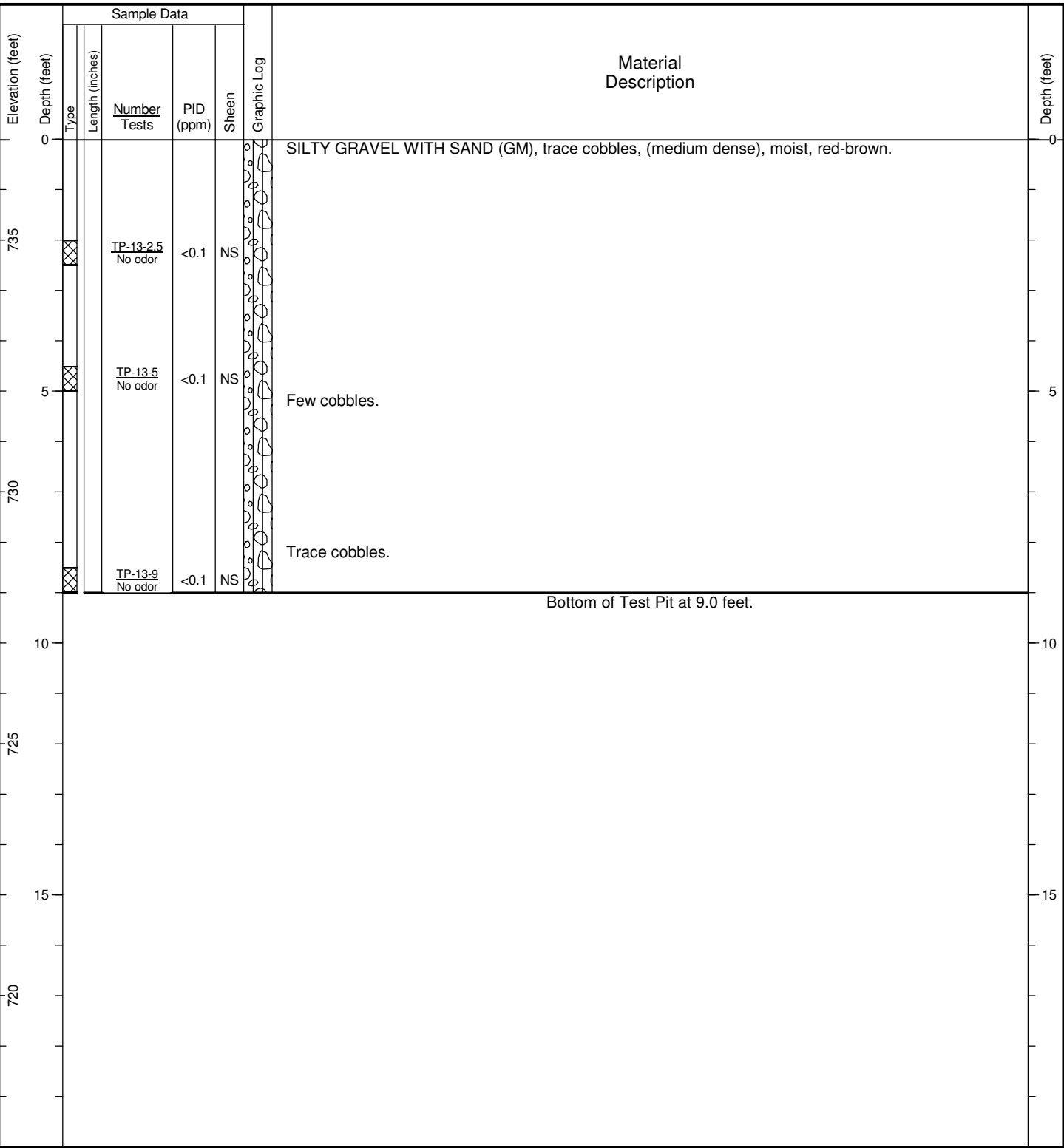
Date Started: 12/9/19 Date Completed: 12/9/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins/A. Nakahara Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,176.63 E: 1,214,886.25 (WGS 84) Total Depth: 5 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 761.79 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.83
Perched groundwater filled the test pit.

Elevation (feet)	Depth (feet)	Sample Data					Material Description	Depth (feet)
		Type	Length (inches)	Number Tests	PID (ppm)	Sheen		
760	0						SILT WITH SAND AND GRAVEL (ML), brown, numerous organics (roots and fines).	0
				TP-12-2.5 No odor	<0.1	NS		
				TP-12-4 No odor	<0.1	NS		
	5						SANDY SILT WITH GRAVEL (ML), wet, brown, scattered organics (fines). Perched groundwater at 4 feet.	5
							Bottom of Test Pit at 5.0 feet.	
755								
	10							
750								
	15							
745								

General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 11/26/19 Date Completed: 11/26/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,286.07 E: 1,214,440.92 (WGS 84) Total Depth: 9 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 737.0 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 733.04
 7' x 11'



General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 11/26/19 Date Completed: 11/26/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,032.63 E: 1,214,487.17 (WGS 84) Total Depth: 10 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 761.36 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 757.40
6' x 9' Slight organic sheen noticed at bottom of the hole.

Elevation (feet)	Depth (feet)	Sample Data					Material Description	Depth (feet)
		Type	Length (inches)	Number Tests	PID (ppm)	Sheen		
760	0						Topsoil, (loose), moist, dark brown.	0
							SILTY SAND WITH GRAVEL (SM), moist, brown, scattered organics (fines).	
				TP-14-2.5 No odor	<0.1	NS		
				TP-14-5 No odor	<0.1	NS	SANDY SILT (SM), (very stiff), moist, brown.	5
755	5						Perched groundwater at 6 feet, becomes wet.	
				TP-14-10 No odor	<0.1	NS	SILTY SAND WITH GRAVEL (SM), moist to wet, dark brown.	
750	10						Bottom of Test Pit at 10.0 feet.	10
745	15							15

General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

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Date Started: 11/26/19 Date Completed: 11/26/19 Contractor/Crew: Anderson Environmental Contracting, LLC
 Logged by: J. Higgins Checked by: C. Kroskie Rig Model/Type: _____
 Location: N: 427,026.39 E: 1,214,432.10 (WGS 84) Total Depth: 14 feet Depth to Seepage: Not Encountered
 Ground Surface Elevation: 759.94 feet (NAVD 88)
 Comments: GS Elev in ft (Tacoma City Light Datum): 755.98
 6' x 9'

Elevation (feet)	Depth (feet)	Sample Data					Material Description	Depth (feet)
		Type	Length (inches)	Number Tests	PID (ppm)	Sheen		
0	0						SILTY SAND (SM), (dense), moist, black, hydrocarbon staining.	0
755	4			TP-15-4 Slight petroleum odor	<0.1	SS	Perched groundwater at 4 feet.	5
755	5			TP-15-6 Slight petroleum odor	<0.1	SS		5
755	8			TP-15-8 Slight petroleum odor	<0.1	SS	Debris (pipe).	
750	10			TP-15-11 No odor	<0.1	NS	SILTY SAND WITH GRAVEL (SM), moist to wet, gray to black, frequent iron oxide staining.	10
745	14			TP-15-14 No odor	<0.1	NS	POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM), moist, red-brown.	15
	14.0						Bottom of Test Pit at 14.0 feet.	

General Notes:
 1. Refer to Figure F-1 for explanation of descriptions and symbols.
 2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
 3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
 4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
 5. Location and ground surface elevations are approximate.

HC TEST PIT - J:\GINT\HC LIBRARY.GLB - 10/16/20 10:44 - \SEAFS\PROJECTS\notebooks\1949900_KOSMOS_MILL_OIL_CLEANUP\FIELD DATA\PERM_GINT FILES\1949900-BL.GPJ - kzi

APPENDIX G
Chemical Data Quality Review
and Laboratory Reports

APPENDIX G

CHEMICAL DATA QUALITY REVIEW AND LABORATORY REPORTS

Chemical Data Quality Review

This chemical data quality review includes the soil and grab groundwater samples collected for the Site investigation as well as the creek bed, creek bank, creek surface water, and stockpile samples collected during the construction and excavation of the emergency IRA.

On November 26, 2019 fourteen soil samples were collected; on December 5, 2019, 21 soil samples and three surface water samples were collected; on December 6, 2019, 15 soil samples and one surface water sample was collected; on December 7, 2019 one surface water sample was collected; on December 8, 2019, four soil samples and two surface water samples were collected; on December 9, 2019, ten soil samples and two surface water samples were collected; on December 10, 2019, twenty-three soil samples and five surface water samples were collected; on December 11, 2019, fifty-eight soil samples, one grab groundwater, and three surface water samples were collected; on December 12, 2019, three soil samples, three grab groundwater samples, and two surface water samples were collected; on December 13, 2019, one soil sample and three surface water samples were collected; on December 14, 2019, four surface water samples were collected; on December 16, 2019, three soil samples and three surface water samples were collected; on December 17, 2019, three soil samples were collected; and on December 18, 2019, three soil samples and one surface water sample was collected. The samples were submitted to Friedman & Bruya, Inc. (F&B), in Seattle, Washington, for chemical analysis. The laboratory reported results as Reference Nos. 912244, 912263, 912296, 912340, 912095, 912124, 912133, 912148, 912164, 912192, 912213, 912243, 912264, 912192, 912213, 912295, 912329, 911412, 912095, 912126, 912147, 912193, 912214, 912215, 912265, 912125, and 912132.

Soil samples were analyzed for one or more of the following:

- Total petroleum hydrocarbons as diesel- and lube-oil-range organics (TPH-D) by Washington State Department of Ecology (Ecology) method NWTPH-Dx;
- Total petroleum hydrocarbons as gasoline-range organics (TPH-G) by Ecology method NWTPH-Gx;
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021B;
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270D-SIM;
- Volatile Organic Compounds (VOCs) by EPA Method 8260C;
- Total metals (arsenic, cadmium, chromium, and lead) by EPA Method 6010C;
- Total mercury by EPA Method 7471B; and
- Polychlorinated biphenyls (PCBs) by EPA Method 8082A.

Water samples were analyzed for one or more of the following:

- Diesel and lube oil range organics by Ecology method NWTPH-Dx;
- Gasoline range organics by Ecology method NWTPH-Gx;

- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021B;
- PAHs by EPA Method 8270D-SIM;
- Total metals (arsenic, cadmium, chromium, and lead) by EPA Method 200.8;
- Total mercury by EPA Method 1631E;
- pH by EPA Method 150.2;
- Hardness by EPA Method 200.8 and SM 2340B; and
- Hexavalent Chromium by SM 3500 Cr B.

The laboratory performed ongoing quality assurance/quality control (QA/QC) reviews. Hart Crowser reviewed summary reports to check that they met data quality objectives for the project.

The following criteria were evaluated during the standard data quality review process:

- Holding times;
- Reporting limits;
- Method blanks;
- Surrogate recoveries;
- Laboratory duplicate relative percent differences (RPDs);
- Spike blank (SB) recoveries; and
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries.

The data were determined to be acceptable for use with some qualifications; the complete laboratory report is presented at the end of this appendix. The data review is summarized below.

Sample Receiving Notes

912296. Westbank 2 sample had one empty VOA.

911412. TP-15-8 sample was added to the COC by the laboratory on 11/27/2019. "Gasoline range organics, diesel and lube oil range organics, PAHs and VOC" analyses were requested outside of the holding times. Sample SP2-3 was received with only 3 VOAs.

912126, 912147, 912193, 912214, 912215. Sample analyses were added on December 19, 2019.

912265. One sample was not labeled.

912125. Sample SP2-7 entry on the COC was crossed out by HC field staff. SP1-5 was added to the COC by laboratory on December 9, 2019.

912132. "Copper, zinc, and Nickel" analyses were added to the COC on January 1, 2020.

Soil Results

Diesel and Lube Oil by NWTPH-Dx

Holding times and reporting limits were acceptable with the following exceptions:

- **912095.** Analyses was requested outside of holding time and source analyte was flagged as J/UJ.

No method blank contamination was detected. Surrogate recoveries were within method control limits. SB and MS recoveries were within laboratory control limits. The sample data was acceptable with the following exception:

- **912126.** In sample TP-7-2.5, the analyte response exceeded the valid instrument calibration range. The value reported is an estimate and flagged as J.

Gas and BTEX by NWTPH-Gx/EPA 8021B

Holding times and reporting limits were acceptable with the following exception:

- **912095.** Analyses was requested outside of holding time and source analyte was flagged as J/UJ.

No method blank contamination was detected. Surrogate recoveries were within laboratory control limits. Spike blank recoveries were within laboratory control limits. The laboratory duplicate RPDs were not applicable, as the sample and duplicate results were below the reporting limit. The sample data was acceptable with the following exception:

- **912125.** The analyte concentration is reported below the lowest calibration standard for SP2-6 and SP2-7. The value reported is an estimate and the samples are flagged as J/UJ.
- **912132.** Benzene concentration was reported below the lowest calibration standard in all the samples. The value reported is an estimate and the samples are flagged J/UJ.

PAHs by EPA 8270D-SIM

Holding times and reporting limits were acceptable with the following exception:

- **912095.** Analyses was requested outside of holding time and source analyte was flagged as J/UJ.

No method blank contamination was detected. SB and surrogate recoveries were within laboratory control limits with the following exception:

- **911412.** Internal standard associated with Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene was out of limits and the source analyte is qualified as J/UJ.

PCBs by EPA 8082A

Holding times and reporting limits were acceptable. No method blank contamination was detected. SB, MS, and surrogate recoveries were within laboratory control limits.

VOCs by EPA 8260C

Holding times and reporting limits were acceptable. No method blank contamination was detected. The laboratory duplicate RPDs were within control limits or were not applicable when the sample and duplicate results were below the reporting limit. MS and surrogate recoveries were within laboratory control limits. The sample data was acceptable with the following exception:

- **912095, 912126, 912215.** Methylene Chloride detections in the samples were due to laboratory contamination and the source analyte was qualified as Ic.

Total Metals by EPA 6010C

Holding times and reporting limits were acceptable. No method blank contamination was detected. The laboratory duplicate RPDs were within control limits or were not applicable when the sample and duplicate results were below the reporting limit.

SB and MS recoveries were within method control limits with the following exception:

- **912296, 911412, 912095, 912126, 912147, 912214, 912125, 912132.** – the internal standard associated with chromium is out of limits and the source analyte is qualified as J/UJ.

Water Results

Gas and BTEX by NWTPH-Gx/EPA 8021B

Holding times and reporting limits were acceptable. No method blank contamination was detected. Surrogate recoveries were within laboratory control limits. SB recoveries were within laboratory control limits. The laboratory duplicate RPDs were not applicable, as the sample and duplicate results were below the reporting limit.

Diesel and Lube Oil by NWTPH-Dx

Holding times and reporting limits were acceptable. No method blank contamination was detected. Surrogate recoveries were within method control limits. SB recoveries were within laboratory control limits. The laboratory duplicate RPDs were not applicable, as the sample and duplicate results were below the reporting limit.

PAHs by EPA 8270D-SIM

Holding times and reporting limits were acceptable. No method blank contamination was detected. SB recoveries were within laboratory control limits. Surrogate recoveries were within laboratory control limits.

Total Metals by EPA 200.8

Holding times and reporting limits were acceptable. No method blank contamination was detected. SB and MS recoveries were within method control limits.

Total Mercury by EPA 7470A

Holding times and reporting limits were acceptable. No method blank contamination was detected. SB and MS recoveries were within method control limits.

Hardness by EPA Method 200.8 and SM 2340B

Holding times and reporting limits were acceptable. No method blank contamination was detected. SB and surrogate recoveries were within laboratory control limits.

pH by EPA Method 150.2

Holding times and reporting limits were acceptable.

Hexavalent Chromium by SM 3500 Cr B

Holding times and reporting limits were acceptable. No method blank contamination was detected. SB and MS recoveries were within method control limits. The laboratory duplicate RPDs were not applicable, as the sample and duplicate results were below the reporting limit.

Laboratory Reports
(Laboratory reports will be provided as separate files)

APPENDIX H
Ponded Water Analytical Laboratory Reports
Provided by Tacoma Public Utilities, Tacoma Power



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

01/30/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

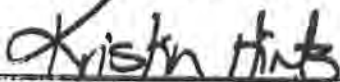
P.O.#: Auth #19-19-12-214
Project: Kosmos
Client ID: D1B
Sample Matrix: Water
Date Sampled: 12/19/2019
Date Received: 12/19/2019
Spectra Project: 2019120577
Spectra Number: 1
Rush

Analyte	Result	Units	Method
Total Mercury	0.00100*	µg/L	EPA 1631E
Arsenic	0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	2.0	µg/L	EPA 200.8
Copper	1.0	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.9	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<500	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
Benzene	<0.4J	µg/L	SW846 8260C
Ethylbenzene	<0.4J	µg/L	SW846 8260C
Toluene	<0.4J	µg/L	SW846 8260C
Total Xylenes	<0.8J	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. **Sample results with "J Flags" are estimates below calibration level but at or above the MDL.

Surrogate	% Recovery	Method
Toluene-d8	89	NWTPH-G
4-Bromofluorobenzene	92	NWTPH-G
p-Terphenyl	85	NWTPH-D

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/jjb



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

01/30/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

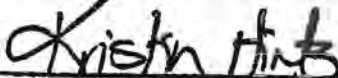
P.O.#: Auth #19-19-12-214
Project: Kosmos
Client ID: B1 Boom #1
Sample Matrix: Water
Date Sampled: 12/19/2019
Date Received: 12/19/2019
Spectra Project: 2019120577
Spectra Number: 2
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.000658*	µg/L	EPA 1631E
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	2.3	µg/L	EPA 200.8
Copper	0.7	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.3	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<500	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
Benzene	<0.4J	µg/L	SW846 8260C
Ethylbenzene	<0.4J	µg/L	SW846 8260C
Toluene	<0.4J	µg/L	SW846 8260C
Total Xylenes	<0.8J	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. **Sample results with "J Flags" are estimates below calibration level but at or above the MDL.

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
Toluene-d8	92	NWTPH-G
4-Bromofluorobenzene	90	NWTPH-G
p-Terphenyl	89	NWTPH-D

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/jjb

December 20, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120577
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	12/20/2019	Date Analyzed:	12/20/2019
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	12/20/2019	Date Analyzed:	12/20/2019
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	109.47	109.5
Cadmium	100.0	99.26	99.3
Chromium	100.0	108.15	108.2
Copper	100.0	96.43	96.4
Lead	100.0	96.59	96.6
Nickel	100.0	94.63	94.6
Zinc	100.0	104.64	104.6

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	12/20/2019	Date Analyzed:	12/20/2019				
Sample Spiked:	2019120575-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	3.43	100.0	113.88	110.5	118.45	115.0	4.1
Cadmium	0.00	100.0	96.99	97.0	97.49	97.5	0.5
Chromium	2.46	100.0	109.51	107.1	112.62	110.2	2.9
Copper	1.35	100.0	89.83	88.5	92.04	90.7	2.5
Lead	0.00	100.0	92.94	92.9	94.17	94.2	1.3
Nickel	1.64	100.0	90.34	88.7	92.70	91.1	2.6
Zinc	21.74	100.0	111.09	89.3	114.41	92.7	3.6

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Jeffrey Cooper
Laboratory Manager

December 30, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120577
Applies to Spectra #: 1-2

HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 12/20/19
Units: ug/L Date Analyzed: 12/21/19

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	1830	73

METHOD BLANK

Date Extracted: 12/20/19 Date Analyzed: 12/21/19
Units: ug/L


Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 104%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

January 30, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug BoettnerSample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2019120577
Date Analyzed: 12/20/2019
Units: ug/L
Applies to Spectra #'s: #1-2**GCMS VOLATILE ORGANIC ANALYSIS**
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4J	10.0	10.6	106
Toluene	<0.4J	10.0	9.68	96.8
Ethylbenzene	<0.4J	10.0	9.85	98.5
Total Xylenes	<0.8J	30.0	30.6	101.9
Gasoline	<50	250	239	96

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	90	92	Benzene	<0.4J
1,2-Dichloroethane-d4	87	92	Toluene	<0.4J
Toluene-d8	98	94	Ethylbenzene	<0.4J
4-Bromofluorobenzene	102	108	Total Xylenes	<0.8J
			Gasoline	<50


Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories
Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120577
Work Order Number: 1912420

December 31, 2019

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 12/24/2019 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Brianna Barnes'.

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2019120577
Work Order: 1912420

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912420-001	120577-1	12/19/2019 12:00 AM	12/24/2019 10:17 AM
1912420-002	120577-2	12/19/2019 12:00 AM	12/24/2019 10:17 AM



CLIENT: Spectra Laboratories
Project: 2019120577

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories
Project: 2019120577

Lab ID: 1912420-001

Collection Date: 12/19/2019

Client Sample ID: 120577-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 26969

Analyst: WF

Mercury	1.00	0.500		ng/L	1	12/30/2019 11:58:15 PM
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Lab ID: 1912420-002

Collection Date: 12/19/2019

Client Sample ID: 120577-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 26969

Analyst: WF

Mercury	0.658	0.500		ng/L	1	12/31/2019 12:09:03 AM
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Date: 12/31/2019

Work Order: 1912420
 CLIENT: Spectra Laboratories
 Project: 2019120577

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122071							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.500									
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Sample ID: MB2-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122072							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.500									
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Sample ID: MB3-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122022							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.500									
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Sample ID: LCS-26969	SampType: LCS	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: LCSW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122023							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	22.1	0.500	25.00	0	88.4	80	120				
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Sample ID: 1912450-003ADUP	SampType: DUP	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: BATCH	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122025							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	4.61	0.500						4.750	2.99	24	
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Date: 12/31/2019

Work Order: 1912420
 CLIENT: Spectra Laboratories
 Project: 2019120577

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 1912450-003AMS	SampType: MS	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: BATCH	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122026							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	25.5	0.500	25.00	4.750	83.0	71	125				

Sample ID: 1912450-003AMS	SampType: MSD	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: BATCH	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122027							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	25.6	0.500	25.00	4.750	83.4	71	125	25.50	0.391	24	



Client Name: SPECTRA	Work Order Number: 1912420
Logged by: Carissa True	Date Received: 12/24/2019 10:17:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA

Unknown prior to receipt.

7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA

Please refer to item information.

8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
BrCl added to 001-002
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler 1		10.1
Sample 1		9.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

1912420 CHAIN of CUSTODY

PAGE 1 of 1 of 10

STANDARD



RUSH



CLIENT: Spectra Labs ADDRESS: 2221 Ross Way Tacoma WA 98445 ADDRESS CHANGE

PROJECT: 2019120577
CONTACT: Marie H
PHONE: 253-272-4850 FAX: 253-572-9838
e-MAIL: marieh@spectra-lab.com
PURCHASE ORDER #

NUMBER OF CONTAINERS	HYDROCARBONS					ORGANICS				METALS				OTHER									
	MTPH-HCD	BTEX	STDM/MTPH-G	MTPH-G	MTPH-DK	1004 SGT-HEM (TPH)	1004 HEM (FOG)	9090/904 VOA	9090 CHLOR SOLVENTS	9070/9025 SEMI VOA	9070 PAH/PNA	9082/908 PCB	TOTAL METALS RCRA #	TOTAL METALS (SPECIFY)	TCLP METALS RCRA #	TCLP METALS (SPECIFY)	Hg by 1831E	PH 3040/3045	TA/TOX 9976	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS
1 120577-1	12/19/19		Water	1
2 120577-2	12/19/19		Water	1
3				
4				
5				
6				
7				
8				
9				
0				

SPECIAL INSTRUCTIONS/COMMENTS:

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>[Signature]</i>	Jeff Draven	Spectra	12/23/19	3:00 PM
RECEIVED BY	<i>[Signature]</i>	PAI		12/24/19	10:17
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus Spectra Analytical, Inc

RETURN SAMPLES DISPOSE SAMPLES

(Minimum Fee Applies)

Marie Holt

From: Knickerbocker, Jessica <JKnicker@ci.tacoma.wa.us>
Sent: Tuesday, January 07, 2020 2:13 PM
To: Marie Holt; cser461@ecy.wa.gov
Cc: Ryan, Terry; Rhubright, Mike; Jeff Cooper; Kroll, Willy
Subject: RE: KOSMOS - BTEX Issue

Please run the samples that can still be run. And just provide a final report on the others

Jessica Knickerbocker, PE | Tacoma Power
Engineering Manager
Plant Engineering & Construction Services
P: (253) 502-8250 | C: (253) 389-8044

From: Marie Holt <MarieH@spectra-lab.com>
Sent: Monday, January 6, 2020 2:00 PM
To: Knickerbocker, Jessica <JKnicker@ci.tacoma.wa.us>; cser461@ecy.wa.gov
Cc: Ryan, Terry <TRYAN@ci.tacoma.wa.us>; Rhubright, Mike <MRhubrig@ci.tacoma.wa.us>; Jeff Cooper <jeffc@spectra-lab.com>; Kroll, Willy <WKROLL@ci.tacoma.wa.us>
Subject: KOSMOS - BTEX Issue

Hi Jessica,

Spectra received a call from Carol with Ecology regarding the Kosmos project. She spoke with our Laboratory Manager Jeff on Friday while I was out. BTEX is a required parameter for this project. BTEX has a 14 day holding time, which means a few of the samples are beyond the hold time for analysis. I've attached a table showing which samples are still within hold time and which are beyond. Spectra will be running the BTEX at the low quantitation level required by your WQPP on the samples within hold time. We will need to know how you and Ecology want to handle the samples already beyond the 14 day holding time.

- We can analyze the three projects (seven samples) for BTEX beyond the hold time to achieve the 2.0 Quantitation Level.
or
- We can report the BTEX results from the original GCMS analysis (NWTPH-G), though the Quantitation Level will be 2.5 (0.5 above the level listed in the WQPP).

Please let us know by tomorrow, if possible, which of the above options you would like.

Thank you!

Marie Holt

Customer Support and Office Manager

SPECTRA Laboratories

2221 Ross Way

Communications Record

Internal Document

Client: TPU
Client Contact: Doug Boettner & Mike Rhubright
Date: 12-19-19
Time: 3:58
Spectra Contact: Marie Holt
Project: Kosmos
Spectra Project: 2019120577

Spectra didn't receive the 250 poly non preserved. We won't be able to perform the pH, Turbidity & Hex Chrom.

Mike and Doug will come up with a non-preserved bottle for the next sample collection.

Also explained that the rush turnaround will be delayed due to the low level mercury analysis, the sample arrived after UPS had picked up today (Thursday). We can't ship on Friday due to the weekend. We will ship Monday for Tuesday deliver (approved with Fremont).

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2019120577

STANDARD

RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Boettner
 PHONE: 253-244-0539 FAX: TESTING
 e-MAIL: dboettner@cp.tacoma.wa.gov Prefer FAX
 PURCHASE ORDER #: 19-19-12-214

NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS				METALS			OTHER																		
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1864 SGT-HEM (TPH)	1864 HEM (FOG)	5060/524 VOA BY 624 TIO	5060 CHLOR SOLVENTS	5270/525 SEMI VOA BY 625 TIO	5270 PAH/PNA	5042/508 PCB	Organochlor Pesticides BY 806	TOTAL METALS PCRA 6	TOTAL METALS (SPECIFY)	TCLP METALS PCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TK/TOX 8076	TURBIDITY	FLASH POINT	800	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B, 4600C	Free Cyanide by D7221-10 SUB **	Residual Chromium	Ammonia Nitrogen SUBCONTRACT	
1	DIB	19/19/12	11:30		X	X								X			X	X									X	
2	B1 Room#1	19/19/12	12:08		X	X								X			X	X									X	
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

Spectra Internal Instructions	SIGNATURE		PRINTED NAME		COMPANY		DATE		TIME	
	RELINQUISHED BY	<i>Doug Boettner</i>	<i>Doug Boettner</i>	TPU	12/19/19	2:57				
	RECEIVED BY	<i>SB</i>	Spencer Beck	Spectra	12/19/19	3:00				
	RELINQUISHED BY									
RECEIVED BY										

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus Spectra Analytical, LLC

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19-20-12-220
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 12/20/2019
 Date Received: 12/20/2019
 Spectra Project: 2019120643
 Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00848*	ug/L	EPA 1631E
Turbidity	51	NTU	EPA 180.1
Arsenic	0.6	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	3.6	µg/L	EPA 200.8
Copper	7.0	µg/L	EPA 200.8
Lead	1.4	µg/L	EPA 200.8
Nickel	2.2	µg/L	EPA 200.8
Zinc	14.6	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	159	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.78	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	82	NWTPH-D
Toluene-d8	98	NWTPH-G
4-Bromofluorobenzene	101	NWTPH-G

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager

jac

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19-20-12-220
 Project: Kosmos
 Client ID: Boom #1
 Sample Matrix: Water
 Date Sampled: 12/20/2019
 Date Received: 12/20/2019
 Spectra Project: 2019120643
 Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	ND*	ug/L	EPA 1631E
Turbidity	24	NTU	EPA 180.1
Arsenic	1.0	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	2.7	µg/L	EPA 200.8
Copper	3.4	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	1.2	µg/L	EPA 200.8
Zinc	3.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	96.6	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	2.70	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	80	NWTPH-D
Toluene-d8	100	NWTPH-G
4-Bromofluorobenzene	101	NWTPH-G

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

December 23, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120643
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested: 12/23/2019 Date Analyzed: 12/23/2019

Element	CAS #	Result
Arsenic	7440-38-2	< 0.3
Cadmium	7440-43-9	< 0.2
Chromium	7440-47-3	< 0.5
Copper	7440-50-8	< 0.3
Lead	7439-92-1	< 0.5
Nickel	7439-98-7	< 0.5
Zinc	7440-66-6	< 0.3

Laboratory Fortified Blank (LFB)

Date Digested: 12/23/2019 Date Analyzed: 12/23/2019

Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	104.84	104.8
Cadmium	100.0	91.38	91.4
Chromium	100.0	92.98	93.0
Copper	100.0	97.36	97.4
Lead	100.0	95.87	95.9
Nickel	100.0	93.18	93.2
Zinc	100.0	94.79	94.8

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 12/23/2019 Date Analyzed: 12/23/2019
Sample Spiked: 2019120635-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	101.29	101.3	98.62	98.6	2.7
Cadmium	0.00	100.0	93.38	93.4	92.44	92.4	1.0
Chromium	2.96	100.0	95.22	92.3	92.44	89.5	3.1
Copper	4.70	100.0	100.37	95.7	96.82	92.1	3.8
Lead	0.58	100.0	99.91	99.3	97.07	96.5	2.9
Nickel	0.00	100.0	94.27	94.3	91.18	91.2	3.3
Zinc	14.52	100.0	107.84	93.3	103.97	89.5	4.2

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Jeffrey Cooper
Laboratory Manager

December 27, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120643
Applies to Spectra #: 1-2

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 12/26/19
Units: ug/L Date Analyzed: 12/27/19

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount</u>		<u>Percent Recovery</u>
		<u>Added</u>	<u>Found</u>	
Diesel	<100	2500	1912	76

METHOD BLANK

Date Extracted: 12/26/19 Date Analyzed: 12/27/19
Units: ug/L

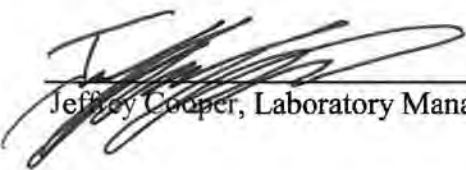
Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 88%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

December 23, 2019

 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

 Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120643
 Date Analyzed: 12/20/2019
 Units: ug/L
 Applies to Spectra #'s: #1

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	10.8	108
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	9.68	96.8
Ethylbenzene	<1	10.0	9.85	98.5
Total Xylenes	<2	30.0	30.6	102
Gasoline	<50	250	239	95.6

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	90	92	Benzene	<1
1,2-Dichloroethane-d4	87	92	Toluene	<1
Toluene-d8	98	94	Ethylbenzene	<1
4-Bromofluorobenzene	102	108	Total Xylenes	<2
			MTBE	<1


 Jeffrey Cooper
 Laboratory Manager

December 27, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120643
Applies to Spectra # 1-2

QUALITY CONTROL RESULTS

Hexavalent Chromium in Water/Liquid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Analyzed: 12/20/2019

	<u>Result</u>
Hexavalent Chromium	<0.01

Blank Spike (LCS)

Date Analyzed: 12/20/2019

	<u>Spike Added</u>	<u>LCS Conc.</u>	<u>LCS %Rec</u>
Hexavalent Chromium	0.05	0.049	98

LCS Recovery limits 73-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Analyzed: 12/20/2019
Sample Spiked: 2019120628-1

	<u>Sample Conc.</u>	<u>Spike Conc.</u>	<u>MS Conc.</u>	<u>MS %Rec</u>	<u>MSD Conc</u>	<u>MSD %Rec</u>	<u>RPD</u>
Hexavalent Chromium	<0.01	0.1	0.09	90	0.085	85	5.7

Recovery Limits 75-125%

RPD Limit 20

SPECTRA LABORATORIES



Jeffrey Cooper
Laboratory Manager

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2019120423

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Roethner
 PHONE: 253-2440539 FAX: TESTING
 e-MAIL: d.roethner@tacoma.wa.us or e-MAIL Prefer FAX
 PURCHASE ORDER #: 19-20-12-220

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER														
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8250/624 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/625 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS (SPECIFY)	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B; 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT
1			X	X									X				X		X						X		
2			X	X									X				X		X						X		
3																											
4																											
5																											
6																											
7																											
8																											
9																											
0																											

Spectra Internal Instructions	SIGNATURE		PRINTED NAME		COMPANY		DATE		TIME	
	RELINQUISHED BY	<i>Doug Roethner</i>	Doug Roethner	TPU	12/20/19	2:30				
	RECEIVED BY	<i>Jerica Carrara</i>	Jerica Carrara	Spectra	12/20/19	14:30				
	RELINQUISHED BY									

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC



Fremont
Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120643

Work Order Number: 1912419

January 09, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 12/24/2019 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

*DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)*



CLIENT: Spectra Laboratories
Project: 2019120643
Work Order: 1912419

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912419-001	120643-1	12/20/2019 12:00 AM	12/24/2019 10:17 AM
1912419-002	120643-2	12/20/2019 12:00 AM	12/24/2019 10:17 AM



CLIENT: Spectra Laboratories
Project: 2019120643

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories
Project: 2019120643

Lab ID: 1912419-001

Collection Date: 12/20/2019

Client Sample ID: 120643-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 26969

Analyst: WF

Mercury	8.48	0.500		ng/L	1	12/31/2019 1:24:46 AM
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Lab ID: 1912419-002

Collection Date: 12/20/2019

Client Sample ID: 120643-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 26969

Analyst: WF

Mercury	ND	0.500		ng/L	1	12/31/2019 1:35:34 AM
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Date: 1/9/2020

Work Order: 1912419
 CLIENT: Spectra Laboratories
 Project: 2019120643

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122071							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122072							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122022							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-26969	SampType: LCS	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: LCSW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122023							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 22.1 0.500 25.00 0 88.4 80 120

Sample ID: 1912450-003ADUP	SampType: DUP	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: BATCH	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122025							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 4.61 0.500 4.750 2.99 24



Date: 1/9/2020

Work Order: 1912419
 CLIENT: Spectra Laboratories
 Project: 2019120643

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 1912450-003AMS	SampType: MS	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: BATCH	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122026							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	25.5	0.500	25.00	4.750	83.0	71	125				
---------	------	-------	-------	-------	------	----	-----	--	--	--	--

Sample ID: 1912450-003AMSD	SampType: MSD	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: BATCH	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122027							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	25.6	0.500	25.00	4.750	83.4	71	125	25.50	0.391	24	
---------	------	-------	-------	-------	------	----	-----	-------	-------	----	--



Sample Log-In Check List

Client Name: SPECTRA	Work Order Number: 1912419
Logged by: Carissa True	Date Received: 12/24/2019 10:17:00 AM

Chain of Custody

- 1. Is Chain of Custody complete? Yes No Not Present
- 2. How was the sample delivered? UPS

Log In

- 3. Coolers are present? Yes No NA
- 4. Shipping container/cooler in good condition? Yes No
- 5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes No Not Required
- 6. Was an attempt made to cool the samples? Yes No NA

Unknown prior to receipt

- 7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA

Please refer to item information.

- 8. Sample(s) in proper container(s)? Yes No
- 9. Sufficient sample volume for indicated test(s)? Yes No
- 10. Are samples properly preserved? Yes No
- 11. Was preservative added to bottles? Yes No NA
- 12. Is there headspace in the VOA vials? Yes No NA BrCl added to 001-002
- 13. Did all samples containers arrive in good condition(unbroken)? Yes No
- 14. Does paperwork match bottle labels? Yes No
- 15. Are matrices correctly identified on Chain of Custody? Yes No
- 16. Is it clear what analyses were requested? Yes No
- 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

- 18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified: _____	Date: _____
By Whom: _____	Via: <input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding: _____	
Client Instructions: _____	

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler 1		10.1
Sample 1		9.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CHAIN of CUSTODY

PAGE 1 of 1

STANDARD RUSH

Page 3 of 9

CLIENT: Spectra Labs ADDRESS: 2221 Ross Way Tacoma WA 98445 ADDRESS CHANGE

PROJECT: 2019120643
CONTACT: Marie H
PHONE: 253-272-4850 FAX: 253-572-9838
e-MAIL: marieh@spectra-lab.com
PURCHASE ORDER #

NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS			OTHER									
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/8045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/8045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs		
120643-1	12/20/19		Water	1																		X								
120643-2	12/20/19		Water	1																		x								

SPECIAL INSTRUCTIONS/COMMENTS:	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	12/23/19	3:00 PM	
	RECEIVED BY	<i>OK</i>	Clare	FAI	12/24/19	10:17	
	RELINQUISHED BY						
	RECEIVED BY						

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

(Shipping Fee Applies)

SPECTRA Laboratories

CHAIN of CUSTODY

PAGE 1 of 1

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STANDARD RUSH

CLIENT: **Spectra Labs** ADDRESS: **2221 Ross Way Tacoma WA 98445** ADDRESS CHANGE

PROJECT: **2019120643**
 CONTACT: **Marie H**
 PHONE: **253-272-4850** FAX: **253-572-9838**
 e-MAIL: **marieh@spectra-lab.com** Prefer FAX
 or e-MAIL
 PURCHASE ORDER #

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
-----------	--------------	--------------	--------

NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS				OTHER										
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 8040/9045	TX/TOX 8078	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs	
1																	X								
2																	X								
3																									
4																									
5																									
6																									
7																									
8																									
9																									
0																									

COPY

SPECIAL INSTRUCTIONS/COMMENTS:

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	12/23/19	3:00 PM
RECEIVED BY					
RELINQUISHED BY					
RECEIVED BY					

RETURN SAMPLES DISPOSE SAMPLES Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

(Shipping Fee Applies)

Marie Holt

From: Brianna Barnes <bbarnes@fremontanalytical.com>
Sent: Monday, January 13, 2020 1:26 PM
To: Marie Holt
Subject: RE: Verification - 1912419-001

Hi Marie,

Our department manager reviewed the data again this morning and didn't find any errors. Let me know if you'd like the sample to be re-analyzed.

Thank you!

Brianna Barnes
Project Manager



3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206.352.3790
Fax: 206.352.7178

www.FremontAnalytical.com

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message.

From: Marie Holt <MarieH@spectra-lab.com>
Sent: Monday, January 13, 2020 9:53 AM
To: Brianna Barnes <bbarnes@fremontanalytical.com>
Subject: Verification - 1912419-001

Hi Brianna,

Can you please ask the lab to double check the Mercury at 8.48 ng/L for your sample 1912419-001, Spectra #2019120643-1.

We don't typically ask this, though this particular sample result was approx. 10 times higher than other samples from this site, so we want to be certain there wasn't a reporting error. No need to re-analyze, just verify there aren't any errors.

Thanks so much!

01/30/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

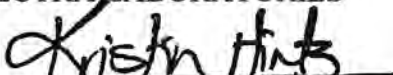
P.O.#: Auth #19-23-12-221
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 12/23/2019
 Date Received: 12/23/2019
 Spectra Project: 2019120694
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	0.00159*	ug/L	EPA 1631E
Turbidity	7.0	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	2.7	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	0.8	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.07	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4J	µg/L	SW846 8260C
Ethylbenzene	<0.4J	µg/L	SW846 8260C
Toluene	<0.4J	µg/L	SW846 8260C
Total Xylenes	<0.8J	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. **Sample results with "J Flags" are estimates below calibration level but are or above the MDL.

Surrogate	% Recovery	Method
p-Terphenyl	94	NWTPH-D
Toluene-d8	96	NWTPH-G
4-Bromofluorobenzene	98	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/jjb

01/30/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

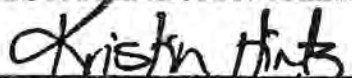
P.O.#: Auth #19-23-12-221
 Project: Kosmos
 Client ID: D6-Oil Curtain
 Sample Matrix: Water
 Date Sampled: 12/23/2019
 Date Received: 12/23/2019
 Spectra Project: 2019120694
 Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	ND*	ug/L	EPA 1631E
Turbidity	9.7	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	2.4	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.85	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4J	µg/L	SW846 8260C
Ethylbenzene	<0.4J	µg/L	SW846 8260C
Toluene	<0.4J	µg/L	SW846 8260C
Total Xylenes	<0.8J	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. **Sample results with "J Flags" are estimates below calibration level but are or above the MDL.

Surrogate	% Recovery	Method
p-Terphenyl	95	NWTPH-D
Toluene-d8	97	NWTPH-G
4-Bromofluorobenzene	99	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

01/30/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

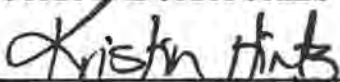
P.O.#: Auth #19-23-12-221
 Project: Kosmos
 Client ID: Stockpile #1
 Sample Matrix: Water
 Date Sampled: 12/23/2019
 Date Received: 12/23/2019
 Spectra Project: 2019120694
 Spectra Number: 3

Analyte	Result	Units	Method
Total Mercury	0.00475*	ug/L	EPA 1631E
Turbidity	31	NTU	EPA 180.1
Arsenic	0.9	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	3.1	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	1.0	µg/L	EPA 200.8
Zinc	5.7	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	269	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.42	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4J	µg/L	SW846 8260C
Ethylbenzene	<0.4J	µg/L	SW846 8260C
Toluene	<0.4J	µg/L	SW846 8260C
Total Xylenes	<0.8J	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. **Sample results with "J Flags" are estimates below calibration level but are or above the MDL.

Surrogate	% Recovery	Method
p-Terphenyl	87	NWTPH-D
Toluene-d8	97	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/jjb

December 27, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120694
Applies to Spectra #'s: 1-3
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	12/27/2019	Date Analyzed:	12/27/2019
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	12/27/2019	Date Analyzed:	12/27/2019		
Element	Spike Added	LCS Conc.	%Rec		
Arsenic	100.0	104.84	104.8		
Cadmium	100.0	91.38	91.4		
Chromium	100.0	92.98	93.0		
Copper	100.0	97.36	97.4		
Lead	100.0	95.87	95.9		
Nickel	100.0	93.18	93.2		
Zinc	100.0	94.79	94.8		

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	12/27/2019	Date Analyzed:	12/27/2019				
Sample Spiked:	2019120635-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	101.29	101.3	98.62	98.6	2.7
Cadmium	0.00	100.0	93.38	93.4	92.44	92.4	1.0
Chromium	2.96	100.0	95.22	92.3	92.44	89.5	3.1
Copper	4.70	100.0	100.37	95.7	96.82	92.1	3.8
Lead	0.58	100.0	99.91	99.3	97.07	96.5	2.9
Nickel	0.00	100.0	94.27	94.3	91.18	91.2	3.3
Zinc	14.52	100.0	107.84	93.3	103.97	89.5	4.2

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES



Jeffrey Cooper

December 30, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120694
Applies to Spectra #: 1-3

HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 12/29/19
Units: ug/L Date Analyzed: 12/30/19

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	1584	63

METHOD BLANK

Date Extracted: 12/29/19 Date Analyzed: 12/30/19
Units: ug/L

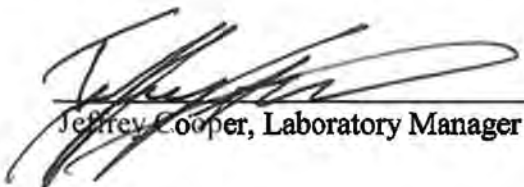
Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 95%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

January 30, 2020

 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

 Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120694
 Date Analyzed: 12/26/2019
 Units: ug/L
 Applies to Spectra #'s: #1-3

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4J	10.0	9.8	98
Toluene	<0.4J	10.0	10.37	103.7
Ethylbenzene	<0.4J	10.0	10.00	100.0
Total Xylenes	<0.8J	30.0	30.3	101.0
Gasoline	<50	250	284	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	98	Benzene	<0.4J
1,2-Dichloroethane-d4	97	97	Toluene	<0.4J
Toluene-d8	100	100	Ethylbenzene	<0.4J
4-Bromofluorobenzene	100	98	Total Xylenes	<0.8J
			Gasoline	<50


 Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories
Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120694
Work Order Number: 1912450

December 31, 2019

Attention Marie Holt:

Fremont Analytical, Inc. received 3 sample(s) on 12/27/2019 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2019120694
Work Order: 1912450

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912450-001	120694-1	12/23/2019 11:00 AM	12/27/2019 1:33 PM
1912450-002	120694-2	12/23/2019 10:20 AM	12/27/2019 1:33 PM
1912450-003	120694-3	12/23/2019 12:50 PM	12/27/2019 1:33 PM



CLIENT: Spectra Laboratories
Project: 2019120694

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Work Order: 1912450

Date Reported: 12/31/2019

CLIENT: Spectra Laboratories

Project: 2019120694

Lab ID: 1912450-001

Client Sample ID: 120694-1

Collection Date: 12/23/2019 11:00:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>						
					Batch ID: 26969	Analyst: WF
Mercury	1.59	0.500		ng/L	1	12/30/2019 11:36:40 PM

Lab ID: 1912450-002

Client Sample ID: 120694-2

Collection Date: 12/23/2019 10:20:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>						
					Batch ID: 26969	Analyst: WF
Mercury	ND	0.500		ng/L	1	12/30/2019 11:47:27 PM

Lab ID: 1912450-003

Client Sample ID: 120694-3

Collection Date: 12/23/2019 12:50:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>						
					Batch ID: 26969	Analyst: WF
Mercury	4.75	0.500		ng/L	1	12/30/2019 10:31:49 PM



Date: 12/31/2019

Work Order: 1912450
 CLIENT: Spectra Laboratories
 Project: 2019120694

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122071							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.500									
---------	----	-------	--	--	--	--	--	--	--	--	--

Sample ID: MB2-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122072							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.500									
---------	----	-------	--	--	--	--	--	--	--	--	--

Sample ID: MB3-26969	SampType: MBLK	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: MBLKW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122022							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.500									
---------	----	-------	--	--	--	--	--	--	--	--	--

Sample ID: LCS-26969	SampType: LCS	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: LCSW	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122023							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	22.1	0.500	25.00	0	88.4	80	120				
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Sample ID: 1912450-003ADUP	SampType: DUP	Units: ng/L	Prep Date: 12/30/2019	RunNo: 56306							
Client ID: 120694-3	Batch ID: 26969		Analysis Date: 12/30/2019	SeqNo: 1122025							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	4.61	0.500						4.750	2.99	24	
---------	------	-------	--	--	--	--	--	-------	------	----	--



Date: 12/31/2019

Work Order: 1912450
 CLIENT: Spectra Laboratories
 Project: 2019120694

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 1912450-003AMS	SampType: MS	Units: ng/L			Prep Date: 12/30/2019	RunNo: 56306					
Client ID: 120694-3	Batch ID: 26969				Analysis Date: 12/30/2019	SeqNo: 1122026					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	25.5	0.500	25.00	4.750	83.0	71	125				

Sample ID: 1912450-003AMS0	SampType: MSD	Units: ng/L			Prep Date: 12/30/2019	RunNo: 56306					
Client ID: 120694-3	Batch ID: 26969				Analysis Date: 12/30/2019	SeqNo: 1122027					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	25.6	0.500	25.00	4.750	83.4	71	125	25.50	0.301	24	



Client Name: SPECTRA	Work Order Number: 1912450
Logged by: Carissa True	Date Received: 12/27/2019 1:33:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Samples received at appropriate temperature
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	8.0
Sample 1	8.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 272-9838 • www.spectra-lab.com

CHAIN of CUSTODY

PAGE 1 of 1

STANDARD RUSH

CLIENT: Spectra Labs				ADDRESS 2221 Ross Way Tacoma WA 98445													ADDRESS CHANGE <input type="checkbox"/>												
PROJECT: 2019120694				NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER												
CONTACT: Marie H					MTWPH-HCID	STEX	STEN/MTWPH-G	MTWPH-G	MTWPH-OL	1864 BGT-HEM (TPM)	1864 HEM (FOG)	8209024 VOA	8209 CHLOR SOLVENTS	8209025 SEM VOA	8270 PAH/PAHs	9032006 PCB	TOTAL METALS RCRA #	TOTAL METALS (SPECIFY)	TCLP METALS RCRA #	TCLP METALS (SPECIFY)	Hg by 1091E	PH 8050/8043	TAT/TOX 8078	TURBIDITY	FLASH POINT	BOC	SOLIDS (SPECIFY)	HCOI	
PHONE: 253-272-4850 FAX: 253-572-9838					DATE SAMPLED	TIME SAMPLED	MATRIX																						
e-MAIL: marish@spectra-lab.com					SAMPLE ID																								
PURCHASE ORDER #				1	120694-1	12/23/19	1100	Water	1												X								
				2	120694-2	12/23/19	1020	Water	1												X								
				3	120694-3	12/23/19	1250	Water	1												X								
				4																									
				5																									
				6																									
				7																									
				8																									
				9																									
				0																									

SPECIAL INSTRUCTIONS/COMMENTS: ASAP TAT per MH 12/30/19 mmj	SIGNATURE		PRINTED NAME		COMPANY		DATE		TIME		
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	12/26/19	3:00 PM					
	RECEIVED BY	<i>Michelle...</i>	Michelle...	+	2/2/20	1:00 PM					
	RELINQUISHED BY										
RECEIVED BY											

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

Marie Holt

From: Knickerbocker, Jessica <JKnicker@ci.tacoma.wa.us>
Sent: Tuesday, January 07, 2020 2:13 PM
To: Marie Holt; cser461@ecy.wa.gov
Cc: Ryan, Terry; Rhubright, Mike; Jeff Cooper; Kroll, Willy
Subject: RE: KOSMOS - BTEX Issue

Please run the samples that can still be run. And just provide a final report on the others

**Jessica Knickerbocker, PE | Tacoma Power
Engineering Manager
Plant Engineering & Construction Services
P: (253) 502-8250 | C: (253) 389-8044**

From: Marie Holt <MarieH@spectra-lab.com>
Sent: Monday, January 6, 2020 2:00 PM
To: Knickerbocker, Jessica <JKnicker@ci.tacoma.wa.us>; cser461@ecy.wa.gov
Cc: Ryan, Terry <TRYAN@ci.tacoma.wa.us>; Rhubright, Mike <MRhubrig@ci.tacoma.wa.us>; Jeff Cooper <jeffc@spectra-lab.com>; Kroll, Willy <WKROLL@ci.tacoma.wa.us>
Subject: KOSMOS - BTEX Issue

Hi Jessica,

Spectra received a call from Carol with Ecology regarding the Kosmos project. She spoke with our Laboratory Manager Jeff on Friday while I was out. BTEX is a required parameter for this project. BTEX has a 14 day holding time, which means a few of the samples are beyond the hold time for analysis. I've attached a table showing which samples are still within hold time and which are beyond. Spectra will be running the BTEX at the low quantitation level required by your WQPP on the samples within hold time. We will need to know how you and Ecology want to handle the samples already beyond the 14 day holding time.

- We can analyze the three projects (seven samples) for BTEX beyond the hold time to achieve the 2.0 Quantitation Level.
or
- We can report the BTEX results from the original GCMS analysis (NWTPH-G), though the Quantitation Level will be 2.5 (0.5 above the level listed in the WQPP).

Please let us know by tomorrow, if possible, which of the above options you would like.

Thank you!

Marie Holt

Customer Support and Office Manager

SPECTRA Laboratories
2221 Ross Way

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 • As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2019120104

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Boettner
 PHONE: 253-244-0539 FAX: TESTING
 Prefer FAX
 e-MAIL: boettner@ci.tacomawash.gov
 PURCHASE ORDER #: 19/23/12-221

NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS				METALS				OTHER																
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Gx	1064 SOT-HEM (TPH)	1064 HEM (FOG)	5280/524 VOA BY 624 T10	5280 CHLOR SOLVENTS	5270/625 SEAR VOA BY 625 T10	3270 PAH/PHA	5052/008 PCB	Organochlor Pesticides BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TU/TOX 9076	TURBIDITY	FLASH POINT	BOO	SOLIDS (SPECIFY) TSS	Total Cyanide by 45006; 4500C	Free Cyanide by D7237-10 SUB **	Hazardous Chromium	Ammonia Nitrogen SUBCONTRACT
1				X	X									X				X	X	X						X	
2				X	X									X				X	X	X						X	
3				X	X									X				X	X	X						X	
4																											
5																											
6																											
7																											
8																											
9																											
0																											

Spectra Internal Instructions	SIGNATURE		PRINTED NAME	COMPANY	DATE	TIME
	RELINQUISHED BY	<i>Doug Boettner</i>	Doug Boettner	TPU	12/23/19	3:17
	RECEIVED BY	<i>Lori Hamilton</i>	Lori Hamilton	Spectra	12/23/19	15:17
	RELINQUISHED BY					
RECEIVED BY						

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner


P.O.#: Auth #19-26-12-223
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 12/26/2019
 Date Received: 12/26/2019
 Spectra Project: 2019120761
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	0.000770*	ug/L	EPA 1631E
Turbidity	4.3	NTU	EPA 180.1
Arsenic	0.5	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	0.7	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.23	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. * Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	78	NWTPH-D
Toluene-d8	94	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager
 a5/jac

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19-26-12-223
 Project: Kosmos
 Client ID: D6
 Sample Matrix: Water
 Date Sampled: 12/26/2019
 Date Received: 12/26/2019
 Spectra Project: 2019120761
 Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	0.000788*		EPA 1631E
Turbidity	1.2	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	59.0	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.12	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. * Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	79	NWTPH-D
Toluene-d8	94	NWTPH-G
4-Bromofluorobenzene	96	NWTPH-G

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

u5/jac

January 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120761
Applies to Spectra #: 1-2

HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/03/20
Units: ug/L Date Analyzed: 01/06/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	1750	70

METHOD BLANK

Date Extracted: 01/03/20 Date Analyzed: 01/06/20
Units: ug/L


Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 94%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

December 27, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120761
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested: 12/27/2019 Date Analyzed: 12/27/2019

Element	CAS #	Result
Arsenic	7440-38-2	< 0.3
Cadmium	7440-43-9	< 0.2
Chromium	7440-47-3	< 0.5
Copper	7440-50-8	< 0.3
Lead	7439-92-1	< 0.5
Nickel	7439-98-7	< 0.5
Zinc	7440-66-6	< 0.3

Laboratory Fortified Blank (LFB)

Date Digested: 12/27/2019 Date Analyzed: 12/27/2019

Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	104.84	104.8
Cadmium	100.0	91.38	91.4
Chromium	100.0	92.98	93.0
Copper	100.0	97.36	97.4
Lead	100.0	95.87	95.9
Nickel	100.0	93.18	93.2
Zinc	100.0	94.79	94.8

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

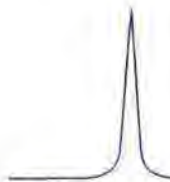
Date Digested: 12/27/2019 Date Analyzed: 12/27/2019
Sample Spiked: 2019120635-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	101.29	101.3	98.62	98.6	2.7
Cadmium	0.00	100.0	93.38	93.4	92.44	92.4	1.0
Chromium	2.96	100.0	95.22	92.3	92.44	89.5	3.1
Copper	4.70	100.0	100.37	95.7	96.82	92.1	3.8
Lead	0.58	100.0	99.91	99.3	97.07	96.5	2.9
Nickel	0.00	100.0	94.27	94.3	91.18	91.2	3.3
Zinc	14.52	100.0	107.84	93.3	103.97	89.5	4.2

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Jeffrey Cooper



December 30, 2019

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120761
 Date Analyzed: 12/27/2019
 Units: ug/L
 Applies to Spectra #'s: #1-2

**GCMS VOLATILE ORGANIC ANALYSIS
 Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.93	99.3
Benzene	<1	10.0	10.1	101
Toluene	<1	10.0	10.1	101
Ethylbenzene	<1	10.0	9.86	98.6
Total Xylenes	<2	30.0	30.0	100
Gasoline	<50	250	248	99.2

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	102	102	Benzene	<1
1,2-Dichloroethane-d4	104	107	Toluene	<1
Toluene-d8	98	99	Ethylbenzene	<1
4-Bromofluorobenzene	96	97	Total Xylenes	<2
			MTBE	<1


 Jeffrey Cooper
 Laboratory Manager

January 13, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120761
 Date Analyzed: 1/8/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	10.3	103
Benzene	<1	10.0	10.1	101
Toluene	<1	10.0	9.80	98.0
Ethylbenzene	<1	10.0	9.45	94.5
Total Xylenes	<2	30.0	28.2	94.0

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1



Jeffrey Cooper
 Laboratory Manager

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

2019120761
CHAIN OF CUSTODY

SPECTRA PROJECT #

See # → 2019120694

Return Samples: Y N Page _____ of _____ **STANDARD** **RUSH**

CLIENT: Tacoma Power (TPU) ADDRESS: 3628 South 35th Street, Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Ihevin Smith
 PHONE: 253-502-8686 FAX:
 e-MAIL: hesmith@cityoftacoma.org Prefer FAX or e-MAIL
 PURCHASE ORDER #

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER											
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-DX	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270-825 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX/EOX	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Hexavalent Chromium	
			X	X									X				X	X					X	
			X	X									X				X	X					X	

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
01B	12/26/19	1:00 PM	
06	12/26/19	2:00 PM	

LAB USE ONLY	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>[Signature]</i>	Ihevin Smith	TPU	12/26/19	5:00 PM
RECEIVED BY	<i>[Signature]</i>	MARIE HOIT	Spectra	12-26-19	5:00 pm
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120761

Work Order Number: 2001006

January 07, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/2/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2019120761
Work Order: 2001006

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001006-001	120761-1	12/26/2019 1:00 PM	01/02/2020 1:00 PM
2001006-002	120761-2	12/26/2019 2:00 PM	01/02/2020 1:00 PM



CLIENT: Spectra Laboratories

Project: 2019120761

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories
Project: 2019120761

Lab ID: 2001006-001

Collection Date: 12/26/2019 1:00:00 PM

Client Sample ID: 120761-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>					Batch ID: 27010	Analyst: WF
Mercury	0.770	0.500		ng/L	1	1/6/2020 4:55:00 PM

Lab ID: 2001006-002

Collection Date: 12/26/2019 2:00:00 PM

Client Sample ID: 120761-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>					Batch ID: 27010	Analyst: WF
Mercury	0.788	0.500		ng/L	1	1/6/2020 5:06:00 PM



Date: 1/7/2020

Work Order: 2001006
 CLIENT: Spectra Laboratories
 Project: 2019120761

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124084							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124085							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124086							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27010	SampType: LCS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: LCSW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124087							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 25.2 0.500 25.00 0 101 80 120

Sample ID: 2001011-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124089							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Date: 1/7/2020

Work Order: 2001006
 CLIENT: Spectra Laboratories
 Project: 2019120761

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001011-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124090							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	23.3	0.500	25.00	0.4250	91.5	71	125				
---------	------	-------	-------	--------	------	----	-----	--	--	--	--

Sample ID: 2001011-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124091							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	23.6	0.500	25.00	0.4250	92.7	71	125	23.30	1.28	24	
---------	------	-------	-------	--------	------	----	-----	-------	------	----	--



Client Name: SPECTRA	Work Order Number: 2001006
Logged by: Clare Griggs	Date Received: 1/2/2020 1:00:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
- Refer to item information.
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler		11.0
Sample		11.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



CHAIN of CUSTODY

PAGE 1 of 1

STANDARD RUSH *3 days*

CLIENT: **Spectra Labs** ADDRESS: **2221 Ross Way Tacoma WA 98445** ADDRESS CHANGE

PROJECT: 2019120761				NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER											
CONTACT: Marie H					120761-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1964 SGT-HEM (TPH)	1964 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8063/809 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1031E	Pb 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs
PHONE: 253-272-4850 FAX: 253-572-9838																												
e-MAIL: marieh@spectra-lab.com <input type="checkbox"/> Prefer FAX or e-MAIL																												
PURCHASE ORDER #																												
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																									

1	120761-1	12/26/19	1300	Water	1
2	120761-2	12/26/19	1400	Water	1
3					
4					
5					
6					
7					
8					
9					
0					

COPY

SPECIAL INSTRUCTIONS/COMMENTS:	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	12/30/19	3:00 PM	
	RECEIVED BY						
	RELINQUISHED BY						
	RECEIVED BY						

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

Communications Record

Internal Document

Client: Tacoma Public Utilities

Client Contact: Mike Rhubright

Date: 12-30-19

Time: 9:57

Spectra Contact: Marie Holt

Project: Kosmos

Spectra Project: 2019120761

I called Mike and explained that two samples were delivered on Thursday after UPS pickup, and they couldn't be shipped Friday because they would sit in the UPS warehouse over the weekend and would not stay at temperature. Therefore, we are shipping on Monday and need to know what turnaround time to select. The COC reads standard, though if we request standard turnaround it will be 10 business days before the low-level mercury results are received.

Mike approved rush mercury analysis for these two samples.

He then emailed after looking at the email from Kevin and said standard turnaround will be fine. Though at this point we are already on the second-third day due to the delivery time and weekend. I will put it though on a 3-day turnaround with Fremont in order to get results within the 10-day turnaround time. We should then have results on Monday Jan. 6th.

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19/27/12-225
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 12/27/2019
 Date Received: 12/30/2019
 Spectra Project: 2019120809
 Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.000618 *	ug/L	EPA 1631E
Turbidity	2.5	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	69.8	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.44	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	77	NWTPH-D
Toluene-d8	94	NWTPH-G
4-Bromofluorobenzene	98	NWTPH-G

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19/27/12-225
 Project: Kosmos
 Client ID: D6
 Sample Matrix: Water
 Date Sampled: 12/27/2019
 Date Received: 12/30/2019
 Spectra Project: 2019120809
 Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	0.000599 *	ug/L	EPA 1631E
Turbidity	1.3	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	75.7	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.92	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	73	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	93	NWTPH-G

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

January 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120809
Applies to Spectra #: 1

HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/03/20
Units: ug/L Date Analyzed: 01/06/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	1750	70

METHOD BLANK

Date Extracted: 01/03/20 Date Analyzed: 01/06/20
Units: ug/L


Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 94%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

January 3, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120809
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	92.38	92.4
Cadmium	100.0	96.33	96.3
Chromium	100.0	95.27	95.3
Copper	100.0	99.25	99.2
Lead	100.0	93.94	93.9
Nickel	100.0	94.91	94.9
Zinc	100.0	110.98	111.0

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 1/3/2020
Sample Spiked: 2020010022-1
Date Analyzed: 1/3/2020

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.53	100.0	87.81	87.3	87.57	87.0	0.3
Cadmium	0.00	100.0	90.77	90.8	90.28	90.3	0.6
Chromium	0.65	100.0	91.53	90.9	88.50	87.9	3.4
Copper	0.00	100.0	92.58	92.6	91.30	91.3	1.4
Lead	0.00	100.0	88.87	88.9	88.09	88.1	0.9
Nickel	0.00	100.0	91.99	92.0	87.66	87.7	4.8
Zinc	1.56	100.0	92.80	91.2	91.44	89.9	1.5

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES



Jeffrey Cooper
Laboratory Manager

December 31, 2019


 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

 Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120809
 Date Analyzed: 12/31/2019
 Units: ug/L
 Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.52	95.2
Benzene	<1	10.0	9.5	95.2
Toluene	<1	10.0	9.2	91.8
Ethylbenzene	<1	10.0	9.33	93.3
Total Xylenes	<2	30.0	28.2	94.0
Gasoline	<50	250	256	102

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	102	101	Benzene	<1
1,2-Dichloroethane-d4	114	116	Toluene	<1
Toluene-d8	97	94	Ethylbenzene	<1
4-Bromofluorobenzene	95	97	Total Xylenes	<2
			MTBE	<1


 Jeffrey Cooper
 Laboratory Manager

January 13, 2020


 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

 Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120809
 Date Analyzed: 1/10/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.50	95
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	10.7	107
Ethylbenzene	<1	10.0	11.4	114
Total Xylenes	<2	30.0	34.4	115
Gasoline	<50	250	286	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1


 Jeffrey Cooper
 Laboratory Manager

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

~~COPY~~ 780

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

20920809

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Rick Witta
 PHONE: 253-502-8680 FAX: TESTING
 e-MAIL: kesmith@cityoftacoma.org or e-MAIL Prefer FAX
 PURCHASE ORDER #: 19/27/12-225

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER														
	NWTPH-HClD	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA BY 624 TIO	8260 CHLOR SOLVENTS	8270/625 SEMI VOA BY 625 TIO	8270 PAH/PNA	8082/608 PCB	Organochlor Pests/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B; 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT
1			X	X										X			X		X							X	
2			X	X										X			X		X							X	
3																											
4			X	X										X			X		X							X	
5			X	X										X			X		X							X	
6																											
7																											
8																											
9																											
0																											

Spectra Internal Instructions
 okay to run analysis out of Hold JSA

	SIGNATURE	PRINTED NAME	COMPANY	DATE
RELINQUISHED BY	<i>Doug Boettner</i>	Doug Boettner	TPU	12/30/19 1425
RECEIVED BY	<i>Lori Hamilton</i>	Lori Hamilton	Spectra	12-30-19 1425
RELINQUISHED BY				
RECEIVED BY				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC



Fremont
Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120809

Work Order Number: 2001024

January 07, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/3/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2019120809
Work Order: 2001024

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001024-001	120809-1	12/27/2019 2:00 PM	01/03/2020 2:04 PM
2001024-002	120809-2	12/27/2019 2:20 PM	01/03/2020 2:04 PM

CLIENT: Spectra Laboratories**Project:** 2019120809

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories

Project: 2019120809

Lab ID: 2001024-001

Collection Date: 12/27/2019 2:00:00 PM

Client Sample ID: 120809-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27010 Analyst: WF

Mercury	0.618	0.500		ng/L	1	1/6/2020 5:17:00 PM
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Lab ID: 2001024-002

Collection Date: 12/27/2019 2:20:00 PM

Client Sample ID: 120809-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27010 Analyst: WF

Mercury	0.599	0.500		ng/L	1	1/6/2020 5:27:00 PM
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Work Order: 2001024
CLIENT: Spectra Laboratories
Project: 2019120809

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: MB-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124084							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124085							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124086							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27010	SampType: LCS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: LCSW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124087							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 25.2 0.500 25.00 0 101 80 120

Sample ID: 2001011-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124089							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Work Order: 2001024
 CLIENT: Spectra Laboratories
 Project: 2019120809

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: 2001011-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124090							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	23.3	0.500	25.00	0.4250	91.5	71	125				
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Sample ID: 2001011-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124091							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	23.6	0.500	25.00	0.4250	92.7	71	125	23.30	1.28	24	
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Client Name: **SPECTRA**
Logged by: **Clare Griggs**

Work Order Number: **2001024**
Date Received: **1/3/2020 2:04:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Unknown prior to receipt.
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
- Refer to item information.
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler		13.1
Sample		13.5

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CHAIN of CUSTODY

PAGE 1 of 1

2001024

STANDARD

RUSH

3 day TAT please

ADDRESS CHANGE

CLIENT: Spectra Labs ADDRESS: 2221 Ross Way Tacoma WA 98445

PROJECT: 2019120809	NUMBER OF CONTAINERS	HYDROCARBONS										ORGANICS					METALS				OTHER					
CONTACT: Marie H		NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 6	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 6	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs	
PHONE: 253-272-4850 FAX: 253-572-9838		8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 6	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 6	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs								
e-MAIL: marieh@spectra-lab.com																										
PURCHASE ORDER #																										

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 6	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 6	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs	
1 120809-1	12/27/19	1400	Water	1																		X							
2 120809-2	12/27/19	1420	Water	1																		x							
3																													
4																													
5																													
6																													
7																													
8																													
9																													
0																													

SPECIAL INSTRUCTIONS/COMMENTS:	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/02/20	3:00 PM	
RECEIVED BY	<i>Makenzie</i>	Makenzie	EAS	01/03/20	1424		
RELINQUISHED BY							
RECEIVED BY							

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

(Shipping Fee Applies)

SPECTRA Laboratories

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CHAIN of CUSTODY

PAGE 1 of 1

STANDARD

RUSH

3 day TAT please

ADDRESS CHANGE

CLIENT: Spectra Labs ADDRESS: 2221 Ross Way Tacoma WA 98445

PROJECT: 2019120809
 CONTACT: Marie H
 PHONE: 253-272-4850 FAX: 253-572-9838
 e-MAIL: marieh@spectra-lab.com Prefer FAX
 or e-MAIL
 PURCHASE ORDER #

NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS				OTHER										
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9078	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOC's	
1																	X								
2																	X								
3																									
4																									
5																									
6																									
7																									
8																									
9																									
0																									

SPECIAL INSTRUCTIONS/COMMENTS:

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/02/20	3:00 PM
RECEIVED BY					
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES
 (Shipping Fee Applies)

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19/30/12-226
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 12/30/2019
 Date Received: 12/30/2019
 Spectra Project: 2019120810
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	0.000806 *	ug/L	EPA 1631E
Turbidity	2.3	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	107	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.95	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	0.72	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	77	NWTPH-D
Toluene-d8	91	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

a5/jlc

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19/30/12-226
 Project: Kosmos
 Client ID: D6
 Sample Matrix: Water
 Date Sampled: 12/30/2019
 Date Received: 12/30/2019
 Spectra Project: 2019120810
 Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	ND **	ug/L	EPA 1631E
Turbidity	1.5	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	117*	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.86	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

*Sample contains heavy oil range organics. ** Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	70	NWTPH-D
Toluene-d8	91	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

January 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120810
Applies to Spectra #: 1

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/06/20
Units: ug/L Date Analyzed: 01/07/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	5000	4190	84

METHOD BLANK

Date Extracted: 01/06/20 Date Analyzed: 01/07/20
Units: ug/L


Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 77%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

January 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120810
Applies to Spectra #: 2

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/07/20
Units: ug/L Date Analyzed: 01/07/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	2040	82

METHOD BLANK

Date Extracted: 01/07/20 Date Analyzed: 01/07/20
Units: ug/L


Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 93%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager

January 3, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120810
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	92.38	92.4
Cadmium	100.0	96.33	96.3
Chromium	100.0	95.27	95.3
Copper	100.0	99.25	99.2
Lead	100.0	93.94	93.9
Nickel	100.0	94.91	94.9
Zinc	100.0	110.98	111.0


LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020				
Sample Spiked:	2020010022-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.53	100.0	87.81	87.3	87.57	87.0	0.3
Cadmium	0.00	100.0	90.77	90.8	90.28	90.3	0.6
Chromium	0.65	100.0	91.53	90.9	88.50	87.9	3.4
Copper	0.00	100.0	92.58	92.6	91.30	91.3	1.4
Lead	0.00	100.0	88.87	88.9	88.09	88.1	0.9
Nickel	0.00	100.0	91.99	92.0	87.66	87.7	4.8
Zinc	1.56	100.0	92.80	91.2	91.44	89.9	1.5

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Jeffrey Cooper
Laboratory Manager

December 31, 2019

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Sample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2019120810
Date Analyzed: 12/31/2019
Units: ug/L
Applies to Spectra #'s: #1-2

**GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.52	95.2
Benzene	<1	10.0	9.5	95.2
Toluene	<1	10.0	9.2	91.8
Ethylbenzene	<1	10.0	9.33	93.3
Total Xylenes	<2	30.0	28.2	94.0
Gasoline	<50	250	256	102

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	102	101	Benzene	<1
1,2-Dichloroethane-d4	114	116	Toluene	<1
Toluene-d8	97	94	Ethylbenzene	<1
4-Bromofluorobenzene	95	97	Total Xylenes	<2
			MTBE	<1



Jeffrey Cooper
Laboratory Manager



January 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Sample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2019120810
Date Analyzed: 1/10/2020
Units: ug/L
Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.50	95
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	10.7	107
Ethylbenzene	<1	10.0	11.4	114
Total Xylenes	<2	30.0	34.4	115
Gasoline	<50	250	286	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1



Jeffrey Cooper
Laboratory Manager

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples **Y** N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

20920810

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Boettner
 PHONE: 253-244-0539 FAX: TESTING
 Prefer FAX
 e-MAIL: or e-MAIL
 PURCHASE ORDER #: 19/30/12-226

NUMBER OF CONTAINERS	HYDROCARBONS					ORGANICS					METALS					OTHER											
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/825 SEMI VOA BY 625 TTO	8270 PAHPNA	8082/808 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B: 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT
1			X	X										X			X		X							X	
2			X	X										X			X		X							X	
3																											
4																											
5																											
6																											
7																											
8																											
9																											
0																											

Spectra Internal Instructions	SIGNATURE		PRINTED NAME		COMPANY		DATE		TIME	
	RELINQUISHED BY	<i>Doug Boettner</i>	Doug Boettner	TPU			12/30/14			
	RECEIVED BY	<i>Jerica Carrara</i>	Jerica Carrara	Spectra			12/30/14	14:25pm		
	RELINQUISHED BY									

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC



Fremont
Analytical

3600 Fremont Ave. N.

Seattle, WA 98103

T: (206) 352-3790

F: (206) 352-7178

info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120810

Work Order Number: 2001028

January 07, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/3/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2019120810
Work Order: 2001028

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001028-001	120810-1	12/30/2019 2:00 PM	01/03/2020 2:22 PM
2001028-002	120810-2	12/30/2019 2:20 PM	01/03/2020 2:22 PM



CLIENT: Spectra Laboratories
Project: 2019120810

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Work Order: 2001028
Date Reported: 1/7/2020

CLIENT: Spectra Laboratories
Project: 2019120810

Lab ID: 2001028-001

Collection Date: 12/30/2019 2:00:00 PM

Client Sample ID: 120810-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27010 Analyst: WF

Mercury	0.806	0.500		ng/L	1	1/6/2020 5:38:00 PM
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Lab ID: 2001028-002

Collection Date: 12/30/2019 2:20:00 PM

Client Sample ID: 120810-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27010 Analyst: WF

Mercury	ND	0.500		ng/L	1	1/6/2020 5:49:00 PM
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Work Order: 2001028
 CLIENT: Spectra Laboratories
 Project: 2019120810

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: MB-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124084							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124085							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124086							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27010	SampType: LCS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: LCSW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124087							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 25.2 0.500 25.00 0 101 80 120

Sample ID: 2001011-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124089							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Work Order: 2001028
 CLIENT: Spectra Laboratories
 Project: 2019120810

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001011-001EMS	SampType: MS	Units: ng/L			Prep Date: 1/3/2020	RunNo: 56431					
Client ID: BATCH	Batch ID: 27010				Analysis Date: 1/6/2020	SeqNo: 1124090					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	23.3	0.500	25.00	0.4250	91.5	71	125				
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Sample ID: 2001011-001EMSD	SampType: MSD	Units: ng/L			Prep Date: 1/3/2020	RunNo: 56431					
Client ID: BATCH	Batch ID: 27010				Analysis Date: 1/6/2020	SeqNo: 1124091					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	23.6	0.500	25.00	0.4250	92.7	71	125	23.30	1.28	24	
---------	------	-------	-------	--------	------	----	-----	-------	------	----	--



Sample Log-In Check List

Client Name: SPECTRA	Work Order Number: 2001028
Logged by: Clare Griggs	Date Received: 1/3/2020 2:22:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Unknown prior to receipt.
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
- Refer to item information.
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:		Date:	
By Whom:		Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:			
Client Instructions:			

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	12.3
Sample	11.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CHAIN of CUSTODY

PAGE 1 of 1

2001028

STANDARD RUSH
 3 day TAT please

Page 1 of 9

CLIENT: Spectra Labs ADDRESS: 2221 Ross Way Tacoma WA 98445 ADDRESS CHANGE

PROJECT: 2019120810				NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS				OTHER										
CONTACT: Marie H					NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 8040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOO	SOLIDS (SPECIFY)	HOCs		
PHONE: 253-272-4850 FAX: 253-572-9838					120810-1	120810-2																							
e-MAIL: marieh@spectra-lab.com																													
PURCHASE ORDER #																													
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																										
120810-1	12/30/19	1400	Water		1															X									
120810-2	12/30/19	1420	Water		1															X									

SPECIAL INSTRUCTIONS/COMMENTS:	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME	
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/02/20	3:00 PM
	RECEIVED BY	<i>Marie H</i>	Marie H	EAL	1/31/19	1422
	RELINQUISHED BY					
	RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

(Shipping Fee Appl^{ies})



SPECTRA Laboratories

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CHAIN of CUSTODY

PAGE 1 of 1

STANDARD RUSH
3 day TAT please

CLIENT: **Spectra Labs** ADDRESS: **2221 Ross Way Tacoma WA 98445** ADDRESS CHANGE

PROJECT: 2019120810				NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER													
CONTACT: Marie H					NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs		
PHONE: 253-272-4850 FAX: 253-572-9838																														
e-MAIL: marieh@spectra-lab.com																														
PURCHASE ORDER #																														
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																											

1	120810-1	12/30/19	1400	Water	1															X									
2	120810-2	12/30/19	1420	Water	1															X									
3																													
4																													
5																													
6																													
7																													
8																													
9																													
0																													

SPECIAL INSTRUCTIONS/COMMENTS:	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/02/20	3:00 PM	
	RECEIVED BY						
	RELINQUISHED BY						
	RECEIVED BY						

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

(Shipping Fee Applies)

SPECTRA Laboratories

...Where experience matters

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01/13/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

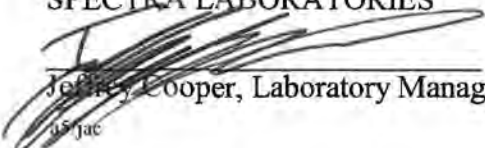
P.O.#: Auth #19-31-12-227
Project: Kosmos
Client ID: D6
Sample Matrix: Water
Date Sampled: 12/31/2019
Date Received: 12/31/2019
Spectra Project: 2019120849
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.000596 *	ug/L	EPA 1631E
Turbidity	1.0	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	318**	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.83	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. **Sample contains heavy oil range organics.

Surrogate	% Recovery	Method
p-Terphenyl	75	NWTPH-D
Toluene-d8	89	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES


Jeffrey Cooper, Laboratory Manager

01/13/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #19-31-12-227
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 12/31/2019
 Date Received: 12/31/2019
 Spectra Project: 2019120849
 Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	0.000871 *	ug/L	EPA 1631E
Turbidity	2.5	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	, 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.29	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	74	NWTPH-D
Toluene-d8	89	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

25 Jac

January 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2019120849
Applies to Spectra #: 1-2

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/07/20
Units: ug/L Date Analyzed: 01/07/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<100	2500	2040	82

METHOD BLANK

Date Extracted: 01/07/20 Date Analyzed: 01/07/20
Units: ug/L


Diesel <100

Heavy Oil <500

Surrogate Recoveries:

p-terphenyl 93%

SPECTRA LABORATORIES



Jeffrey Cooper, Laboratory Manager



January 13, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2019120849
 Date Analyzed: 1/10/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

**GCMS VOLATILE ORGANIC ANALYSIS
 Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.50	95
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	10.7	107
Ethylbenzene	<1	10.0	11.4	114
Total Xylenes	<2	30.0	34.4	115
Gasoline	<50	250	286	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1



 Jeffrey Cooper
 Laboratory Manager

January 3, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2019120849
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested: 1/3/2020 Date Analyzed: 1/3/2020

Element	CAS #	Result
Arsenic	7440-38-2	< 0.3
Cadmium	7440-43-9	< 0.2
Chromium	7440-47-3	< 0.5
Copper	7440-50-8	< 0.3
Lead	7439-92-1	< 0.5
Nickel	7439-98-7	< 0.5
Zinc	7440-66-6	< 0.3

Laboratory Fortified Blank (LFB)

Date Digested: 1/3/2020 Date Analyzed: 1/3/2020

Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	92.38	92.4
Cadmium	100.0	96.33	96.3
Chromium	100.0	95.27	95.3
Copper	100.0	99.25	99.3
Lead	100.0	93.94	93.9
Nickel	100.0	94.91	94.9
Zinc	100.0	110.98	111.0

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)


Date Digested: 1/3/2020 Date Analyzed: 1/3/2020
Sample Spiked: 2020010022-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.53	100.0	87.81	87.3	87.57	87.0	0.3
Cadmium	0.00	100.0	90.77	90.8	90.28	90.3	0.5
Chromium	0.65	100.0	91.53	90.9	88.50	87.9	3.4
Copper	0.00	100.0	92.58	92.6	91.30	91.3	1.4
Lead	0.00	100.0	88.87	88.9	88.09	88.1	0.9
Nickel	0.00	100.0	91.99	92.0	87.66	87.7	4.8
Zinc	1.56	100.0	92.80	91.2	91.44	89.9	1.5

Comment:

Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES



Jeffrey Cooper
Laboratory Manager



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2019120849

Work Order Number: 2001029

January 08, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/3/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2019120849
Work Order: 2001029

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001029-001	120849-1	12/31/2019 12:30 PM	01/03/2020 2:13 PM
2001029-002	120849-2	12/31/2019 10:29 AM	01/03/2020 2:13 PM



Case Narrative

WO#: 2001029

Date: 1/8/2020

CLIENT: Spectra Laboratories
Project: 2019120849

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers & Acronyms

WO#: 2001029

Date Reported: 1/8/2020

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate

Original



CLIENT: Spectra Laboratories
Project: 2019120849

Lab ID: 2001029-001

Collection Date: 12/31/2019 12:30:00 PM

Client Sample ID: 120849-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27010 Analyst: WF

Mercury	0.596	0.500		ng/L	1	1/6/2020 6:00:00 PM
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Lab ID: 2001029-002

Collection Date: 12/31/2019 10:29:00 AM

Client Sample ID: 120849-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27010 Analyst: WF

Mercury	0.871	0.500		ng/L	1	1/6/2020 6:11:00 PM
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Date: 1/8/2020

Work Order: 2001029
 CLIENT: Spectra Laboratories
 Project: 2019120849

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124084							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124085							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27010	SampType: MBLK	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: MBLKW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124086							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27010	SampType: LCS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: LCSW	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124087							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 25.2 0.500 25.00 0 101 80 120

Sample ID: 2001011-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124089							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Date: 1/8/2020

Work Order: 2001029
 CLIENT: Spectra Laboratories
 Project: 2019120849

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001011-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124090							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 23.3 0.500 25.00 0.4250 91.5 71 125

Sample ID: 2001011-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/3/2020	RunNo: 56431							
Client ID: BATCH	Batch ID: 27010		Analysis Date: 1/6/2020	SeqNo: 1124091							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 23.6 0.500 25.00 0.4250 92.7 71 125 23.30 1.28 24



Sample Log-In Check List

Client Name: SPECTRA	Work Order Number: 2001029
Logged by: Clare Griggs	Date Received: 1/3/2020 2:13:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Unknown prior to receipt.
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
- Refer to item information.
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	11.0
Sample	11.0

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CHAIN of CUSTODY

PAGE 1 of 1 Page 9 of 9

2001029

STANDARD RUSH

3 day TAT please

CLIENT: Spectra Labs ADDRESS: 2221 Ross Way Tacoma WA 98445 ADDRESS CHANGE

				NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS				OTHER										
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX		NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8280/824 VOA	8280 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs	
120849-1	12/31/19	1230	Water	1																	X								
120849-2	12/31/19	1029	Water	1																	X								

SPECIAL INSTRUCTIONS/COMMENTS:	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME	
	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/02/20	3:00 PM
	RECEIVED BY	<i>Makenzie Meinhart</i>	Makenzie Meinhart	CAI	01/03/20	14:73
	RELINQUISHED BY					
	RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

RETURN SAMPLES DISPOSE SAMPLES

(Shipping Fee Applies)

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CHAIN of CUSTODY

PAGE 1 of 1

STANDARD RUSH

3 day TAT please

CLIENT: Spectra Labs				ADDRESS: 2221 Ross Way Tacoma WA 98445										ADDRESS CHANGE <input type="checkbox"/>													
PROJECT: 2019120849				NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER										
CONTACT: Marie H					BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs
PHONE: 253-272-4850 FAX: 253-572-9838					1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs				
e-MAIL: marieh@spectra-lab.com					1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs				
PURCHASE ORDER #					1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hg by 1631E	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	HOCs				
SAMPLE ID		DATE SAMPLED	TIME SAMPLED	MATRIX																							
1 120849-1		12/31/19	1230	Water	1																						
2 120849-2		12/31/19	1029	Water	1																						
3																											
4																											
5																											
6																											
7																											
8																											
9																											
0																											
SPECIAL INSTRUCTIONS/COMMENTS:					SIGNATURE		PRINTED NAME			COMPANY			DATE		TIME												
					RELINQUISHED BY		<i>Jen Draven</i>			Jen Draven			Spectra			01/02/20		3:00 PM									
					RECEIVED BY																						
					RELINQUISHED BY																						
					RECEIVED BY																						
RETURN SAMPLES <input type="checkbox"/>					DISPOSE SAMPLES <input type="checkbox"/>					Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.																	

(Shipping Fee Applies)

01/28/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #
 Project: Kosmos
 Client ID: D6
 Sample Matrix: Water
 Date Sampled: 01/02/2020
 Date Received: 01/02/2020
 Spectra Project: 2020010022
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	0.00226*	ug/L	EPA 1631E
Turbidity	8.90	NTU	EPA 180.1
Arsenic	0.5	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	0.6	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	1.6	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	258*	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.30	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached. *Sample contains heavy oil range organics.

Surrogate	% Recovery	Method
p-Terphenyl	76	NWTPH-D
Toluene-d8	91	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/mlh

01/28/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #
 Project: Kosmos
 Client ID: D1B
 Sample Matrix: Water
 Date Sampled: 01/02/2020
 Date Received: 01/02/2020
 Spectra Project: 2020010022
 Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	0.00216*	ug/L	EPA 1631E
Turbidity	7.61	NTU	EPA 180.1
Arsenic	0.5	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.9	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	117	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.20	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	75	NWTPH-D
Toluene-d8	91	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/mlh

January 3, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010022
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	92.38	92.4
Cadmium	100.0	96.33	96.3
Chromium	100.0	95.27	95.3
Copper	100.0	99.25	99.2
Lead	100.0	93.94	93.9
Nickel	100.0	94.91	94.9
Zinc	100.0	110.98	111.0

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/3/2020	Date Analyzed:	1/3/2020				
Sample Spiked:	2020010022-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.53	100.0	87.81	87.3	87.57	87.0	0.3
Cadmium	0.00	100.0	90.77	90.8	90.28	90.3	0.6
Chromium	0.65	100.0	91.53	90.9	88.50	87.9	3.4
Copper	0.00	100.0	92.58	92.6	91.30	91.3	1.4
Lead	0.00	100.0	88.87	88.9	88.09	88.1	0.9
Nickel	0.00	100.0	91.99	92.0	87.66	87.7	4.8
Zinc	1.56	100.0	92.80	91.2	91.44	89.9	1.5

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES

Krista Hintz for
Jeffrey Cooper
Laboratory Manager

January 13, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010022
 Date Analyzed: 1/10/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.50	95
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	10.7	107
Ethylbenzene	<1	10.0	11.4	114
Total Xylenes	<2	30.0	34.4	115
Gasoline	<50	250	286	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1


 Krista Hantz for
 Jeffrey Cooper
 Laboratory Manager

January 28, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Stormwater
Spectra Project: 2020010022
Applies to Sample # 1 & 2

STORMWATER HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/13/20
Units: mg/L Date Analyzed: 01/15/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.15	2.50	2.24	90

METHOD BLANK

Date Extracted: 01/13/20 Date Analyzed: 01/15/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 130%

SPECTRA LABORATORIES



Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010022

Work Order Number: 2001108

January 09, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/7/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2020010022
Work Order: 2001108

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001108-001	010022-1	01/02/2020 11:50 AM	01/07/2020 12:20 PM
2001108-002	010022-2	01/02/2020 11:15 AM	01/07/2020 12:20 PM



CLIENT: Spectra Laboratories

Project: 2020010022

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

Work Order: 2001108
Date Reported: 1/9/2020

Client: Spectra Laboratories
Project: 2020010022
Lab ID: 2001108-001
Client Sample ID: 010022-1

Collection Date: 1/2/2020 11:50:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27052

Analyst: WF

Mercury	2.26	0.500		ng/L	1	1/8/2020 9:48:11 PM
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Analytical Report

Work Order: 2001108
Date Reported: 1/9/2020

Client: Spectra Laboratories
Project: 2020010022
Lab ID: 2001108-002
Client Sample ID: 010022-2

Collection Date: 1/2/2020 11:15:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27052

Analyst: WF

Mercury	2.16	0.500		ng/L	1	1/8/2020 9:59:01 PM
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Date: 1/9/2020

Work Order: 2001108
 CLIENT: Spectra Laboratories
 Project: 2020010022

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125531							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125532							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125533							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27052	SampType: LCS	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: LCSW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125534							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 24.6 0.500 25.00 0 98.4 80 120

Sample ID: 2001097-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125536							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Date: 1/9/2020

Work Order: 2001108
 CLIENT: Spectra Laboratories
 Project: 2020010022

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001097-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052	Analysis Date: 1/8/2020	SeqNo: 1125537								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	6.20	0.500	25.00	0	24.8	71	125				S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID: 2001097-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052	Analysis Date: 1/8/2020	SeqNo: 1125538								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	6.07	0.500	25.00	0	24.3	71	125	6.200	2.12	24	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.



Client Name: **SPECTRA**

Work Order Number: **2001108**

Logged by: **Matt Langston**

Date Received: **1/7/2020 12:20:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Mercury in water, preserved
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified: _____	Date: _____
By Whom: _____	Via: <input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding: _____	
Client Instructions: _____	

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler		15.1
Sample		16.8

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Turnaround Time Requested
 STANDARD RUSH SPECIAL 3 day
 Lab Approval Required *Please*

CHAIN of CUSTODY

SPECTRA PROJECT #

Return Samples Yes No X

2001108

Page 10 of 10

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010022
 CONTACT: Marie Holt
 SAMPLED BY:
 PHONE: 253-272-4850
 e-MAIL: marieh@spectra-lab.com
 PURCHASE ORDER #:

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER										
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	9290/924 VOA	9290 CHLOR SOLVENTS	9270/925 SEMI VOA	9270 PAH/PNA	9092/908 PCS	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF

	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS
1	010022-1	01/02/20	1150	Water	1
2	010022-2	01/02/20	1115	Water	1
3					
4					
5					
6					
7					
8					
9					
0					

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/06/19	3:00 PM	
COC seals present? <u>intact?</u>	RECEIVED BY	<i>[Signature]</i>	<i>[Signature]</i>	<i>FAI</i>	1/7/20	1220	
Temp at receipt _____ deg. C.	RELINQUISHED BY						
Received within hold time?	RECEIVED BY						
Proper sample containers?	RELINQUISHED BY						
Refrigerated with Cooler?	RECEIVED BY						

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus.

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples **Y** N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2020010022

STANDARD **RUSH**

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT: 1
 SAMPLED BY: Doug Boethner
 PHONE: 253-244-0539 FAX: TESTING
 e-MAIL: Prefer FAX or e-MAIL
 PURCHASE ORDER #: 20/2/1-1

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER														
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/825 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B: 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBTRACT
1			X	X										X			X		X							X	
2			X	X										X			X		X							X	
3																											
4			X	X										X			X		X							X	
5																											
6																											
7																											
8																											
9																											
0																											

Spectra Internal Instructions	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
	RELINQUISHED BY	<i>Doug Boethner</i>	<i>Doug Boethner</i>	TPU	1-2-20	4:57	
RECEIVED BY	<i>SB</i>	Spencer Beck	Spectra	1/2/20	4:57		
RELINQUISHED BY							
RECEIVED BY							

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

01/10/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

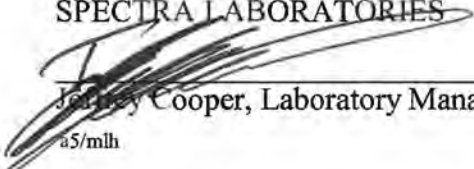
P.O.#: Auth #20/2/1-002
 Project: Kosmos
 Client ID: Baker Tank #1
 Sample Matrix: Water
 Date Sampled: 01/02/2020
 Date Received: 01/02/2020
 Spectra Project: 2020010021
 Spectra Number: 1
 Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.0211*	ug/L	EPA 1631E
Turbidity	150	NTU	EPA 180.1
Arsenic	3.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	2.8	µg/L	EPA 200.8
Copper	15.7	µg/L	EPA 200.8
Lead	4.2	µg/L	EPA 200.8
Nickel	5.0	µg/L	EPA 200.8
Zinc	84.2	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	124	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	7.08	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	99	NWTPH-D
Toluene-d8	92	NWTPH-G
4-Bromofluorobenzene	93	NWTPH-G

SPECTRA LABORATORIES


 Jeffrey Cooper, Laboratory Manager

a5/mlh

January 10, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug BoettnerMethod: NWTPH-Dx
Sample Matrix: Stormwater
Spectra Project: 2020010021
Applies to Sample # 1**STORMWATER HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS****BLANK SPIKE (LCS)**Spiked Sample: LCS Date Extracted: 01/03/20
Units: mg/L Date Analyzed: 01/06/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	1.75	70


METHOD BLANKDate Extracted: 01/03/20 Date Analyzed: 01/06/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 94%

SPECTRA LABORATORIES


Jeff Cooper, Laboratory Manager

January 10, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010021
 Date Analyzed: 1/3/2020
 Units: ug/L
 Applies to Spectra #'s: #1

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	10.5	105
Benzene	<1	10.0	11.0	110
Toluene	<1	10.0	10.4	104
Ethylbenzene	<1	10.0	10.0	100
Total Xylenes	<2	30.0	29.6	98.7
Gasoline	<50	250	282	113

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	110	102	Benzene	<1
1,2-Dichloroethane-d4	114	107	Toluene	<1
Toluene-d8	97	95	Ethylbenzene	<1
4-Bromofluorobenzene	94	83	Total Xylenes	<2
			MTBE	<1



Jeffrey Casper
 Laboratory Manager



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories
Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010021
Work Order Number: 2001104

January 09, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 1 sample(s) on 1/7/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020010021
Work Order: 2001104

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001104-001	010021-1	01/02/2020 2:15 PM	01/07/2020 12:30 PM



CLIENT: Spectra Laboratories
Project: 2020010021

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories
Project: 2020010021
Lab ID: 2001104-001
Client Sample ID: 010021-1

Collection Date: 1/2/2020 2:15:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27052

Analyst: WF

Mercury	21.1	0.500		ng/L	1	1/8/2020 8:54:12 PM
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Date: 1/9/2020

Work Order: 2001104
 CLIENT: Spectra Laboratories
 Project: 2020010021

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125531							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125532							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125533							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27052	SampType: LCS	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: LCSW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125534							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 24.6 0.500 25.00 0 98.4 80 120

Sample ID: 2001097-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125536							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Work Order: 2001104
CLIENT: Spectra Laboratories
Project: 2020010021

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: 2001097-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052	Analysis Date: 1/8/2020	SeqNo: 1125537								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	6.20	0.500	25.00	0	24.8	71	125				S
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NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID: 2001097-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052	Analysis Date: 1/8/2020	SeqNo: 1125538								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	6.07	0.500	25.00	0	24.3	71	125	6.200	2.12	24	S
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NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.



Client Name: SPECTRA	Work Order Number: 2001104
Logged by: Matt Langston	Date Received: 1/7/2020 12:30:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Unknown prior to receipt.
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA

Please refer to item information.

8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler		17.9
Sample		16.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Turnaround Time Requested
 STANDARD RUSH SPECIAL **2 Day**
 Lab Approval Required
CHAIN of CUSTODY

Return Samples Yes No **X**
 SPECTRA PROJECT # **2001104**
 Please

Page 9 of 9

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010021	NUMBER OF CONTAINERS	HYDROCARBONS												ORGANICS				METALS			OTHER						
CONTACT: Marie Holt		NYTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	9250/624 VOA	6260 CHLOR SOLVENTS	6270/625 SEMI VOA	6270 PAN/PINA	6282/608 PCB	TOTAL METALS RCRA #	TOTAL METALS (SPECIFY)	TCLP METALS RCRA #	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	800	SOLIDS (SPECIFY)	Fecal Coliform - MPN or NIF	Hg by 1631E		
SAMPLED BY:																											
PHONE: 253-272-4850																											
e-MAIL: marieh@spectra-lab.com																											
PURCHASE ORDER #:																											
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																								

1	010021-1	01/02/20	1415	Water	1																					X
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
0																										

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)		SIGNATURE		PRINTED NAME		COMPANY		DATE		TIME	
Total # of containers	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/06/19	3:00 PM					
COC seals present? Intact?	RECEIVED BY	<i>Ch...</i>	Ch...	PAI	4/1/20	1230					
Temp at receipt deg C.	RELINQUISHED BY										
Received within hold time?	RECEIVED BY										
Proper sample containers?	RELINQUISHED BY										
Received via Cooler?	RECEIVED BY										

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue.

Marie Holt

2020010021

From: Marie Holt
Sent: Thursday, January 02, 2020 5:04 PM
To: Jeff Cooper; Jesse Bynum; Jennifer Draven
Subject: FYI - RUSH KOSMOS

Importance: High

Hi,

TPU brought in 3 more Kosmos samples today. One of them (Baker Tank) is a rush priority, if possible it should go before any other Kosmos samples. He understands that the mercury alone will probably take until Wed. or Thursday of next week, though if the petroleum is complete before then, they may want a partial.

Jen, please send this mercury on a 2 day turnaround.

Marie Holt

Customer Support and Office Manager

SPECTRA Laboratories

2221 Ross Way
Tacoma, WA 98421
P (253) 272-4850
F (253) 572-9838
marieh@spectra-lab.com



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

01/23/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner


P.O.#: Auth #20/3/1-003
Project: Kosmos
Client ID: D1B
Sample Matrix: Water
Date Sampled: 01/03/2020
Date Received: 01/03/2020
Spectra Project: 2020010076
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00135*	µg/L	EPA 1631E
Turbidity	5.87	NTU	EPA 180.1
Arsenic	0.7	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.4	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	73.0	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.73	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	82	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	92	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Devan Salter



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

01/23/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner


P.O.#: Auth #20/3/1-003
Project: Kosmos
Client ID: D6
Sample Matrix: Water
Date Sampled: 01/03/2020
Date Received: 01/03/2020
Spectra Project: 2020010076
Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00152*	µg/L	EPA 1631E
Turbidity	6.56	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.50	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	67	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	92	NWTPH-G

SPECTRA LABORATORIES


Authorized by: I. van Salter

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a5/fjb



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

01/23/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner


P.O.#: Auth #20/3/1-003
Project: Kosmos
Client ID: D2
Sample Matrix: Water
Date Sampled: 01/03/2020
Date Received: 01/03/2020
Spectra Project: 2020010076
Spectra Number: 3

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00222*	µg/L	EPA 1631E
Turbidity	13.0	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	1.8	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	129	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.41	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	72	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	91	NWTPH-G

SPECTRA LABORATORIES


Authorized by: Ian Salter

Page 3 of 3

a5/jjb

January 6, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010076
Applies to Spectra #'s: 1-3
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	1/6/2020	Date Analyzed:	1/6/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/6/2020	Date Analyzed:	1/6/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	107.50	107.5
Cadmium	100.0	109.79	109.8
Chromium	100.0	109.58	109.6
Copper	100.0	110.92	110.9
Lead	100.0	109.87	109.9
Nickel	100.0	110.94	110.9
Zinc	100.0	109.80	109.8

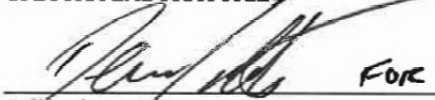
LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/6/2020	Date Analyzed:	1/6/2020				
Sample Spiked:	2020010076-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.65	100.0	118.70	118.1	118.54	117.9	0.1
Cadmium	0.00	100.0	111.15	111.1	110.92	110.9	0.2
Chromium	0.00	100.0	115.61	115.6	116.64	116.6	0.9
Copper	0.00	100.0	112.44	112.4	111.05	111.0	1.2
Lead	0.00	100.0	111.33	111.3	111.79	111.8	0.4
Nickel	0.00	100.0	117.29	117.3	117.35	117.3	0.0
Zinc	0.40	100.0	113.68	113.3	115.24	114.8	1.4

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES



Jeffrey Cooper
Laboratory Manager

January 23, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2020010076
Applies to Sample # 1-3

STORMWATER HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/14/20
Units: mg/L Date Analyzed: 01/17/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	1.75	70

METHOD BLANK

Date Extracted: 01/14/20 Date Analyzed: 01/17/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 93%

SPECTRA LABORATORIES



Authorized by: Jesse J. Bynum

January 13, 2020

 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

 Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010076
 Date Analyzed: 1/10/2020
 Units: ug/L
 Applies to Spectra #'s: #1-3

**GCMS VOLATILE ORGANIC ANALYSIS
 Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.50	95
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	10.7	107
Ethylbenzene	<1	10.0	11.4	114
Total Xylenes	<2	30.0	34.4	115
Gasoline	<50	250	286	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1



Jeffrey Cooper
 Laboratory Manager



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010076

Work Order Number: 2001107

January 09, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 3 sample(s) on 1/7/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020010076
Work Order: 2001107

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001107-001	010076-1	01/03/2020 12:55 PM	01/07/2020 12:27 PM
2001107-002	010076-2	01/03/2020 12:05 PM	01/07/2020 12:27 PM
2001107-003	010076-3	01/03/2020 12:45 PM	01/07/2020 12:27 PM



CLIENT: Spectra Laboratories
Project: 2020010076

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories
Project: 2020010076
Lab ID: 2001107-001
Client Sample ID: 010076-1

Collection Date: 1/3/2020 12:55:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>					Batch ID: 27052	Analyst: WF
Mercury	1.35	0.500		ng/L	1	1/8/2020 9:15:49 PM



Client: Spectra Laboratories
Project: 2020010076
Lab ID: 2001107-002
Client Sample ID: 010076-2

Collection Date: 1/3/2020 12:05:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>					Batch ID: 27052	Analyst: WF
Mercury	1.52	0.500		ng/L	1	1/8/2020 9:26:36 PM



Client: Spectra Laboratories
Project: 2020010076
Lab ID: 2001107-003
Client Sample ID: 010076-3

Collection Date: 1/3/2020 12:45:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Mercury by Method 1631E</u>					Batch ID: 27052	Analyst: WF
Mercury	2.22	0.500		ng/L	1	1/8/2020 9:37:23 PM



Date: 1/9/2020

Work Order: 2001107
 CLIENT: Spectra Laboratories
 Project: 2020010076

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125531							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125532							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27052	SampType: MBLK	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: MBLKW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125533							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27052	SampType: LCS	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: LCSW	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125534							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 24.6 0.500 25.00 0 98.4 80 120

Sample ID: 2001097-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052		Analysis Date: 1/8/2020	SeqNo: 1125536							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Date: 1/9/2020

Work Order: 2001107
 CLIENT: Spectra Laboratories
 Project: 2020010076

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001097-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052	Analysis Date: 1/8/2020	SeqNo: 1125537								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	6.20	0.500	25.00	0	24.8	71	125				S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID: 2001097-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/8/2020	RunNo: 56507							
Client ID: BATCH	Batch ID: 27052	Analysis Date: 1/8/2020	SeqNo: 1125538								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	6.07	0.500	25.00	0	24.3	71	125	6.200	2.12	24	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.



Client Name: SPECTRA	Work Order Number: 2001107
Logged by: Matt Langston	Date Received: 1/7/2020 12:27:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA

Mercury in water, preserved

7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified: _____	Date: _____
By Whom: _____	Via: <input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding: _____	
Client Instructions: _____	

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	15.1
Sample	14.5

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010076	NUMBER OF CONTAINERS	HYDROCARBONS										ORGANICS				METALS			OTHER						
CONTACT: Marie Holt		NWTPH-RCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1064 SGT-HEM (TPH)	1064 HEM (FOG)	8200/824 VOA	8200 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8032/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8042/8045	TX/TOX 9078	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E
SAMPLED BY:																									
PHONE: 253-272-4850																									
e-MAIL: marieh@spectra-lab.com																									
PURCHASE ORDER #:																									
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																						

1	010076-1	01/03/20	1255	Water	1																			X
2	010076-2	01/03/20	1205	Water	1																			X
3	010076-3	01/03/20	1245	Water	1																			X
4																								
5																								
6																								
7																								
8																								
9																								
0																								

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	RELINQUISHED BY	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/06/19	3:00 PM
COC seals present? _____ Intact? _____	RECEIVED BY	<i>Joe</i>	Joe	PAI	1/7/20	12:17
Temp at receipt _____ deg. C.	RELINQUISHED BY					
Received within hold time? _____	RECEIVED BY					
Proper sample containers? _____	RELINQUISHED BY					
Received via _____ Cooler? _____	RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus

Table. Parameters, analytical methods, detection limits (DLs) and quantitation levels (QLs) shown below, shall be used for water quality monitoring. Other methods may be used but must produce measurable results in the sample and be an EPA-approved method in 40 CFR Part 136. If an alternative method is used that is not specified in an order or listed below the test method, DL, and QL will be defined in lab and/or monitoring reports. Indicator level values at or below those specified in the table are within compliance.

Pollutant & CAS No. (if available)	Sampling Frequency	Sample Type	Indicator Level, µg/L (unless noted)	Required Analytical Protocol	Detection Level, µg/L	Quantitation Level, µg/L
METALS						
Arsenic, Total (7440-38-2)	Daily*	Grab	360 ^a	200.8	0.1	0.5
Chromium, (hex) (18540-29-9)	Daily*	Grab	15 ^b	SM3500-Cr EC	0.3	1.2
Chromium, Total (7440-47-3)	Daily*	Grab	259 ^d	200.8	0.2	1.0
Lead, Total (7439-92-1)	Daily*	Grab	23.5 ^a	200.8	0.1	0.5
Cadmium (7440-43-9)	Daily*	Grab	1.5 ^a	200.8	0.05	0.25
Mercury (7439-97-6)	Daily*	Grab	2.10 ^a	1631E	0.0002	0.0005
Copper (7440-50-8)	Daily*	Grab	7.2 ^a	200.8	0.4	2.0
Nickel (7440-02-0)	Daily*	Grab	652 ^a	200.8	0.1	0.5
Zinc (7440-66-6)	Daily*	Grab	52.7 ^a	200.8	0.5	2.5
NONCONVENTIONAL POLLUTANTS						
BTEX (benzene + toluene + ethylbenzene + m, o, p xylenes)	Daily*	Grab	2.0	EPA SW 846 8021/8260	1.0	2.0
PETROLEUM HYDROCARBONS						
Gasoline-Range Hydrocarbons (NWTPH-Gx) ^c	Daily*	Grab	250 ^d	NWTPH-Gx	250	250
Diesel-Range Hydrocarbons (NWTPH-Dx) ^e	Daily*	Grab	250 ^d	NWTPH-Dx	250	250
Stormwater General Permit Benchmarks						
Parameter			Benchmark	Analytical Method		
Turbidity	Daily*	Grab	25 NTU	SM2130 ^f		
pH	Daily*	Grab	6.5 - 8.5 SU	SM4500-H ^g B		

a	Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240); metals for receiving waterbody of hardness value = 40. Hardness will need to be verified through sampling and criteria adjusted accordingly. Heavy metal toxicity general decreases in freshwater as hardness increases.
b	Indicator Level total chromium is actually for hexavalent chromium using Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240), National Toxics Rule (40 CFR 131.36).
c	NWTPH-Gx = Northwest Total Petroleum Hydrocarbons –Volatile petroleum products (includes aviation and automotive gasolines, mineral spirits, Stoddard solvent and naphtha).
d	No surface water standard, value is laboratory quantitation level.
e	NWTPH-Dx = Northwest Total Petroleum Hydrocarbons – Semi-volatile (“diesel”) for diesel range organics and heavy oils (includes jet fuels, kerosene, diesel-oils, hydraulic fluids, mineral oils, lubricating oils, and fuel oils).
f	Or equivalent.
*	Sampling to occur daily during active slope excavation and grading. Frequency and parameters assessed will be modified following cap completion.

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples **Y** N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

202010076

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Beettner
 PHONE: 253-244-0539 FAX: TESTING
 e-MAIL: Prefer FAX or e-MAIL
 PURCHASE ORDER #: 20/3/1#003

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	HYDROCARBONS					ORGANICS					METALS			OTHER												
					NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/825 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOO	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B: 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium
1 D1B	2/3/1	12:55					X	X							X			X	X										X	
2 D.6	2/3/1	12:05					X	X							X			X	X									X		
3 D1B inside	2/3/1																													
4 D2	20/3/1	12:45					X	X							X			X	X									X		
5																														
6																														
7																														
8																														
9																														
0																														

Spectra Internal Instructions
 Please Refer to the Kosmos O.I seep Cap (WAPP) Table 1 Parameters methods, Detection limits and levels

SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY: <i>Doug Beettner</i>	Doug Beettner	TPU	1/3/20	3:54
RECEIVED BY: <i>Jen Draven</i>	Jen Draven	Spectra	1/3/20	15:34
RELINQUISHED BY:				
RECEIVED BY:				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

01/22/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #20-6-1-007
 Project: Kosmos
 Client ID: D2
 Sample Matrix: Water
 Date Sampled: 01/06/2020
 Date Received: 01/06/2020
 Spectra Project: 2020010099
 Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00164 *	ug/L	EPA 1631E
Turbidity	16	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	3.4	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	0.7	µg/L	EPA 200.8
Zinc	4.0	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	72	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.04	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	74	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	91	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Jesse J. Bynum

January 13, 2020

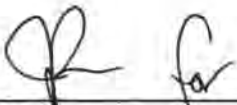
Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010099
 Date Analyzed: 1/10/2020
 Units: ug/L
 Applies to Spectra #'s: #1

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.50	95
Benzene	<1	10.0	10.6	106
Toluene	<1	10.0	10.7	107
Ethylbenzene	<1	10.0	11.4	114
Total Xylenes	<2	30.0	34.4	115
Gasoline	<50	250	286	114

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	101	Benzene	<1
1,2-Dichloroethane-d4	105	108	Toluene	<1
Toluene-d8	96	94	Ethylbenzene	<1
4-Bromofluorobenzene	87	89	Total Xylenes	<2
			MTBE	<1



Jeffrey Cooper
 Laboratory Manager

January 23, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug BoettnerMethod: NWTPH-Dx
Sample Matrix: Stormwater
Spectra Project: 2020010099
Applies to Sample # 1**STORMWATER HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS****BLANK SPIKE (LCS)**Spiked Sample: LCS Date Extracted: 01/16/20
Units: mg/L Date Analyzed: 01/21/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	1.88	75

METHOD BLANKDate Extracted: 01/16/20 Date Analyzed: 01/21/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 98%

SPECTRA LABORATORIES


Authorized by: Jesse J. Bynum



Fremont
Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010099

Work Order Number: 2001134

January 14, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 1 sample(s) on 1/9/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2020010099
Work Order: 2001134

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001134-001	010099-1	01/06/2020 12:30 PM	01/09/2020 9:49 AM



CLIENT: Spectra Laboratories

Project: 2020010099

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories

Collection Date: 1/6/2020 12:30:00 PM

Project: 2020010099

Lab ID: 2001134-001

Matrix: Water

Client Sample ID: 010099-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27110

Analyst: WF

Mercury	1.64	0.500		ng/L	1	1/13/2020 8:57:17 PM
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Date: 1/14/2020

Work Order: 2001134
 CLIENT: Spectra Laboratories
 Project: 2020010099

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27110	SampType: MBLK	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: MBLKW	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127809							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27110	SampType: MBLK	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: MBLKW	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127810							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27110	SampType: MBLK	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: MBLKW	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127811							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27110	SampType: LCS	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: LCSW	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127812							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 26.2 0.500 25.00 0 105 80 120

Sample ID: 2001134-001ADUP	SampType: DUP	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: 010099-1	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127814							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 1.51 0.500 1.640 8.25 24



Date: 1/14/2020

Work Order: 2001134
 CLIENT: Spectra Laboratories
 Project: 2020010099

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001134-001AMS	SampType: MS	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: 010099-1	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127815							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	27.7	0.500	25.00	1.640	104	71	125				
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Sample ID: 2001134-001AMSD	SampType: MSD	Units: ng/L	Prep Date: 1/13/2020	RunNo: 56609							
Client ID: 010099-1	Batch ID: 27110		Analysis Date: 1/13/2020	SeqNo: 1127816							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	27.9	0.500	25.00	1.640	105	71	125	27.70	0.719	24	
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Client Name: SPECTRA	Work Order Number: 2001134
Logged by: Carissa True	Date Received: 1/9/2020 9:49:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Unknown prior to receipt
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
- Please refer to item information
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

	Item #	Temp °C
Cooler		9.4
Sample		10.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Turnaround Time Requested
 STANDARD RUSH SPECIAL 3 day
 Lab Approval Required Please

CHAIN of CUSTODY

Return Samples Yes No X SPECTRA PROJECT # 2001134 Page 9 of 9

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010099	NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS			METALS			OTHER															
CONTACT: Marie Holt		NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	B260/624 VOA	B260 CHLOR SOLVENTS	B270/625 SEMI VOA	B270 PAH/PNA	B082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E
SAMPLED BY:																									
PHONE: 253-272-4850																									
e-MAIL: marieh@spectra-lab.com																									
PURCHASE ORDER #:																									

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	B260/624 VOA	B260 CHLOR SOLVENTS	B270/625 SEMI VOA	B270 PAH/PNA	B082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E			
010099-1	01/06/20	1230	Water	1																										X	
2																															
3																															
4																															
5																															
6																															
7																															
8																															
9																															
0																															

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY <i>Jen Draven</i>	Jen Draven	Spectra	01/8/20	3:00 PM
COC seals present? _____ intact?	RECEIVED BY <i>Carter Johnson</i>	Carter Johnson	FAI	1/9/20	0949
Temp at receipt _____ deg. C	RELINQUISHED BY				
Received within hold time? _____	RECEIVED BY				
Proper sample containers? _____	RELINQUISHED BY				
Received via _____ Cooler?	RECEIVED BY				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue.

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

702000099

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Boettner
 PHONE: 253-244-0539 FAX: TESTING
 e-MAIL: Prefer FAX or e-MAIL
 PURCHASE ORDER #: 20-6-1-007

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER															
	NWTPH-HClD	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/625 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TX/TOX 9078	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B, 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT	
1			X	X										X			X		X								X	
2																												
3																												
4																												
5																												
6																												
7																												
8																												
9																												
0																												

<p>Spectra Internal Instructions Please refer to the Kosmos Oil seep (WQPP) Table 1 - Parameters method of detection limits and levels</p>	RELINQUISHED BY	<i>Doug Boettner</i>	PRINTED NAME	Doug Boettner	COMPANY	TPU	DATE	1/6/20	TIME	3:35
	RECEIVED BY	<i>SB</i>	PRINTED NAME	Spencer Beck	COMPANY	Spectra	DATE	1/6/20	TIME	1536
	RELINQUISHED BY		PRINTED NAME		COMPANY		DATE		TIME	
	RECEIVED BY		PRINTED NAME		COMPANY		DATE		TIME	

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

02/07/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner


P.O.#: Auth #20-13-1-009
Project: Kosmos
Client ID: D-2
Sample Matrix: Water
Date Sampled: 01/13/2020
Date Received: 01/13/2020
Spectra Project: 2020010349
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	ND*		EPA 1631E
Turbidity	5.9	NTU	EPA 180.1
Arsenic	0.6	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	1.1	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.5	µg/L	EPA 200.8
Diesel	120	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.48	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Total Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	111	NWTPH-D
Toluene-d8	98	NWTPH-G
4-Bromofluorobenzene	102	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Devan Salter
a5/sks

January 15, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010349
Applies to Spectra #'s: 1
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested:	1/15/2020	Date Analyzed:	1/15/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/15/2020	Date Analyzed:	1/15/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	94.31	94.3
Cadmium	100.0	93.56	93.6
Chromium	100.0	91.85	91.9
Copper	100.0	94.27	94.3
Lead	100.0	96.20	96.2
Nickel	100.0	93.88	93.9
Zinc	100.0	93.50	93.5


LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/15/2020	Date Analyzed:	1/15/2020				
Sample Spiked:	2020010320-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	102.55	102.6	108.77	108.8	5.9
Cadmium	0.00	100.0	93.82	93.8	97.60	97.6	4.0
Chromium	0.00	100.0	107.90	107.9	114.34	114.3	5.8
Copper	0.36	100.0	91.96	91.6	96.40	96.0	4.7
Lead	0.00	100.0	89.02	89.0	93.14	93.1	4.5
Nickel	0.00	100.0	95.06	95.1	98.53	98.5	3.6
Zinc	28.81	100.0	123.39	94.6	128.19	99.4	4.9

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Jeffrey Cooper
Laboratory Manager

January 16, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010349
 Date Analyzed: 1/14/2020
 Units: ug/L
 Applies to Spectra #'s: #1

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	9.6	96
Benzene	<1	10.0	9.5	95
Toluene	<1	10.0	9.03	90.3
Ethylbenzene	<1	10.0	10.37	103.7
Total Xylenes	<2	30.0	31.1	103.8
Gasoline	<50	250	295	118

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	94	94	Benzene	<0.4
1,2-Dichloroethane-d4	96	95	Toluene	<0.4
Toluene-d8	90	94	Ethylbenzene	<0.4
4-Bromofluorobenzene	89	91	Total Xylenes	<0.8
			MTBE	<0.4
			Gasoline	<50



Jeffrey Cooper
 Laboratory Manager

February 7, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2020010349
Applies to Sample # 1

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/28/20
Units: mg/L Date Analyzed: 02/03/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	2.10	84

METHOD BLANK


Date Extracted: 01/28/20 Date Analyzed: 02/03/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

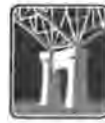
Surrogate Recoveries:

p-terphenyl 104%

SPECTRA LABORATORIES



Authorized by: Kristin Hintz



Fremont
Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010349

Work Order Number: 2001217

January 17, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 1 sample(s) on 1/14/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2020010349
Work Order: 2001217

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001217-001	010349-1	01/13/2020 10:00 AM	01/14/2020 12:52 PM



CLIENT: Spectra Laboratories

Project: 2020010349

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories
Project: 2020010349
Lab ID: 2001217-001
Client Sample ID: 010349-1

Collection Date: 1/13/2020 10:00:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27164

Analyst: WF

Mercury	ND	0.500		ng/L	1	1/17/2020 4:34:12 PM
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Date: 1/17/2020

Work Order: 2001217
 CLIENT: Spectra Laboratories
 Project: 2020010349

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB2-27164	SampType: MBLK	Units: ng/L	Prep Date: 1/17/2020	RunNo: 56730							
Client ID: MBLKW	Batch ID: 27164		Analysis Date: 1/17/2020	SeqNo: 1130283							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: MB2-27164	SampType: MBLK	Units: ng/L	Prep Date: 1/17/2020	RunNo: 56730							
Client ID: MBLKW	Batch ID: 27164		Analysis Date: 1/17/2020	SeqNo: 1130284							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: MB3-27164	SampType: MBLK	Units: ng/L	Prep Date: 1/17/2020	RunNo: 56730							
Client ID: MBLKW	Batch ID: 27164		Analysis Date: 1/17/2020	SeqNo: 1130285							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: LCS-27164	SampType: LCS	Units: ng/L	Prep Date: 1/17/2020	RunNo: 56730							
Client ID: LCSW	Batch ID: 27164		Analysis Date: 1/17/2020	SeqNo: 1130286							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	33.4	0.500	25.00	0	134	80	120				S

NOTES:
 S - Outlying spike recovery observed (high bias). Samples are non-detect for this analyte; no further action required.

Sample ID: 2001217-001ADUP	SampType: DUP	Units: ng/L	Prep Date: 1/17/2020	RunNo: 56730							
Client ID: 010349-1	Batch ID: 27164		Analysis Date: 1/17/2020	SeqNo: 1130289							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500						0		24	



Work Order: 2001217
CLIENT: Spectra Laboratories
Project: 2020010349

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: 2001217-001AMS	SampType: MS	Units: ng/L			Prep Date: 1/17/2020	RunNo: 56730					
Client ID: 010349-1	Batch ID: 27164				Analysis Date: 1/17/2020	SeqNo: 1130290					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	33.4	0.500	25.00	0.4180	132	71	125				S

NOTES:

S - Outlying spike recovery observed.

Sample ID: 2001217-001AMSD	SampType: MSD	Units: ng/L			Prep Date: 1/17/2020	RunNo: 56730					
Client ID: 010349-1	Batch ID: 27164				Analysis Date: 1/17/2020	SeqNo: 1130291					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	34.1	0.500	25.00	0.4180	135	71	125	33.40	2.07	24	S

NOTES:

S - Outlying spike recovery observed.



Client Name: SPECTRA	Work Order Number: 2001217
Logged by: Carissa True	Date Received: 1/14/2020 12:52:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA

Samples received at appropriate temperature

7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
BrCl added to 001
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified: _____	Date: _____
By Whom: _____	Via: <input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding: _____	
Client Instructions: _____	

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	8.3
Sample 1	7.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Turnaround Time Requested
 STANDARD RUSH SPECIAL *3 day TAT*
 Lab Approval Required SPECTRA PROJECT #

CHAIN of CUSTODY

Return Samples Yes No X

Please 2001217

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010349	NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS		METALS		OTHER																			
CONTACT: Marie Holt		NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8200/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E		
SAMPLED BY:																											
PHONE: 253-272-4850																											
e-MAIL: marieh@spectra-lab.com																											
PURCHASE ORDER #:																											

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8200/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E	
010349-1	01/13/20	1000	Water	1																									X
2																													
3																													
4																													
5																													
6																													
7																													
8																													
9																													
0																													

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY <i>Jen Draven</i>	Jen Draven	Spectra	01/13/20	3:00 PM
COC seals present? _____ intact?	RECEIVED BY <i>Carly Johnson</i>	Carly Johnson	FAI	1/14/20	1252
Temp at receipt _____ deg. C.	RELINQUISHED BY _____				
Received within hold time? _____	RECEIVED BY _____				
Proper sample containers? _____	RELINQUISHED BY _____				
Received via _____ Cooler? _____	RECEIVED BY _____				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue.

Page 1 of 9

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2020010349

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos

CONTACT:

SAMPLED BY: *Doug Baethner*

PHONE: *253-244-0539* FAX: TESTING

e-MAIL: Prefer FAX or e-MAIL

PURCHASE ORDER #: 20-13-1-009

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
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NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS				METALS			OTHER																	
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	3260/R24 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/R25 SEMI VOA BY 625 TTO	8270 PAHPNA	8082/R08 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B; 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT
1		X	X	X										X				X	X							X	
2																											
3																											
4																											
5																											
6																											
7																											
8																											
9																											
0																											

Spectra Internal Instructions
 Refer to the Kosmos oil seep WAPP Table 1 Parameters method of detection limits and levels

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>Doug Baethner</i>	Doug Baethner	TPU	1-13-20	10:00
RECEIVED BY	<i>SB</i>	Spencer Beck	Spectra	1/13/20	1236
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

01/31/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

P.O.#: Auth #20-20-1-012
 Project: Kosmos
 Client ID: D-2
 Sample Matrix: Water
 Date Sampled: 01/21/2020
 Date Received: 01/21/2020
 Spectra Project: 2020010572
 Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00161*	ug/L	EPA 1631E
Turbidity	4.1	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	< 0.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8

* Mercury analyzed by Fremont Analytical. Please see complete report attached.

<u>Surrogate</u>	<u>Recovery</u>	<u>Method</u>
p-Terphenyl	91	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	103	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a6/stb



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

01/31/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-20-1-012
Project: Kosmos
Client ID: D-2
Sample Matrix: Water
Date Sampled: 01/21/2020
Date Received: 01/21/2020
Spectra Project: 2020010572
Spectra Number: 1

Diesel	<70	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.09	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see complete report attached.

Surrogate	Recovery	Method
p-Terphenyl	91	NWTPH-D
Toluene-d8	93	NWTPH-G
4-Bromofluorobenzene	103	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

Page 2 of 2

January 22, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010572
Applies to Spectra #'s: 1
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	1/22/2020	Date Analyzed:	1/22/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/22/2020	Date Analyzed:	1/22/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	99.73	99.7
Cadmium	100.0	96.51	96.5
Chromium	100.0	99.44	99.4
Copper	100.0	97.42	97.4
Lead	100.0	95.07	95.1
Nickel	100.0	106.49	106.5
Zinc	100.0	105.00	105.0

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/22/2020	Date Analyzed:	1/22/2020				
Sample Spiked:	2020010221-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.92	100.0	103.28	102.4	103.60	102.7	0.3
Cadmium	0.00	100.0	93.86	93.9	96.26	96.3	2.5
Chromium	1.11	100.0	98.55	97.4	99.13	98.0	0.6
Copper	0.57	100.0	93.69	93.1	95.19	94.6	1.6
Lead	0.00	100.0	91.37	91.4	92.18	92.2	0.9
Nickel	2.28	100.0	102.01	99.7	106.87	104.6	4.8
Zinc	59.89	100.0	161.85	102.0	159.91	100.0	1.9

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES

Krista Hitz
Authorized by:

January 23, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug BoettnerSample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2020010572
Date Analyzed: 1/22/2020
Units: ug/L
Applies to Spectra #'s: #1**GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<0.4	10.0	11.5	115
Benzene	<0.4	10.0	11.3	113
Toluene	<0.4	10.0	9.40	94.0
Ethylbenzene	<0.4	10.0	10.24	102.4
Total Xylenes	<0.8	30.0	29.7	99.0
Gasoline	<50	250	264	105

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	102	100	Benzene	<0.4
1,2-Dichloroethane-d4	110	110	Toluene	<0.4
Toluene-d8	93	91	Ethylbenzene	<0.4
4-Bromofluorobenzene	100	100	Total Xylenes	<0.8
			MTBE	<0.4
			Gasoline	<50



Authorized by:



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories
Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010572
Work Order Number: 2001335

January 27, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 1 sample(s) on 1/22/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020010572
Work Order: 2001335

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001335-001	010572-1	01/21/2020 11:10 AM	01/22/2020 9:00 AM



CLIENT: Spectra Laboratories
Project: 2020010572

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

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- E - Value above quantitation range
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- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories
Project: 2020010572
Lab ID: 2001335-001
Client Sample ID: 010572-1

Collection Date: 1/21/2020 11:10:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27239

Analyst: WF

Mercury	1.61	0.500		ng/L	1	1/23/2020 10:57:09 PM
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Work Order: 2001335
 CLIENT: Spectra Laboratories
 Project: 2020010572

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: MB2-27239	SampType: MBLK	Units: ng/L	Prep Date: 1/23/2020	RunNo: 56873							
Client ID: MBLKW	Batch ID: 27239		Analysis Date: 1/23/2020	SeqNo: 1133904							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: MB2-27239	SampType: MBLK	Units: ng/L	Prep Date: 1/23/2020	RunNo: 56873							
Client ID: MBLKW	Batch ID: 27239		Analysis Date: 1/23/2020	SeqNo: 1133905							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: MB3-27239	SampType: MBLK	Units: ng/L	Prep Date: 1/23/2020	RunNo: 56873							
Client ID: MBLKW	Batch ID: 27239		Analysis Date: 1/23/2020	SeqNo: 1133906							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: LCS-27239	SampType: LCS	Units: ng/L	Prep Date: 1/23/2020	RunNo: 56873							
Client ID: LCSW	Batch ID: 27239		Analysis Date: 1/23/2020	SeqNo: 1133907							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	22.0	0.500	25.00	0	88.0	80	120				

Sample ID: 2001350-001ADUP	SampType: DUP	Units: ng/L	Prep Date: 1/23/2020	RunNo: 56873							
Client ID: BATCH	Batch ID: 27239		Analysis Date: 1/23/2020	SeqNo: 1133856							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	32.5	0.500						33.00	1.53	24	



Work Order: 2001335
 CLIENT: Spectra Laboratories
 Project: 2020010572

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001350-001AMS	SampType: MS	Units: ng/L			Prep Date: 1/23/2020	RunNo: 56873					
Client ID: BATCH	Batch ID: 27239				Analysis Date: 1/23/2020	SeqNo: 1133857					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	58.1	0.500	25.00	33.00	100	71	125				

Sample ID: 2001350-001AMSD	SampType: MSD	Units: ng/L			Prep Date: 1/23/2020	RunNo: 56873					
Client ID: BATCH	Batch ID: 27239				Analysis Date: 1/23/2020	SeqNo: 1133858					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	59.1	0.500	25.00	33.00	104	71	125	58.10	1.71	24	



Client Name: SPECTRA	Work Order Number: 2001335
Logged by: Carissa True	Date Received: 1/22/2020 9:00:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Mercury in water, preserved**
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Vis:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	12.0
Sample 1	12.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Return Samples Yes No

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

				NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER											
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX		NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E
010572-1	01/21/20	1110	Water	1																								X

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE		PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/21/20	3:00 PM
COC seals present? <u>intact?</u>	RECEIVED BY	<i>Emma Holmes</i>	Emma Holmes	Fal	1/22/20	0900
Temp at receipt _____ deg. C	RELINQUISHED BY					
Received within hold time? _____	RECEIVED BY					
Proper sample containers? _____	RELINQUISHED BY					
Received via <u>Cooler?</u>	RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue.

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2020010572

STANDARD RUSH

CLIENT: Tacoma Power (TPU)

3628 South 35th Street Tacoma, WA 98409

ADDRESS CHANGE

PROJECT: Kosmos

CONTACT:

SAMPLED BY: Doug Boettner

PHONE: 253-244-0529 FAX: TESTING

e-MAIL:

Prefer FAX
 or e-MAIL

PURCHASE ORDER #: 20-21-1-012

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
D-2	1/21/20	11:10 ^{am}	

NUMBER OF CONTAINERS

HYDROCARBONS		ORGANICS				METALS			OTHER																			
NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	E200/E24 VOA BY 624 TTO	E280 CHLOR SOLVENTS	E270/E25 SEMI VOA BY 625 TTO	E270 PAH/PNA	E082/E08 PCB	Organochlor Pests/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOO	SOLIDS (SPECIFY)	TSS	Total Cyanide by 4500B; 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT	
	X	X	X										X				X	X	X							X		

Spectra Internal Instructions
 Please Refer to the Kosmos Oil seep (WAPP) table 1 Parameters of detection limits and levels

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>Doug Boettner</i>	Doug Boettner	TPU	1-21-20	1:45
RECEIVED BY	<i>Marie Holt</i>	MARIE HOLT	Spectra	1-21-20	1:45
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

02/06/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

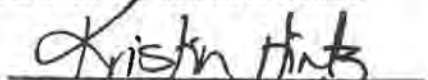
P.O.#: Auth #20-27-1-015
 Project: Kosmos
 Client ID: U-3
 Sample Matrix: Water
 Date Sampled: 01/27/2020
 Date Received: 01/27/2020
 Spectra Project: 2020010734
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	0.00502*	ug/L	EPA 1631E
Turbidity	20	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	1.2	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	4.0	µg/L	EPA 200.8
Diesel	140	µg/L	NWTPH-D
Oil	230	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.99	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Total Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	83	NWTPH-D
Toluene-d8	98	NWTPH-G
4-Bromofluorobenzene	102	NWTPH-G

SPECTRA LABORATORIES


 Authorized by: Kristin Hintz

a5/sks

02/06/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

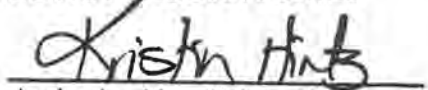
P.O.#: Auth #20-27-1-015
 Project: Kosmos
 Client ID: T-1
 Sample Matrix: Water
 Date Sampled: 01/27/2020
 Date Received: 01/27/2020
 Spectra Project: 2020010734
 Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	ND*	ug/L	EPA 1631E
Turbidity	333	NTU	EPA 180.1
Arsenic	0.8	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	12.8	µg/L	EPA 200.8
Lead	4.8	µg/L	EPA 200.8
Nickel	1.4	µg/L	EPA 200.8
Zinc	16.8	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	76	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.85	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Total Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	110	NWTPH-D
Toluene-d8	98	NWTPH-G
4-Bromofluorobenzene	97	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/sks

February 7, 2020

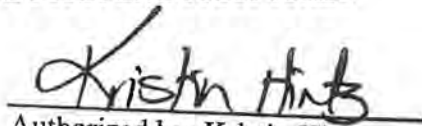
Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
Spectra Project # 2020010734
Applies to Spectra # 1-2

QUALITY CONTROL RESULTS CONVENTIONALS

<u>Analyte</u>	<u>Method</u>	<u>Date</u>	<u>Analyst</u>	Method	ICV	Batch		
				<u>Blank</u> <u>Result</u>	<u>%</u> <u>Rec.</u>	<u>Control</u> <u>Limits</u>	<u>Duplicate</u> <u>RPD</u>	<u>Control</u> <u>Limits</u>
Turbidity	EPA 180.1	01/28/20	HDE	<0.1	97.7	90.6-107	2.53	≤20
pH	SM 4500-H+B	01/28/20	HDE	N/A	100.6	± 0.2 pH	4.07	≤20

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

January 28, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010734
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	1/28/2020	Date Analyzed:	1/28/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/28/2020	Date Analyzed:	1/28/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	94.20	94.2
Cadmium	100.0	96.78	96.8
Chromium	100.0	101.58	101.6
Copper	100.0	103.29	103.3
Lead	100.0	98.92	98.9
Nickel	100.0	99.53	99.5
Zinc	100.0	103.50	103.5

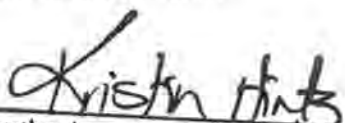
LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/28/2020	Date Analyzed:	1/28/2020				
Sample Spiked:	2020010723-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	98.18	98.2	102.22	102.2	4.0
Cadmium	0.00	100.0	94.89	94.9	98.47	98.5	3.7
Chromium	0.00	100.0	103.05	103.1	107.69	107.7	4.4
Copper	3.93	100.0	106.85	102.9	113.64	109.7	6.4
Lead	0.00	100.0	94.39	94.4	96.70	96.7	2.4
Nickel	0.00	100.0	101.54	101.5	105.55	105.6	3.9
Zinc	60.81	100.0	166.72	105.9	175.22	114.4	7.7

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 7, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Stormwater
Spectra Project: 2020010734
Applies to Sample # 1-2

STORMWATER HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/29/20
Units: mg/L Date Analyzed: 01/30/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	2.59	104

METHOD BLANK

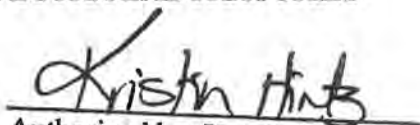
Date Extracted: 01/29/20 Date Analyzed: 01/30/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 84%

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

February 6, 2020

 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

 Units: mg/L
 Spectra Project: 2020010775
 Applies to Spectra #'s : 1,2

QUALITY CONTROL RESULTS
Hexavalent Chromium in Water/Liquid - Method SM 3500 Cr-D/ SW846 7196A
Method Blank

Date Analyzed: 1/28/2020

	Result
Hexavalent Chromium	<0.01

Blank Spike (LCS)

Date Analyzed: 1/28/2020

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.05	0.045	90

LCS Recovery limits 73-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Analyzed: 12/18/2019

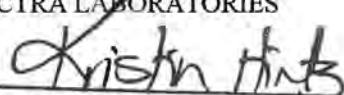
Sample Spiked: 010734-1

	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Hexavalent Chromium	<0.1	0.05	0.049	98	0.051	102	4.0

Low recovery due to matrix interference

RPD Limit 20

SPECTRA LABORATORIES


 Authorized by: Kristin Hintz

January 28, 2020

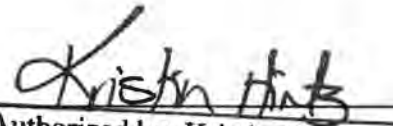
 Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

 Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010734
 Date Analyzed: 1/28/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

**GCMS VOLATILE ORGANIC ANALYSIS
 Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
MTBE	<1	10.0	11.6	116
Benzene	<1	10.0	12.4	124
Toluene	<1	10.0	12.20	122.0
Ethylbenzene	<1	10.0	12.43	124.3
Total Xylenes	<2	30.0	37.2	123.9
Gasoline	<50	250	251	100

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	99	102	Benzene	<0.4
1,2-Dichloroethane-d4	98	114	Toluene	<0.4
Toluene-d8	100	88	Ethylbenzene	<0.4
4-Bromofluorobenzene	96	103	Total Xylenes	<0.8
			MTBE	<0.4
			Gasoline	<50


 Authorized by: Kristin Hintz



Fremont
Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010734

Work Order Number: 2001466

February 03, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/29/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020010734
Work Order: 2001466

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001466-001	010734-1	01/27/2020 10:35 AM	01/29/2020 9:16 AM
2001466-002	010734-2	01/27/2020 10:50 AM	01/29/2020 9:16 AM



Case Narrative

WO#: 2001466

Date: 2/3/2020

CLIENT: Spectra Laboratories

Project: 2020010734

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories

Collection Date: 1/27/2020 10:35:00 AM

Project: 2020010734

Lab ID: 2001466-001

Matrix: Water

Client Sample ID: 010734-1

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Mercury by Method 1631E

Batch ID: 27314

Analyst: WF

Mercury

5.02

0.500

ng/L

1

1/31/2020 4:28:00 PM



Client: Spectra Laboratories

Collection Date: 1/27/2020 10:50:00 AM

Project: 2020010734

Lab ID: 2001466-002

Matrix: Water

Client Sample ID: 010734-2

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Mercury by Method 1631E

Batch ID: 27314

Analyst: WF

Mercury

ND

0.500

ng/L

1

1/31/2020 4:42:00 PM



Date: 2/3/2020

Work Order: 2001466
 CLIENT: Spectra Laboratories
 Project: 2020010734

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137730							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: MB2-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137731							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: MB3-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137732							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500									

Sample ID: LCS-27314	SampType: LCS	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: LCSW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137733							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	27.1	0.500	25.00	0	108	80	120				

Sample ID: 2001475-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137735							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.500						0		24	



Work Order: 2001466
CLIENT: Spectra Laboratories
Project: 2020010734

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: 2001475-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137736							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	18.3	0.500	25.00	0.2860	72.1	71	125				

Sample ID: 2001475-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137737							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	17.2	0.500	25.00	0.2860	67.7	71	125	18.30	6.20	24	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.



Client Name: **SPECTRA**
 Logged by: **Carissa True**

Work Order Number: **2001466**
 Date Received: **1/29/2020 9:16:00 AM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
 2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes No Not Required
 6. Was an attempt made to cool the samples? Yes No NA
 7. Were all items received at a temperature of >0°C to 10.0°C* LL Hg. Preserved Yes No NA
 8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	11.7
Sample 1	12.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Turnaround Time Requested
 STANDARD RUSH SPECIAL 3 day
 Lab Approval Required *Please*

CHAIN of CUSTODY

SPECTRA PROJECT # 2001466

Return Samples Yes No

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421

PROJECT: 2020010734
 CONTACT: Marie Holt
 SAMPLED BY:
 PHONE: 253-272-4850
 e-MAIL: marieh@spectra-lab.com
 PURCHASE ORDER #:

NUMBER OF CONTAINERS	HYDROCARBONS				ORGANICS				METALS				OTHER										
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1064 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF

	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																				
1	010734-1	01/27/20	1035	Water	1																			X
2	010734-2	01/27/20	1050	Water	1																			X
3																								
4																								
5																								
6																								
7																								
8																								
9																								
0																								

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY <i>Jen Draven</i>	Jen Draven	Spectra	01/28/20	3:00 PM
COC seals present? _____ Intact? _____	RECEIVED BY <i>Emma Holmes</i>	Emma Holmes	FBI	1/29/20	09:16
Temp at receipt _____ deg. C.	RELINQUISHED BY _____				
Received within hold time? _____	RECEIVED BY _____				
Proper sample containers? _____	RELINQUISHED BY _____				
Received via _____ Cooler? _____	RECEIVED BY _____				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus.

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:
 Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2020010734

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Boettner
 PHONE 253-381-1370 FAX: TESTING
 e-MAIL: Prefer FAX or e-MAIL
 PURCHASE ORDER #: 20-27-1-015

NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS				METALS		OTHER																	
	NWTPH-HClD	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/625 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TX/TOX 8076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B, 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium

	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NWTPH-HClD	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/625 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pest/PCB BY 608	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TX/TOX 8076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B, 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT		
1	U-3	1-27-20	10:35			X	X	X											X			X	X								X		
2	T-1	1-27-20	10:50			X	X	X											X			X	X								X		
3																																	
4																																	
5																																	
6																																	
7																																	
8																																	
9																																	
0																																	

Spectra Internal Instructions Please Refer to the Kosmos oil seep (wapp) Table 1 Parameters method of detection limits + levels	SIGNATURE		PRINTED NAME		COMPANY	DATE	TIME
	RELINQUISHED BY	<i>[Signature]</i>	Doug Boettner	TPU	1-27-20	1405	
	RECEIVED BY	<i>[Signature]</i>	Lorri Hamilton	Spectra	1-27-20	1405	
	RELINQUISHED BY						
RECEIVED BY							

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

02/07/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-28-1-019
Project: Kosmos
Client ID: U-3
Sample Matrix: Water
Date Sampled: 01/28/2020
Date Received: 01/28/2020
Spectra Project: 2020010775
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00574*		EPA 1631E
Turbidity	22.5	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	1.3	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.3	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	83	NWTPH-D
Toluene-d8	96	NWTPH-G
4-Bromofluorobenzene	103	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/mlh



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

02/07/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-28-1-019
Project: Kosmos
Client ID: T-1
Sample Matrix: Water
Date Sampled: 01/28/2020
Date Received: 01/28/2020
Spectra Project: 2020010775
Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00843*		EPA 1631E
Turbidity	44.6	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	2.5	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	83	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.2	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	55	NWTPH-D
Toluene-d8	96	NWTPH-G
4-Bromofluorobenzene	105	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz
a5/mlh



February 7, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
Spectra Project # 2020010775
Applies to Spectra # 1-2

QUALITY CONTROL RESULTS
CONVENTIONALS

<u>Analyte</u>	<u>Method</u>	<u>Date</u>	<u>Analyst</u>	Method	ICV	Batch		
				Blank	%	Control	Duplicate	Control
				<u>Result</u>	<u>Rec.</u>	<u>Limits</u>	<u>RPD</u>	<u>Limits</u>
Turbidity	EPA 180.1	01/28/20	HDE	<0.1	97.7	90.6-107	2.53	≤20
pH	SM 4500-H+B	01/28/20	HDE	N/A	100.6	± 0.2 pH	4.07	≤20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

January 31, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010775
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested:	1/31/2020	Date Analyzed:	1/31/2020
	<u>Element</u>	<u>CAS #</u>	<u>Result</u>
	Arsenic	7440-38-2	< 0.3
	Cadmium	7440-43-9	< 0.2
	Chromium	7440-47-3	< 0.5
	Copper	7440-50-8	< 0.3
	Lead	7439-92-1	< 0.5
	Nickel	7439-98-7	< 0.5
	Zinc	7440-66-6	< 0.3

Laboratory Fortified Blank (LFB)

Date Digested:	1/31/2020	Date Analyzed:	1/31/2020	
	<u>Element</u>	<u>Spike Added</u>	<u>LCS Conc.</u>	<u>LCS %Rec</u>
	Arsenic	100.0	94.40	94.4
	Cadmium	100.0	95.31	95.3
	Chromium	100.0	101.10	101.1
	Copper	100.0	103.40	103.4
	Lead	100.0	101.04	101.0
	Nickel	100.0	100.08	100.1
	Zinc	100.0	104.58	104.6

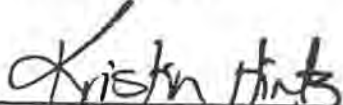
LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/31/2020	Date Analyzed:	1/31/2020				
Sample Spiked:	202010775-1						
<u>Element</u>	<u>Sample Conc.</u>	<u>Spike Conc.</u>	<u>MS Conc.</u>	<u>MS %Rec</u>	<u>MSD Conc.</u>	<u>MSD %Rec</u>	<u>RPD</u>
Arsenic	0.00	100.0	93.60	93.6	96.36	96.4	2.9
Cadmium	0.00	100.0	92.73	92.7	94.37	94.4	1.8
Chromium	0.00	100.0	94.85	94.9	98.65	98.6	3.9
Copper	1.29	100.0	96.89	95.6	99.61	98.3	2.8
Lead	0.00	100.0	93.66	93.7	96.99	97.0	3.5
Nickel	0.00	100.0	94.37	94.4	96.03	96.0	1.7
Zinc	0.00	100.0	94.93	94.9	102.17	102.2	7.4

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 7, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

Method: NWTPH-Dx
 Sample Matrix: Stormwater
 Spectra Project: 2020010775
 Applies to Sample # 1-2

**STORMWATER HYDROCARBON ANALYSIS
 QUALITY CONTROL RESULTS**

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 01/30/20
 Units: mg/L Date Analyzed: 02/03/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	2.20	88

METHOD BLANK

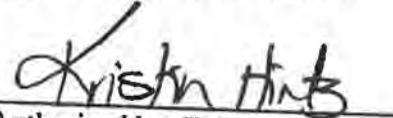
Date Extracted: 01/30/20 Date Analyzed: 02/03/20
 Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 71%

SPECTRA LABORATORIES


 Authorized by: Kristin Hintz

February 6, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: mg/L
Spectra Project: 2020010734
Applies to Spectra #'s : 1,2

QUALITY CONTROL RESULTS

Hexavalent Chromium in Water/Liquid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Analyzed: 1/28/2020

	Result
Hexavalent Chromium	<0.01

Blank Spike (LCS)

Date Analyzed: 1/28/2020

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.05	0.045	90

LCS Recovery limits 73-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Analyzed: 12/18/2019


Sample Spiked: 010734-1

	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Hexavalent Chromium	<0.1	0.05	0.049	98	0.051	102	4.0

Low recovery due to matrix interference

RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

January 30, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020010775
 Date Analyzed: 1/29/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4	10.0	10.2	102
Toluene	<0.4	10.0	9.99	99.9
Ethylbenzene	<0.4	10.0	9.89	98.9
Total Xylenes	<0.8	30.0	29.7	99.1
Gasoline	<50	250	239	95

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	100	Benzene	<0.4
1,2-Dichloroethane-d4	102	104	Toluene	<0.4
Toluene-d8	98	97	Ethylbenzene	<0.4
4-Bromofluorobenzene	100	102	Total Xylenes	<0.8
			Gasoline	<50



Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories
Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010775
Work Order Number: 2001502

February 04, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/30/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in black ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2020010775
Work Order: 2001502

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001502-001	010775-1	01/28/2020 12:00 AM	01/30/2020 12:26 PM
2001502-002	010775-2	01/28/2020 12:00 AM	01/30/2020 12:26 PM



CLIENT: Spectra Laboratories
Project: 2020010775

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

Work Order: 2001502
Date Reported: 2/4/2020

CLIENT: Spectra Laboratories
Project: 2020010775

Lab ID: 2001502-001

Collection Date: 1/28/2020

Client Sample ID: 010775-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27314 Analyst: WF

Mercury	5.74	0.500		ng/L	1	1/31/2020 4:52:00 PM
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Lab ID: 2001502-002

Collection Date: 1/28/2020

Client Sample ID: 010775-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27314 Analyst: WF

Mercury	8.43	0.500		ng/L	1	1/31/2020 5:03:00 PM
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Date: 2/4/2020

Work Order: 2001502
 CLIENT: Spectra Laboratories
 Project: 2020010775

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137730							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137731							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137732							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27314	SampType: LCS	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: LCSW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137733							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 27.1 0.500 25.00 0 108 80 120

Sample ID: 2001475-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137735							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Date: 2/4/2020

Work Order: 2001502
 CLIENT: Spectra Laboratories
 Project: 2020010775

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001475-001EMS	SampType: MS	Units: ng/L			Prep Date: 1/31/2020	RunNo: 57059					
Client ID: BATCH	Batch ID: 27314				Analysis Date: 1/31/2020	SeqNo: 1137736					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	18.3	0.500	25.00	0.2860	72.1	71	125				

Sample ID: 2001475-001EMSD	SampType: MSD	Units: ng/L			Prep Date: 1/31/2020	RunNo: 57059					
Client ID: BATCH	Batch ID: 27314				Analysis Date: 1/31/2020	SeqNo: 1137737					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	17.2	0.500	25.00	0.2860	67.7	71	125	18.30	6.20	24	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.



Client Name: **SPECTRA**
Logged by: **Carissa True**

Work Order Number: **2001502**
Date Received: **1/30/2020 12:26:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA

Mercury in water, preserved

7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	12.0
Sample 1	14.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SB
~~COC~~

Turnaround Time Requested

STANDARD RUSH SPECIAL

CHAIN of CUSTODY

3 day please

Lab Approval Required

SPECTRA PROJECT #

2001502

Return Samples Yes No X



SPECTRA Laboratories
...Where experience matters

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010775
CONTACT: Marie Holt
SAMPLED BY:
PHONE: 253-272-4850
e-MAIL: marieh@spectra-lab.com
PURCHASE ORDER #:

NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS			OTHER									
	NWTPH-ACID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1964 SGT-HEM (TPH)	1964 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	8082/808 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9078	TURBIDITY	FLASH POINT	BOO	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF

	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	HYDROCARBONS	ORGANICS	METALS	OTHER																
1	010775-1	01/28/20		Water	1																			X	
2	010775-2	01/28/20		Water	1																			X	
3																									
4																									
5																									
6																									
7																									
8																									
9																									
0																									

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY <i>Jen Draven</i>	Jen Draven	Spectra	01/29/20	3:00 PM
COC seals present? _____ Intact?	RECEIVED BY <i>[Signature]</i>	Sara Decker-Mayer	FBI	1/30/20	12:26
Temp at receipt _____ deg. C.	RELINQUISHED BY				
Received within hold time? _____	RECEIVED BY				
Proper sample containers? _____	RELINQUISHED BY				
Received via _____ Cooler?	RECEIVED BY				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co. WA versus.



SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838
 www.spectra-lab.com info@spectra-lab.com

Please use Clean Water Act Methods
 Refer to attached list of required methods and detection limits
 * As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)
 Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #
 2020010775

STANDARD RUSH

CLIENT: Tacoma Power (TPU) 3628 South 35th Street Tacoma, WA 98409 ADDRESS CHANGE

PROJECT: Kosmos
 CONTACT:
 SAMPLED BY: Doug Beethner
 PHONE: 253-244-0539 FAX: TESTING
 e-MAIL: Prefer FAX or e-MAIL
 PURCHASE ORDER #: 20-28-1-019

NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS				METALS			OTHER																
	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dk	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA BY 624 TTO	8260 CHLOR SOLVENTS	8270/625 SEMI VOA BY 625 TTO	8270 PAH/PNA	8082/608 PCB	Organochlor Pests/PCB BY 608	TOTAL METALS (SPECIFY)	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TXTOX 9076	TURBIDITY	FLASH POINT	SOO	SOLIDS (SPECIFY) TSS	Total Cyanide by 4010C; 4900C	Free Cyanide by D7217-10 SUB **	Hexavalent Chromium	Arsenic Nitrogen SUBCONTRACT
		X	X									X			X											X
		X	X									X			X											X
		X	X									X			X											X
		X	X									X			X											X

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX
U-3	1-28-20	10:00	
T-1	1-28-20		
DB	1-28-20		
DB	1-28-20		

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<u>Doug Beethner</u>	Doug Beethner	TPU	1-28-20	2:47
RECEIVED BY	<u>S. Beck</u>	S. Beck	Spectra	1/28/20	1448
RELINQUISHED BY					
RECEIVED BY					

Spectra Internal Instructions
 Please Refer to the Kosmos Oil seep (wapp) Table 1 Parameters, method of detection limits & levels

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC

02/10/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

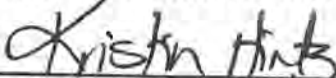
P.O.#: Auth #20-29-1-020
 Project: Kosmos
 Client ID: U3
 Sample Matrix: Water
 Date Sampled: 01/29/2020
 Date Received: 01/29/2020
 Spectra Project: 2020010835
 Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00598*	ug/L	EPA 1631E
Turbidity	36.5	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	2.6	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	1.8	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<100	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.84	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	118	NWTPH-D
Toluene-d8	99	NWTPH-G
4-Bromofluorobenzene	107	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/djs



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

02/10/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

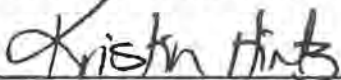
P.O.#: Auth #20-29-1-020
Project: Kosmos
Client ID: T1
Sample Matrix: Water
Date Sampled: 01/29/2020
Date Received: 01/29/2020
Spectra Project: 2020010835
Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00825*	ug/L	EPA 1631E
Turbidity	38.4	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	2.6	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<100	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.91	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. Please see the complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	119	NWTPH-D
Toluene-d8	100	NWTPH-G
4-Bromofluorobenzene	106	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/djs

February 10, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
Spectra Project # 2020010835
Applies to Spectra # 1-2

QUALITY CONTROL RESULTS CONVENTIONALS

<u>Analyte</u>	<u>Method</u>	<u>Date</u>	<u>Analyst</u>	Method	ICV	Batch		
				<u>Blank</u>	<u>%</u>	<u>Control</u>	<u>Duplicate</u>	<u>Control</u>
				<u>Result</u>	<u>Rec.</u>	<u>Limits</u>	<u>RPD</u>	<u>Limits</u>
Turbidity	EPA 180.1	01/29/20	MMO	<0.1	98.3	90.6-107	6.71	≤20
pH	SM 4500-H ⁺ B	01/29/20	MMO	N/A	99.9	± 0.2 pH	2.34	≤20

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

January 31, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010835
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	1/31/2020	Date Analyzed:	1/31/2020
Element	CAS #	Result	
Arsenic	7440-38-2	< 0.3	
Cadmium	7440-43-9	< 0.2	
Chromium	7440-47-3	< 0.5	
Copper	7440-50-8	< 0.3	
Lead	7439-92-1	< 0.5	
Nickel	7439-98-7	< 0.5	
Zinc	7440-66-6	< 0.3	

Laboratory Fortified Blank (LFB)

Date Digested:	1/31/2020	Date Analyzed:	1/31/2020
Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	94.40	94.4
Cadmium	100.0	95.31	95.3
Chromium	100.0	101.10	101.1
Copper	100.0	103.40	103.4
Lead	100.0	101.04	101.0
Nickel	100.0	100.08	100.1
Zinc	100.0	104.58	104.6

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	1/31/2020	Date Analyzed:	1/31/2020				
Sample Spiked:	202010775-1						
Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	93.60	93.6	96.36	96.4	2.9
Cadmium	0.00	100.0	92.73	92.7	94.37	94.4	1.8
Chromium	0.00	100.0	94.85	94.9	98.65	98.6	3.9
Copper	1.29	100.0	96.89	95.6	99.61	98.3	2.8
Lead	0.00	100.0	93.66	93.7	96.99	97.0	3.5
Nickel	0.00	100.0	94.37	94.4	96.03	96.0	1.7
Zinc	0.00	100.0	94.93	94.9	102.17	102.2	7.4

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 10, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2020010835
Applies to Sample # 1-2

STORMWATER HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 02/03/20
Units: mg/L Date Analyzed: 02/06/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.15	2.50	2.52	101

METHOD BLANK

Date Extracted: 02/03/20 Date Analyzed: 02/06/20
Units: mg/L

Total Petroleum Hydrocarbons <0.15

Surrogate Recoveries:

p-terphenyl 100%

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 10, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug BoettnerSample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2020010835
Date Analyzed: 2/5/2020
Units: ug/L
Applies to Spectra #'s: #1-2**GCMS VOLATILE ORGANIC ANALYSIS**
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4	10.0	9.3	93
Toluene	<0.4	10.0	9.25	92.5
Ethylbenzene	<0.4	10.0	9.77	97.7
Total Xylenes	<0.8	30.0	20.4	68.1
Gasoline	<50	250	254	102

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	102	Benzene	<0.4
1,2-Dichloroethane-d4	101	106	Toluene	<0.4
Toluene-d8	105	100	Ethylbenzene	<0.4
4-Bromofluorobenzene	100	108	Total Xylenes	<0.8
			Gasoline	<50


Authorized by: Kristin Hintz



Fremont
Analytical

3600 Fremont Ave. N.

Seattle, WA 98103

T: (206) 352-3790

F: (206) 352-7178

info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010835

Work Order Number: 2001523

February 05, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 1/31/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020010835
Work Order: 2001523

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2001523-001	010835-1	01/29/2020 10:50 AM	01/31/2020 9:30 AM
2001523-002	010835-2	01/29/2020 11:20 AM	01/31/2020 9:30 AM



CLIENT: Spectra Laboratories
Project: 2020010835

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories

Collection Date: 1/29/2020 10:50:00 AM

Project: 2020010835

Lab ID: 2001523-001

Matrix: Water

Client Sample ID: 010835-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
-----------------	---------------	-----------	-------------	--------------	-----------	----------------------

Mercury by Method 1631E

Batch ID: 27314

Analyst: WF

Mercury	5.98	0.500		ng/L	1	1/31/2020 5:14:00 PM
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Client: Spectra Laboratories

Collection Date: 1/29/2020 11:20:00 AM

Project: 2020010835

Lab ID: 2001523-002

Matrix: Water

Client Sample ID: 010835-2

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Mercury by Method 1631E

Batch ID: 27314

Analyst: WF

Mercury

8.25

0.500

ng/L

1

1/31/2020 5:25:00 PM



Date: 2/5/2020

Work Order: 2001523
 CLIENT: Spectra Laboratories
 Project: 2020010835

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137730							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137731							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27314	SampType: MBLK	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: MBLKW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137732							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27314	SampType: LCS	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: LCSW	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137733							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 27.1 0.500 25.00 0 108 80 120

Sample ID: 2001475-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137735							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Date: 2/5/2020

Work Order: 2001523
 CLIENT: Spectra Laboratories
 Project: 2020010835

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2001475-001EMS	SampType: MS	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137736							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	18.3	0.500	25.00	0.2860	72.1	71	125				

Sample ID: 2001475-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 1/31/2020	RunNo: 57059							
Client ID: BATCH	Batch ID: 27314		Analysis Date: 1/31/2020	SeqNo: 1137737							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	17.2	0.500	25.00	0.2860	67.7	71	125	18.30	6.20	24	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.



Sample Log-In Check List

Client Name: SPECTRA	Work Order Number: 2001523
Logged by: Clare Griggs	Date Received: 1/31/2020 9:30:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- LL Hg in water, preserved.
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	12.3
Sample	14.7

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Turnaround Time Requested
 STANDARD RUSH SPECIAL *3 day please*
 Lab Approval Required

CHAIN of CUSTODY

SPECTRA PROJECT # *2001523*

Return Samples Yes No

CLIENT: Spectra Laboratories				ADDRESS: 2221 Ross Way Tacoma, WA				ZIP: 98421				ADDRESS CHANGE <input type="checkbox"/>	
PROJECT: 2020010835				NUMBER OF CONTAINERS		HYDROCARBONS		ORGANICS		METALS		OTHER	
CONTACT: Marie Holt						BTEX		8260/824 VOA		TOTAL METALS RCRA 8		TURBIDITY	
SAMPLED BY:						BTEX/MWTPH-G		8260 CHLOR SOLVENTS		TOTAL METALS (SPECIFY)		FLASH POINT	
PHONE: 253-272-4850						MWTPH-G		8270/825 SEMI VOA		TCLP METALS RCRA 8		BOD	
e-MAIL: marleh@spectra-lab.com						MWTPH-Dx		8270 PAH/PINA		TCLP METALS (SPECIFY)		SOLIDS (SPECIFY)	
PURCHASE ORDER #:						1604 SGT-HEM (TPH)		8082/808 PCB		PH 9040/9045		Fecal Coliform - MPN or MP	
SAMPLE ID		DATE SAMPLED	TIME SAMPLED	MATRIX	1604 HEM (FOG)								
1	010835-1	01/29/20	1050	Water								X	
2	010835-2	01/07/20	1120	Water								X	
3		<i>1/29/20</i>											
4		<i>for lab</i>											
5		<i>see lab</i>											
6													
7													
8													
9													
0													

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)		SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY	<i>Jen Draven</i>	Jen Draven	Spectra	01/30/20	3:00 PM
COC seals present? _____ Intact? _____	RECEIVED BY	<i>EMMA HELMS</i>	EMMA HELMS	FAI	1/30/20	0930
Temp at receipt _____ deg. C	RELINQUISHED BY					
Received within hold time? _____	RECEIVED BY					
Proper sample containers? _____	RELINQUISHED BY					
Received via _____ Cooler? _____	RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus.

SPECTRA Laboratories

2221 Ross Way, Tacoma, WA 98421
 (253) 272-4850 Fax (253) 572-9838

www.spectra-lab.com info@spectra-lab.com

Please use Clean Water Act Methods
 *Refer to attached list of required methods and detection limits

* As, Cd, Cr, Cu, Pb, Ni, Zn (EPA Method 200.8), Hg (EPA 1631E)

Return Samples Y N Page 1 of 1

CHAIN of CUSTODY

SPECTRA PROJECT #

2020010835

STANDARD RUSH

ADDRESS CHANGE

CLIENT: Tacoma Power (TPU)

3628 South 35th Street Tacoma, WA 98409

PROJECT: Kosmos

CONTACT:

SAMPLED BY: Doug Boettner

PHONE: 253-294-0539 FAX: TESTING

e-MAIL: Prefer FAX
 or e-MAIL

PURCHASE ORDER #: 20-29-1-020

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS				METALS			OTHER																				
					NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-OX	1694 SGT-HEM (TPH)	1694 HEM (FOG)	5270/624 VOA BY 624 TIO	8260 CHLOR SOLVENTS	5270/625 SEMI VOA BY 625 TIO	5270 PAH/PNA	8032/608 PCB	Organochlor Pesticides BY 606	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 9	TCLP METALS (SPECIFY)	PH 90-40/90-45	TX/TOX 9076	TURBIDITY	FLASH POINT	BOO	SOLIDS (SPECIFY) TSS	Total Cyanide by 4500B, 4500C	Free Cyanide by D7237-10 SUB **	Hexavalent Chromium	Ammonia Nitrogen SUBCONTRACT			
U 3	1-29-20	10:50					X	X	X					X			X	X															X	
T 1	1-29-20	10:20					X		X					X			X	X															X	

Spectra Internal Instructions
 Please refer to the Kosmos oil seep wgpp table 1 parameters method of detection limits + levels

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	<i>Doug Boettner</i>	Doug Boettner	TPU	1-29-20	2:31
RECEIVED BY	<i>S Beck</i>	S Beck	Spectra	1/29/20	1431
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, LLC



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

02/10/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-31-1-021
Project: Kosmos
Client ID: U3
Sample Matrix: Water
Date Sampled: 01/31/2020
Date Received: 01/31/2020
Spectra Project: 2020010921
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00599*	ug/L	EPA 1631E
Turbidity	17.2	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	1.7	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	1.6	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<100	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.15	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Analyzed by Fremont Analytical. See complete report attached.

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	140	NWTPH-D
Toluene-d8	99	NWTPH-G
4-Bromofluorobenzene	106	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz.



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02/10/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-31-1-021
Project: Kosmos
Client ID: T1
Sample Matrix: Water
Date Sampled: 01/31/2020
Date Received: 01/31/2020
Spectra Project: 2020010921
Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00611*	ug/L	EPA 1631E
Turbidity	15.2	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	1.7	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	< 0.3	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<100	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.30	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

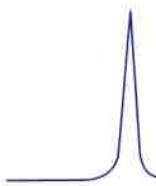
<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	155	NWTPH-D
Toluene-d8	99	NWTPH-G
4-Bromofluorobenzene	105	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/djs



February 10, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
Spectra Project # 2020010921
Applies to Spectra # 1-2

QUALITY CONTROL RESULTS
CONVENTIONALS

<u>Analyte</u>	<u>Method</u>	<u>Date</u>	<u>Analyst</u>	Method	ICV	<u>Control Limits</u>	Batch	
				Blank	%		Duplicate	Control
				<u>Result</u>	<u>Rec.</u>		<u>RPD</u>	<u>Limits</u>
Turbidity	EPA 180.1	01/31/20	MMO	<0.1	98.1	90.6-107	0	≤20
pH	SM 4500-H ⁺ B	01/31/20	MMO	N/A	99.9	± 0.2 pH	1.76	≤20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 4, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020010921
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested: 2/4/2020 Date Analyzed: 2/4/2020

Element	CAS #	Result
Arsenic	7440-38-2	< 0.3
Cadmium	7440-43-9	< 0.2
Chromium	7440-47-3	< 0.5
Copper	7440-50-8	< 0.3
Lead	7439-92-1	< 0.5
Nickel	7439-98-7	< 0.5
Zinc	7440-66-6	< 0.3

Laboratory Fortified Blank (LFB)

Date Digested: 2/4/2020 Date Analyzed: 2/4/2020

Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	100.0	92.63	92.6
Cadmium	100.0	93.99	94.0
Chromium	100.0	98.12	98.1
Copper	100.0	102.00	102.0
Lead	100.0	97.94	97.9
Nickel	100.0	98.20	98.2
Zinc	100.0	100.49	100.5

LCS Recovery limits 85-115%


Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 2/4/2020 Date Analyzed: 2/4/2020
Sample Spiked: 2020020007-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.00	100.0	93.34	93.3	92.03	92.0	1.4
Cadmium	0.00	100.0	88.58	88.6	86.13	86.1	2.8
Chromium	0.00	100.0	100.95	101.0	99.00	99.0	2.0
Copper	0.00	100.0	102.42	102.4	99.10	99.1	3.3
Lead	0.00	100.0	90.92	90.9	90.84	90.8	0.1
Nickel	0.00	100.0	98.24	98.2	97.68	97.7	0.6
Zinc	57.19	100.0	164.05	106.9	158.90	101.7	4.9

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 10, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

Method: NWTPH-Dx
 Sample Matrix: Water
 Spectra Project: 2020010921
 Applies to Sample # 1-2

STORMWATER HYDROCARBON ANALYSIS
 QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 02/03/20
 Units: mg/L Date Analyzed: 02/06/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike</u>		<u>Percent Recovery</u>
		<u>Amount Added</u>	<u>Amount Found</u>	
Diesel	<0.15	2.50	2.52	101

METHOD BLANK

Date Extracted: 02/03/20 Date Analyzed: 02/06/20
 Units: mg/L

Total Petroleum Hydrocarbons <0.15

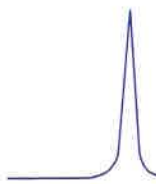
Surrogate Recoveries:

p-terphenyl 100%

SPECTRA LABORATORIES



Authorized by: Kristin Hintz



February 10, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2020010921
Date Analyzed: 2/5/2020
Units: ug/L
Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4	10.0	9.3	93
Toluene	<0.4	10.0	9.25	92.5
Ethylbenzene	<0.4	10.0	9.77	97.7
Total Xylenes	<0.8	30.0	20.4	68.1
Gasoline	<50	250	254	102

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	102	Benzene	<0.4
1,2-Dichloroethane-d4	101	106	Toluene	<0.4
Toluene-d8	105	100	Ethylbenzene	<0.4
4-Bromofluorobenzene	100	108	Total Xylenes	<0.8
			Gasoline	<50


Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020010921

Work Order Number: 2002019

February 07, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 2/4/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in black ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



Date: 02/07/2020

CLIENT: Spectra Laboratories
Project: 2020010921
Work Order: 2002019

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2002019-001	010921-1	01/31/2020 11:00 AM	02/04/2020 9:10 AM
2002019-002	010921-2	01/31/2020 10:30 AM	02/04/2020 9:10 AM



CLIENT: Spectra Laboratories

Project: 2020010921

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Spectra Laboratories

Collection Date: 1/31/2020 11:00:00 AM

Project: 2020010921

Lab ID: 2002019-001

Matrix: Water

Client Sample ID: 010921-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27337

Analyst: WF

Mercury	5.99	0.500		ng/L	1	2/5/2020 5:10:00 PM
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Client: Spectra Laboratories

Collection Date: 1/31/2020 10:30:00 AM

Project: 2020010921

Lab ID: 2002019-002

Matrix: Water

Client Sample ID: 010921-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Mercury by Method 1631E

Batch ID: 27337

Analyst: WF

Mercury	6.11	0.500		ng/L	1	2/5/2020 5:21:00 PM
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Date: 2/7/2020

Work Order: 2002019
 CLIENT: Spectra Laboratories
 Project: 2020010921

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27337	SampType: MBLK	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: MBLKW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139434							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27337	SampType: MBLK	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: MBLKW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139435							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27337	SampType: MBLK	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: MBLKW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139436							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27337	SampType: LCS	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: LCSW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139437							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 25.7 0.500 25.00 0 103 80 120

Sample ID: 2002010-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: BATCH	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139439							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 1.94 0.500 1.990 2.54 24



Work Order: 2002019
CLIENT: Spectra Laboratories
Project: 2020010921

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: 2002010-001EMS	SampType: MS	Units: ng/L			Prep Date: 2/4/2020	RunNo: 57154					
Client ID: BATCH	Batch ID: 27337				Analysis Date: 2/5/2020	SeqNo: 1139440					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	26.9	0.500	25.00	1.990	99.6	71	125				

Sample ID: 2002010-001EMSD	SampType: MSD	Units: ng/L			Prep Date: 2/4/2020	RunNo: 57154					
Client ID: BATCH	Batch ID: 27337				Analysis Date: 2/5/2020	SeqNo: 1139441					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	27.4	0.500	25.00	1.990	102	71	125	26.90	1.84	24	



Sample Log-In Check List

Client Name: SPECTRA	Work Order Number: 2002019
Logged by: Clare Griggs	Date Received: 2/4/2020 9:10:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of >2°C to 6°C * Yes No NA

Mercury in water, preserved.

8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	9.6
Sample	8.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020010921
CONTACT: Marie Holt
SAMPLED BY:
PHONE: 253-272-4850
e-MAIL: marieh@spectra-lab.com
PURCHASE ORDER #:

NUMBER OF CONTAINERS	HYDROCARBONS					ORGANICS				METALS			OTHER										
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-DX	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF

	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	HYDROCARBONS	ORGANICS	METALS	OTHER
1	010921-1	01/31/20	1100	Water	1				X
2	010921-2	01/31/20	1030	Water	1				X
3									
4									
5									
6									
7									
8									
9									
0									

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	<i>Jen Draven</i>	Jen Draven	Spectra	02/03/20	3:00 PM
COC seals present? _____ Intact? _____	<i>John Carter</i>	Carter Johnson	FAI	2/4/20	0910
Temp at receipt _____ deg. C.					
Received within hold time? _____					
Proper sample containers? _____					
Received via _____ Cooler? _____					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue.

02/12/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

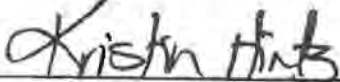
P.O.#: Auth #20-4-2-024
 Project: Kosmos
 Client ID: U-3
 Sample Matrix: Water
 Date Sampled: 02/04/2020
 Date Received: 02/04/2020
 Spectra Project: 2020020049
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	0.000536*	ug/L	EPA 1631E
Turbidity	13	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	13.3	µg/L	EPA 200.8
Lead	1.3	µg/L	EPA 200.8
Nickel	3.7	µg/L	EPA 200.8
Zinc	28.8	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	210	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.34	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Analyzed by Fremont Analytical. See complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	100	NWTPH-D
Toluene-d8	100	NWTPH-G
4-Bromofluorobenzene	107	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz
 a5/klb



SPECTRA Laboratories

...Where experience matters

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

02/12/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

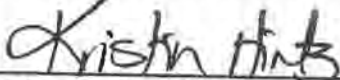
P.O.#: Auth #20-4-2-024
Project: Kosmos
Client ID: T-1
Sample Matrix: Water
Date Sampled: 02/04/2020
Date Received: 02/04/2020
Spectra Project: 2020020049
Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.00293*	ug/L	EPA 1631E
Turbidity	8.1	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	1.9	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	0.8	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	110	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.14	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Analyzed by Fremont Analytical. See complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	102	NWTPH-D
Toluene-d8	99	NWTPH-G
4-Bromofluorobenzene	105	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz
a5/klh

02/12/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

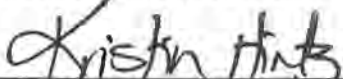
P.O.#: Auth #20-4-2-024
 Project: Kosmos
 Client ID: T-2
 Sample Matrix: Water
 Date Sampled: 02/04/2020
 Date Received: 02/04/2020
 Spectra Project: 2020020049
 Spectra Number: 3

Analyte	Result	Units	Method
Total Mercury	ND*	ug/L	EPA 1631E
Turbidity	7.8	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	2.1	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	< 0.5	µg/L	EPA 200.8
Zinc	1.3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	100	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.18	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Analyzed by Fremont Analytical. See complete report attached.

Surrogate	% Recovery	Method
p-Terphenyl	101	NWTPH-D
Toluene-d8	99	NWTPH-G
4-Bromofluorobenzene	109	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/klh

February 7, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020020049
Applies to Spectra #'s: 1-3
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested:	2/7/2020	Element	CAS #	Date Analyzed:	2/7/2020	Result
		Arsenic	7440-38-2			< 0.3
		Cadmium	7440-43-9			< 0.2
		Chromium	7440-47-3			< 0.5
		Copper	7440-50-8			< 0.3
		Lead	7439-92-1			< 0.5
		Nickel	7439-98-7			< 0.5
		Zinc	7440-66-6			< 0.3

Laboratory Fortified Blank (LFB)

Date Digested:	2/7/2020	Element	Spike Added	LCS Conc.	LCS %Rec
		Arsenic	100.0	93.43	93.4
		Cadmium	100.0	93.72	93.7
		Chromium	100.0	99.51	99.5
		Copper	100.0	103.38	103.4
		Lead	100.0	105.54	105.5
		Nickel	100.0	98.77	98.8
		Zinc	100.0	103.10	103.1

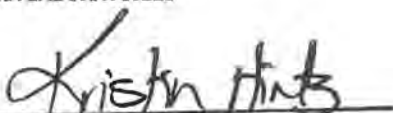
LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	2/7/2020	Sample	Spike	MS	MS	MSD	MSD	RPD	
Sample Spiked:	2020020170-1	Conc.	Conc.	Conc.	%Rec	Conc	%Rec		
		Arsenic	0.26	100.0	103.86	103.6	105.31	105.1	1.4
		Cadmium	0.00	100.0	86.51	86.5	88.33	88.3	2.1
		Chromium	1.09	100.0	102.03	100.9	101.20	100.1	0.8
		Copper	12.63	100.0	116.27	103.6	115.91	103.3	0.4
		Lead	0.55	100.0	104.39	103.8	104.11	103.6	0.3
		Nickel	8.59	100.0	110.55	102.0	110.33	101.7	0.2
		Zinc	113.58	100.0	217.50	103.9	219.53	105.9	1.9

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

February 10, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020020049
 Date Analyzed: 2/5/2020
 Units: ug/L
 Applies to Spectra #'s: #1-3

GCMS VOLATILE ORGANIC ANALYSIS
Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4	10.0	9.3	93
Toluene	<0.4	10.0	9.25	92.5
Ethylbenzene	<0.4	10.0	9.77	97.7
Total Xylenes	<0.8	30.0	20.4	68.1
Gasoline	<50	250	244	98

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	102	Benzene	<0.4
1,2-Dichloroethane-d4	101	106	Toluene	<0.4
Toluene-d8	105	100	Ethylbenzene	<0.4
4-Bromofluorobenzene	100	108	Total Xylenes	<0.8
			Gasoline	<50



Authorized by: Kristin Hintz

February 12, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Units: mg/L
 Spectra Project: 2020020049
 Applies to Spectra #'s : 1-3

QUALITY CONTROL RESULTS

Hexavalent Chromium in Water/Liquid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Analyzed: 2/4/2020

	Result
Hexavalent Chromium	<0.01

Blank Spike (LCS)

Date Analyzed: 2/4/2020

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.05	0.047	94

LCS Recovery limits 73-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)


Date Analyzed: 2/4/2020

Sample Spiked: 020006-1

	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Hexavalent Chromium	<0.1	0.05	0.069	138	0.058	116	17.3

RPD Limit 20

SPECTRA LABORATORIES



Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020020049

Work Order Number: 2002045

February 10, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 3 sample(s) on 2/5/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in black ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Spectra Laboratories
Project: 2020020049
Work Order: 2002045

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2002045-001	020049-1	02/04/2020 10:45 AM	02/05/2020 12:05 PM
2002045-002	020049-2	02/04/2020 11:00 AM	02/05/2020 12:05 PM
2002045-003	020049-3	02/04/2020 11:20 AM	02/05/2020 12:05 PM



CLIENT: Spectra Laboratories
Project: 2020020049

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories
Project: 2020020049

Lab ID: 2002045-001 Collection Date: 2/4/2020 10:45:00 AM
Client Sample ID: 020049-1 Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Mercury by Method 1631E						
						Batch ID: 27337 Analyst: WF
Mercury	0.536	0.500		ng/L	1	2/5/2020 7:00:00 PM

Lab ID: 2002045-002 Collection Date: 2/4/2020 11:00:00 AM
Client Sample ID: 020049-2 Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Mercury by Method 1631E						
						Batch ID: 27337 Analyst: WF
Mercury	2.93	0.500		ng/L	1	2/5/2020 7:11:00 PM

Lab ID: 2002045-003 Collection Date: 2/4/2020 11:20:00 AM
Client Sample ID: 020049-3 Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Mercury by Method 1631E						
						Batch ID: 27337 Analyst: WF
Mercury	ND	0.500		ng/L	1	2/5/2020 7:22:00 PM



Date: 2/10/2020

Work Order: 2002045
 CLIENT: Spectra Laboratories
 Project: 2020020049

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27337	SampType: MBLK	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: MBLKW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139434							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27337	SampType: MBLK	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: MBLKW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139435							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27337	SampType: MBLK	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: MBLKW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139436							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27337	SampType: LCS	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: LCSW	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139437							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 25.7 0.500 25.00 0 103 80 120

Sample ID: 2002010-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 2/4/2020	RunNo: 57154							
Client ID: BATCH	Batch ID: 27337		Analysis Date: 2/5/2020	SeqNo: 1139439							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 1.94 0.500 1.990 2.54 24



Work Order: 2002045
 CLIENT: Spectra Laboratories
 Project: 2020020049

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2002010-001EMS	SampType: MS	Units: ng/L				Prep Date: 2/4/2020	RunNo: 57154				
Client ID: BATCH	Batch ID: 27337					Analysis Date: 2/5/2020	SeqNo: 1139440				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	26.9	0.500	25.00	1.990	99.6	71	125				

Sample ID: 2002010-001EMSD	SampType: MSD	Units: ng/L				Prep Date: 2/4/2020	RunNo: 57154				
Client ID: BATCH	Batch ID: 27337					Analysis Date: 2/5/2020	SeqNo: 1139441				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	27.4	0.500	25.00	1.990	102	71	125	26.90	1.84	24	



Client Name: **SPECTRA**
Logged by: **Carissa True**

Work Order Number: **2002045**
Date Received: **2/5/2020 12:05:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- Mercury in water, preserved
7. Were all items received at a temperature of >2°C to 6°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Custody seal from Carter J. 2/4

Item Information

Item #	Temp °C
Cooler 1	10.8
Sample 1	10.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421

PROJECT: 2020020049	NUMBER OF CONTAINERS	HYDROCARBONS										ORGANICS					METALS			OTHER									
CONTACT: Marie Holt		NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/824 VOA	8260 CHLOR SOLVENTS	8270/825 SEMI VOA	8270 PAH/PNA	9082/908 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 8040/8045	TX/TOX 9078	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E				
SAMPLED BY:																													
PHONE: 253-272-4850																													
e-MAIL: marieh@spectra-lab.com																													
PURCHASE ORDER #:																													
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX																										

1	020049-1	02/04/20	1045	Water	1																				X
2	020049-2	02/04/20	1100	Water	1																				X
3	020049-3	02/04/20	1120	Water	1																				X
4																									
5																									
6																									
7																									
8																									
9																									
0																									

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY <i>Jen Draven</i>	Jen Draven	Spectra	02/04/20	3:00 PM
COC seals present? <input type="checkbox"/> Intact? <input type="checkbox"/>	RECEIVED BY <i>Emma Holmes</i>	Emma Holmes	FA-1	2/5/20	12:05
Temp at receipt _____ deg. C.	RELINQUISHED BY				
Received within hold time? _____	RECEIVED BY				
Proper sample containers? _____	RELINQUISHED BY				
Received via _____ Cooler? <input type="checkbox"/>	RECEIVED BY				

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA versus.



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03/04/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-8-2-026
Project: Kosmos
Client ID: Log Pond #1
Sample Matrix: Water
Date Sampled: 02/08/2020
Date Received: 02/10/2020
Spectra Project: 2020020269
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	0.009*	ug/L	EPA 1631E
Turbidity	25	NTU	EPA 180.1
Arsenic	< 0.3	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	6.1	µg/L	EPA 200.8
Lead	< 0.5	µg/L	EPA 200.8
Nickel	0.8	µg/L	EPA 200.8
Zinc	16..3	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	95	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	5.95	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Analyzed by Fremont Analytical. See complete report attached.

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
Toluene-d8	94	NWTPH-G
4-Bromofluorobenzene	101	NWTPH-G
p-Terphenyl	107	NWTPH-D

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Authorized by: Kristin Hintz

a5/sks



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03/04/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-8-2-026
Project: Kosmos
Client ID: Log Pond #2
Sample Matrix: Water
Date Sampled: 02/08/2020
Date Received: 02/10/2020
Spectra Project: 2020020269
Spectra Number: 2

Analyte	Result	Units	Method
Total Mercury	ND*	ug/L	EPA 1631E
Turbidity	62	NTU	EPA 180.1
Arsenic	0.8	µg/L	EPA 200.8
Cadmium	< 0.2	µg/L	EPA 200.8
Chromium	< 0.5	µg/L	EPA 200.8
Copper	6.2	µg/L	EPA 200.8
Lead	0.9	µg/L	EPA 200.8
Nickel	1.7	µg/L	EPA 200.8
Zinc	21.6	µg/L	EPA 200.8
Diesel	<50	µg/L	NWTPH-D
Oil	<50	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.26	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

Surrogate	% Recovery	Method
Toluene-d8	94	NWTPH-G
4-Bromofluorobenzene	100	NWTPH-G
p-Terphenyl	120	NWTPH-D

SPECTRA LABORATORIES



Authorized by: Kristin Hintz
a5/sks

March 5, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
Spectra Project # 2020020269
Applies to Spectra # 1-2

QUALITY CONTROL RESULTS CONVENTIONALS

<u>Analyte</u>	<u>Method</u>	<u>Date</u>	<u>Analyst</u>	Method	ICV	Batch		
				Blank	%	Control	Duplicate	Control
				<u>Result</u>	<u>Rec.</u>	<u>Limits</u>	<u>RPD</u>	<u>Limits</u>
Turbidity	EPA 180.1	2/10/20	HDE	<0.1	97.7	96-110	1.57	≤20
pH	SM 4500-H ⁺ B	2/10/20	HDE	N/A	99	± 0.2 pH	0.66	≤20

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

February 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020020269
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank (LRB)

Date Digested:	2/13/2020	Element	CAS #	Date Analyzed:	2/13/2020	Result
		Arsenic	7440-38-2			< 0.3
		Cadmium	7440-43-9			< 0.2
		Chromium	7440-47-3			< 0.5
		Copper	7440-50-8			< 0.3
		Lead	7439-92-1			< 0.5
		Nickel	7439-98-7			< 0.5
		Zinc	7440-66-6			< 0.3

Laboratory Fortified Blank (LFB)

Date Digested:	2/13/2020	Element	Spike Added	LCS Conc.	LCS %Rec	Date Analyzed:	2/13/2020
		Arsenic	100.0	93.40	93.4		
		Cadmium	100.0	91.15	91.1		
		Chromium	100.0	95.43	95.4		
		Copper	100.0	100.97	101.0		
		Lead	100.0	92.39	92.4		
		Nickel	100.0	96.01	96.0		
		Zinc	100.0	103.00	103.0		

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	2/13/2020	Sample	Spike	MS	MS	MSD	MSD	RPD	
Sample Spiked:	2020020143-1	Conc.	Conc.	Conc.	%Rec	Conc	%Rec		
		Arsenic	0.92	100.0	88.71	87.8	105.31	104.4	17.3
		Cadmium	0.00	100.0	81.28	81.3	81.94	81.9	0.8
		Chromium	0.00	100.0	87.22	87.2	87.42	87.4	0.2
		Copper	7.10	100.0	98.9	91.8	96.1	89.0	3.1
		Lead	0.00	100.0	80.32	80.3	81.04	81.0	0.9
		Nickel	0.00	100.0	84.21	84.2	84.97	85.0	0.9
		Zinc	80.39	100.0	169.4	89.0	174.0	93.6	5.0

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

March 5, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2020010269
Applies to Sample # 1-2

STORMWATER HYDROCARBON ANALYSIS
QUALITY CONTROL RESULTS

BLANK SPIKE (LCS)

Spiked Sample: LCS Date Extracted: 02/20/20
Units: mg/L Date Analyzed: 02/25/20

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	2.24	90

METHOD BLANK

Date Extracted: 02/20/20 Date Analyzed: 02/25/20
Units: mg/L

Total Petroleum Hydrocarbons <0.10

Surrogate Recoveries:

p-terphenyl 111%

SPECTRA LABORATORIES


Authorized by: Kristin Hintz

March 4, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411

Units: mg/L
 Spectra Project: 20200269
 Applies to Spectra #'s : 1-2

QUALITY CONTROL RESULTS

Hexavalent Chromium in Water/Liquid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Analyzed: 2/10/2020

	Result
Hexavalent Chromium	<0.01

Blank Spike (LCS)

Date Analyzed: 2/10/2020

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.05	0.047	94

LCS Recovery limits 73-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

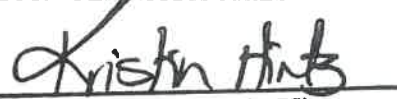
Date Analyzed: 2/10/2020

Sample Spiked: 020269-1

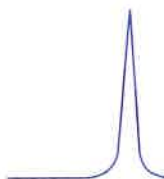
	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Hexavalent Chromium	<0.1	0.05	0.041	82	0.035	70	15.8

RPD Limit 20

SPECTRA LABORATORIES



Authorized by: Kristin Hintz



February 13, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Sample Matrix: Water
EPA Method: 624/8260C
Spectra Project: 2020020269
Date Analyzed: 2/11/2020
Units: ug/L
Applies to Spectra #'s: #1-2

GCMS VOLATILE ORGANIC ANALYSIS Method Blank and Laboratory Control Sample (LCS) Results

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4	10.0	11.4	114
Toluene	<0.4	10.0	10.94	109.4
Ethylbenzene	<0.4	10.0	10.63	106.3
Total Xylenes	<0.8	30.0	32.2	107.2
Gasoline	<50	250	249	100

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	99	102	Benzene	<0.4
1,2-Dichloroethane-d4	100	107	Toluene	<0.4
Toluene-d8	97	93	Ethylbenzene	<0.4
4-Bromofluorobenzene	92	103	Total Xylenes	<0.8
			Gasoline	<50

Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020020269

Work Order Number: 2002161

February 18, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 2/11/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020020269
Work Order: 2002161

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2002161-001	020269-1	02/08/2020 9:20 AM	02/11/2020 9:37 AM
2002161-002	020269-2	02/08/2020 10:10 AM	02/11/2020 9:37 AM



CLIENT: Spectra Laboratories

Project: 2020020269

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories
Project: 2020020269

Lab ID: 2002161-001 **Collection Date:** 2/8/2020 9:20:00 AM
Client Sample ID: 020269-1 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Mercury by Method 1631E				Batch ID: 27444	Analyst: WF	
Mercury	9.00	0.500		ng/L	1	2/18/2020 1:22:00 PM

Lab ID: 2002161-002 **Collection Date:** 2/8/2020 10:10:00 AM
Client Sample ID: 020269-2 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Mercury by Method 1631E				Batch ID: 27444	Analyst: WF	
Mercury	ND	0.500		ng/L	1	2/18/2020 1:32:00 PM



Date: 2/18/2020

Work Order: 2002161
 CLIENT: Spectra Laboratories
 Project: 2020020269

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: MB-27444	SampType: MBLK	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: MBLKW	Batch ID: 27444		Analysis Date: 2/18/2020	SeqNo: 1145163							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27444	SampType: MBLK	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: MBLKW	Batch ID: 27444		Analysis Date: 2/18/2020	SeqNo: 1145164							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27444	SampType: MBLK	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: MBLKW	Batch ID: 27444		Analysis Date: 2/18/2020	SeqNo: 1145165							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27444	SampType: LCS	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: LCSW	Batch ID: 27444		Analysis Date: 2/18/2020	SeqNo: 1145166							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 23.1 0.500 25.00 0 92.4 80 120

Sample ID: 2002152-001EDUP	SampType: DUP	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: BATCH	Batch ID: 27444		Analysis Date: 2/18/2020	SeqNo: 1145168							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 7.10 0.500 7.100 0 24



Work Order: 2002161
 CLIENT: Spectra Laboratories
 Project: 2020020269

QC SUMMARY REPORT
Mercury by Method 1631E

Sample ID: 2002152-001EMS	SampType: MS	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: BATCH	Batch ID: 27444	Analysis Date: 2/18/2020	SeqNo: 1145169								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	27.1	0.500	25.00	7.100	80.0	71	125				
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Sample ID: 2002152-001EMSD	SampType: MSD	Units: ng/L	Prep Date: 2/17/2020	RunNo: 57417							
Client ID: BATCH	Batch ID: 27444	Analysis Date: 2/18/2020	SeqNo: 1145170								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	27.5	0.500	25.00	7.100	81.6	71	125	27.10	1.47	24	
---------	------	-------	-------	-------	------	----	-----	-------	------	----	--



Sample Log-In Check List

Client Name: SPECTRA	Work Order Number: 2002161
Logged by: Carissa True	Date Received: 2/11/2020 9:37:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
- LL Mercury in water, preserved**
7. Were all items received at a temperature of >2°C to 6°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified: _____	Date: _____
By Whom: _____	Via: <input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding: _____	
Client Instructions: _____	

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	9.9
Sample 1	9.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Communications Record

Internal Document

Client: TPU

Client Contact: Doug

Date: 2/10/20

Time: 0845

Spectra Contact: Spencer

Project Number:

Note: pH, Turbidity, and Cr6 out of hold – run what you can or out of hold, samples primarily for checking for oil/fuel.

03/17/2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

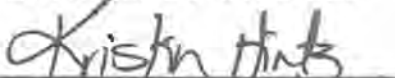
P.O.#: Auth #20-3-3-041
 Project: Kosmos
 Client ID: Stockpile Pond SOP 1
 Sample Matrix: Liquid
 Date Sampled: 03/03/2020
 Date Received: 03/03/2020
 Spectra Project: 2020030049
 Spectra Number: 1

Analyte	Result	Units	Method
Total Mercury	ND*		EPA 1631E
Turbidity	55	NTU	EPA 180.1
Arsenic	2.1	µg/L	EPA 200.8
Cadmium	0.3	µg/L	EPA 200.8
Chromium	6.1	µg/L	EPA 200.8
Copper	7.3	µg/L	EPA 200.8
Lead	0.5	µg/L	EPA 200.8
Nickel	5.1	µg/L	EPA 200.8
Zinc	70.6	µg/L	EPA 200.8
Diesel	3320*	µg/L	NWTPH-D
Oil	1250	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	3.87	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

* Mercury analyzed by Fremont Analytical. See complete report attached. *Sample pattern does not match the laboratory reference for diesel, sample was quantified with diesel response.

Surrogate	% Recovery	Method
p-Terphenyl	102	NWTPH-D
Toluene-d8	94	NWTPH-G
4-Bromofluorobenzene	109	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz

a5/sks



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03/17/2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

P.O.#: Auth #20-3-3-041
Project: Kosmos
Client ID: Concrete Oil Pond COP 1
Sample Matrix: Liquid
Date Sampled: 03/03/2020
Date Received: 03/03/2020
Spectra Project: 2020030049
Spectra Number: 2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Mercury	ND*		EPA 1631E
Turbidity	135	NTU	EPA 180.1
Arsenic	0.9	µg/L	EPA 200.8
Cadmium	0.3	µg/L	EPA 200.8
Chromium	3.3	µg/L	EPA 200.8
Copper	25.6	µg/L	EPA 200.8
Lead	8.2	µg/L	EPA 200.8
Nickel	4.7	µg/L	EPA 200.8
Zinc	72.5	µg/L	EPA 200.8
Diesel	<100	µg/L	NWTPH-D
Oil	<500	µg/L	NWTPH-D
Gasoline	<50	µg/L	NWTPH-G
pH	6.78	pH Units	SM 4500-H+ B
Hexavalent Chromium	<0.01	mg/L	SM3500-CR B
Benzene	<0.4	µg/L	SW846 8260C
Ethylbenzene	<0.4	µg/L	SW846 8260C
Toluene	<0.4	µg/L	SW846 8260C
Total Xylenes	<0.8	µg/L	SW846 8260C

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	119	NWTPH-D
Toluene-d8	92	NWTPH-G
4-Bromofluorobenzene	109	NWTPH-G

SPECTRA LABORATORIES



Authorized by: Kristin Hintz
a5/sks

March 18, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411
Attn: Doug Boettner

Method: NWTPH-Dx
Sample Matrix: Water
Spectra Project: 2020030049
Applies to Spectra #: 1-2

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

LCS/LCSD

Spiked Sample: Method Blank Date Extracted: 3/11/2020
Units: mg/L Date Analyzed: 3/17/2020

<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<0.10	2.50	2.19	88

METHOD BLANK

Date Extracted: 3/11/2020 Date Analyzed: 3/17/2020
Units: mg/L

Diesel <0.10

Heavy Oil <0.05

Surrogate Recovery:

p-terphenyl 199%

SPECTRA LABORATORIES



Authorized by: Devan Salter



March 5, 2020

Tacoma Public Utilities
 PO Box 11007
 Tacoma, WA 98411
 Attn: Doug Boettner

Sample Matrix: Water
 EPA Method: 624/8260C
 Spectra Project: 2020030049
 Date Analyzed: 3/4/2020
 Units: ug/L
 Applies to Spectra #'s: #1-2

**GCMS VOLATILE ORGANIC ANALYSIS
 Method Blank and Laboratory Control Sample (LCS) Results**

COMPOUND	BLANK RESULT	SPIKE AMOUNT	SPIKE RESULT	LCS %REC
Benzene	<0.4	10.0	11.7	117
Toluene	<0.4	10.0	10.54	105.4
Ethylbenzene	<0.4	10.0	11.04	110.4
Total Xylenes	<0.8	30.0	33.7	112.2
Gasoline	<50	250	234	93

Surrogate Recoveries (%)	LCS	MB	Method Blank	ug/L
Dibromofluoromethane	100	111	Benzene	<0.4
1,2-Dichloroethane-d4	94	111	Toluene	<0.4
Toluene-d8	99	91	Ethylbenzene	<0.4
4-Bromofluorobenzene	96	112	Total Xylenes	<0.8
			Gasoline	<50


 Authorized by: Kristin Hintz

March 5, 2020

Tacoma Public Utilities
PO Box 11007
Tacoma, WA 98411

Units: ug/L
Spectra Project: 2020030049
Applies to Spectra #'s: 1-2
Analyst: SCJ

QUALITY CONTROL RESULTS
ICP-MS Metals - EPA Method 200.8 - Water
Laboratory Reagent Blank (LRB)

Date Digested:	3/5/2020	Element	CAS #	Date Analyzed:	3/5/2020	Result
		Arsenic	7440-38-2			< 0.3
		Cadmium	7440-43-9			< 0.2
		Chromium	7440-47-3			< 0.5
		Copper	7440-50-8			< 0.3
		Lead	7439-92-1			< 0.5
		Nickel	7439-98-7			< 0.5
		Zinc	7440-66-6			< 0.3

Laboratory Fortified Blank (LFB)

Date Digested:	3/5/2020	Element	Spike Added	LCS Conc.	LCS %Rec
		Arsenic	100.0	87.62	87.6
		Cadmium	100.0	92.82	92.8
		Chromium	100.0	94.41	94.4
		Copper	100.0	104.20	104.2
		Lead	100.0	96.44	96.4
		Nickel	100.0	100.71	100.7
		Zinc	100.0	105.21	105.2

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested:	3/5/2020	Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Sample Spiked:	2020020730-1	Arsenic	1.84	100.0	97.28	95.4	98.45	96.6	1.2
		Cadmium	0.00	100.0	92.98	93.0	95.77	95.8	3.0
		Chromium	0.00	100.0	94.15	94.1	95.66	95.7	1.6
		Copper	2.36	100.0	107.27	104.9	112.62	110.3	5.0
		Lead	0.00	100.0	92.58	92.6	96.03	96.0	3.7
		Nickel	0.00	100.0	99.99	100.0	107.76	107.8	7.5
		Zinc	19.34	100.0	122.57	103.2	132.54	113.2	9.2

Comment:
Recovery Limits 70-130%
RPD Limit 20

SPECTRA LABORATORIES


Authorized by: Kristin Hintz



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Spectra Laboratories

Marie Holt
2221 Ross Way
Tacoma, WA 98421

RE: 2020030049

Work Order Number: 2003055

March 10, 2020

Attention Marie Holt:

Fremont Analytical, Inc. received 2 sample(s) on 3/5/2020 for the analyses presented in the following report.

Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager



CLIENT: Spectra Laboratories
Project: 2020030049
Work Order: 2003055

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2003055-001	030049-1	03/03/2020 10:30 AM	03/05/2020 1:12 PM
2003055-002	030049-2	03/03/2020 10:40 AM	03/05/2020 1:12 PM



CLIENT: Spectra Laboratories

Project: 2020030049

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Spectra Laboratories
Project: 2020030049

Lab ID: 2003055-001

Collection Date: 3/3/2020 10:30:00 AM

Client Sample ID: 030049-1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Mercury by Method 1631E

Batch ID: 27683 Analyst: WF

Mercury	ND	0.500		ng/L	1	3/10/2020 3:09:20 PM
---------	----	-------	--	------	---	----------------------

Lab ID: 2003055-002

Collection Date: 3/3/2020 10:40:00 AM

Client Sample ID: 030049-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Mercury by Method 1631E

Batch ID: 27683 Analyst: WF

Mercury	ND	0.500		ng/L	1	3/10/2020 3:52:32 PM
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Work Order: 2003055
 CLIENT: Spectra Laboratories
 Project: 2020030049

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: MB-27683	SampType: MBLK	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: MBLKW	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156418							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB2-27683	SampType: MBLK	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: MBLKW	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156419							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: MB3-27683	SampType: MBLK	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: MBLKW	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156420							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500

Sample ID: LCS-27683	SampType: LCS	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: LCSW	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156421							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 24.2 0.500 25.00 0 96.8 80 120

Sample ID: 2003055-001ADUP	SampType: DUP	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: 030049-1	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156423							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.500 0 24



Work Order: 2003055
CLIENT: Spectra Laboratories
Project: 2020030049

QC SUMMARY REPORT

Mercury by Method 1631E

Sample ID: 2003055-001AMS	SampType: MS	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: 030049-1	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156424							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	3.50	0.500	25.00	0.3000	12.8	71	125				S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID: 2003055-001AMSD	SampType: MSD	Units: ng/L	Prep Date: 3/10/2020	RunNo: 57913							
Client ID: 030049-1	Batch ID: 27683		Analysis Date: 3/10/2020	SeqNo: 1156425							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.80	0.500	25.00	0.3000	10.0	71	125	3.500	22.2	24	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.



Client Name: SPECTRA	Work Order Number: 2003055
Logged by: Carissa True	Date Received: 3/5/2020 1:12:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA

Mercury in water, preserved

7. Were all items received at a temperature of >2°C to 6°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Sample 1	15.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

CLIENT: Spectra Laboratories ADDRESS: 2221 Ross Way Tacoma, WA ZIP: 98421 ADDRESS CHANGE

PROJECT: 2020030049				NUMBER OF CONTAINERS	HYDROCARBONS		ORGANICS			METALS		OTHER																			
CONTACT: Marie Holt					NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E			
SAMPLED BY:																															
PHONE: 253-272-4850																															
e-MAIL: marieh@spectra-lab.com																															
PURCHASE ORDER #:																															

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Fecal Coliform - MPN or MF	Hg by 1631E			
1 030049-1	03/03/20	<u>1030</u>	Water	1																										X	
2 030049-2	03/03/20	<u>1040</u>	Water	1																										X	
3																															
4																															
5																															
6																															
7																															
8																															
9																															
0																															

SPECIAL INSTRUCTIONS/COMMENTS:

Sample Receipt (lab use only)	RELINQUISHED BY	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
Total # of containers _____	RELINQUISHED BY	<u>Jen Draven</u>	Jen Draven	Spectra	03/04/20	3:00 PM
COC seals present? _____ Intact? _____	RECEIVED BY	<u>Emma Holmes</u>	Emma Holmes	FBI	3/5/20	13/2
Temp at receipt _____ deg. C.	RELINQUISHED BY					
Received within hold time? _____	RECEIVED BY					
Proper sample containers? _____	RELINQUISHED BY					
Received via _____ Cooler? _____	RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co. WA venue

APPENDIX I
Reactive Core Mat Data Sheet

REACTIVE CORE MAT™

WITH ORGANOCLAY®

DESCRIPTION

ORGANOCLAY® REACTIVE CORE MAT™ is a permeable composite of geotextiles and granular Organoclay that reliably adsorbs NAPL and low solubility organics from water. Batch isotherm testing by a university determined the following partition coefficients:

- Naphthalene, Kd = 3280 L/kg
- Phenanthrene, Kd = 117,000 L/kg
- Pyrene, Kd - 286,000 L/kg

APPLICATION

ORGANOCLAY® REACTIVE CORE MAT™ is designed for use in the following applications:

- In situ subaqueous cap for contaminated sediments or post-dredge residual sediments
- Embankment seepage control
- Groundwater remediation

BENEFITS

- ORGANOCLAY® REACTIVE CORE MAT™ provides a reactive material that treats contaminants carried by advective/diffusive flow
- Reactive cap allows for thinner cap thickness than a traditional sand cap
- Geotextiles provide stability and physical isolation of contaminants

AVAILABILITY

ORGANOCLAY® REACTIVE CORE MAT™ is available from the following CETCO plant locations:

- 92 Highway 37, Lovell, WY

PACKAGING

15' by 100' rolls, packaged on 4" PVC core tubes wrapped with polyethylene plastic packaging.



REACTIVE CORE MAT™ is designed to provide a simple method of placing active materials into subaqueous sediment caps.

TESTING DATA

PHYSICAL PROPERTIES		
PROPERTY	TEST METHOD	RESULTS
ORGANOCLAY¹		
Bulk Density Range	ASTM D 7481	44 - 56 lbs/ft ³
Oil Adsorption Capacity	CETCO Test Method	0.5 lb of oil per lb of Organoclay, min
Quaternary Amine Content	ASTM D 7626	25 - 33% quaternary amine loading
FINISHED RCM PRODUCT		
Organoclay Mass per Area	CETCO Test Method	0.8 lb/ft ²
Mat Grab Strength ²	ASTM D4632	90 lbs. MARV
Hydraulic Conductivity ³	ASTM D4491	1 x 10 ⁻³ cm/sec minimum

NOTES:

¹ Organoclay properties performed periodically on material prior to incorporation into the RCM

² All tensile testing is performed in the machine direction

³ Permittivity at constant head of 2 inches and converted to hydraulic conductivity using Darcy's Law and RCM thickness per ASTM D5199 for geotextiles

North America: 847.851.1800 | 800.527.9948 | www.cetco.com

UPDATED: MAY 2017

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APPENDIX J
Cap Design Documents

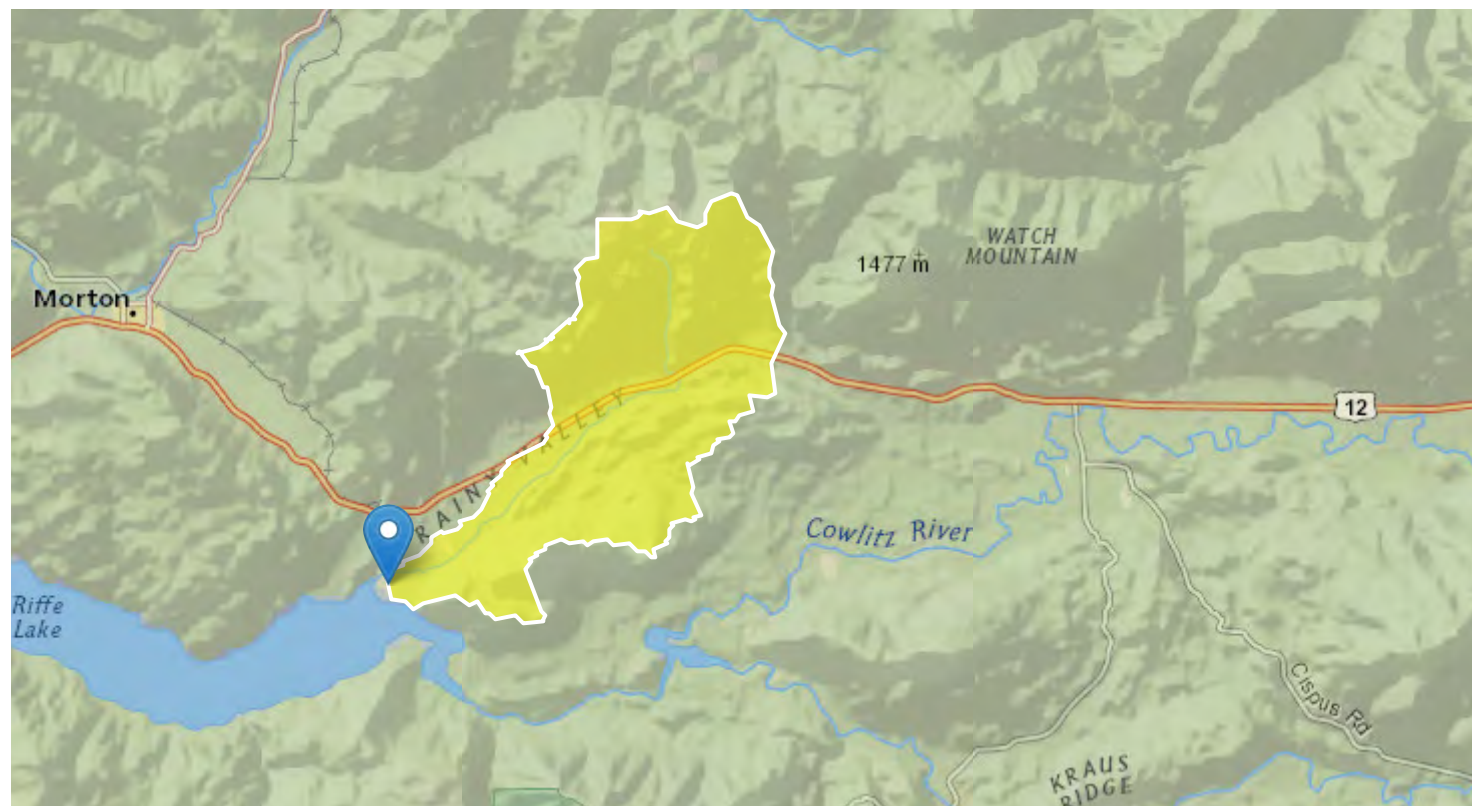
StreamStats Report

Region ID: WA

Workspace ID: WA20191117182524978000

Clicked Point (Latitude, Longitude): 46.49195, -122.19342

Time: 2019-11-17 10:25:41 -0800



Rainey Creek near the former Kosmos Mill Site.

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	20.22	square miles
PRECPRIS10	Basin average mean annual precipitation for 1981 to 2010 from PRISM	76.3	inches

Peak-Flow Statistics Parameters[Peak Region 4 2016 5118]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	20.22	square miles	0.18	2230
PRECPRIS10	Mean Annual Precip PRISM 1981 2010	76.3	inches	11.9	187

Peak-Flow Statistics Flow Report[Peak Region 4 2016 5118]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu	SEp
2 Year Peak Flood	856	ft ³ /s	163	4490	52.5
5 Year Peak Flood	1330	ft ³ /s	260	6820	50.6
10 Year Peak Flood	1700	ft ³ /s	325	8900	50.5
25 Year Peak Flood	2170	ft ³ /s	387	12200	51.7
50 Year Peak Flood	2540	ft ³ /s	428	15100	52.9
100 Year Peak Flood	2940	ft ³ /s	467	18500	54.2
200 Year Peak Flood	3290	ft ³ /s	494	21900	55.5
500 Year Peak Flood	3880	ft ³ /s	532	28300	58

Peak-Flow Statistics Citations

Mastin, M.C., Konrad, C.P., Veilleux, A.G., and Tecca, A.E.,2016, Magnitude, frequency, and trends of floods at gaged and ungaged sites in Washington, based on data through water year 2014 (ver 1.1, October 2016): U.S. Geological Survey Scientific Investigations Report 2016–5118, 70 p. (<http://dx.doi.org/10.3133/sir20165118>)

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.3.8



HARTCROWSER

Page 1 of 2

Job No. 19499-00

Date 11/18/2019

Made By A. KAPARDOS

Checked By

Project KOSMOS OIL SEEP - CAP DESIGN

Calculations for PERMITTING

THE FOLLOWING CALCS WERE USED TO SIZE RIPRAP FOR AN EMERGENCY CAP CONSTRUCTION AT THE KOSMOS OIL SEEP AREA, PER TPU'S REQUEST,

ONLY LIMITED SURVEY DATA IS AVAILABLE.

NO STREAM FLOW DATA IS AVAILABLE AND THERE IS NOT TIME TO SURVEY CREEK AND/OR GET STREAM FLOWS, THEREFORE, STREAMSTATS WEBBASED GIS TOOL THAT PROVIDES SPATIAL ANALYTICAL TOOLS TO DELINEATE DRAINAGE AREAS FOR UNGAGED STREAMS (I.E., RAINEY CREEK), AND PROVIDES BASIN CHARACTERISTICS AND FLOW STATISTICS, AND LOCAL REGRESSION EQUATIONS TO CALCULATE ESTIMATED FLOWS, SS IS PROVIDED BY USGS,

SEE ATTACHED STREAMSTATS OUTPUT FOR RAINEY CREEK AT THE SITE,

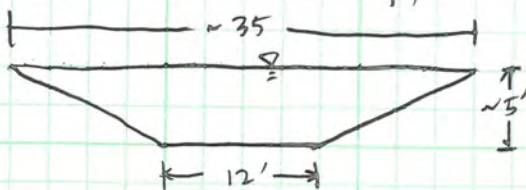
SINCE WATER LEVELS CAN FLUCTUATE BASED ON RIFFE LAKE RESERVOIR OPERATIONS, TWO SCENARIOS ARE EVALUATED.

- 1) FLOW WHEN WATER LEVELS ARE LOW
- 2) FLOW WHEN WATER LEVELS RISE.

① LOW WATER LEVELS,

FROM STREAMSTATS, THE 2-YEAR PEAK FLOW (Q_2) = 856 ft³/s

USING AVAILABLE SURVEY, A ROUGH ESTIMATE OF THE CHANNEL CROSS SECTION IS BELOW



$$\text{AREA} = 117.5 \text{ ft}^2$$

$$Q_2 = 856 \text{ ft}^3/\text{s}$$

$$Q = VA \Rightarrow V = \frac{856}{117.5} = 7.29 \text{ ft/s}$$

RIPRAP SIZING BY USGS METHOD

$$D_{50} = 0.01 V^{2.44}$$

$$D_{50} = 0.01 (7.29)^{2.44} = 1.27 \text{ ft}$$

SAFETY FACTOR = 1.5 (SIGNIFICANT UNCERTAINTY IN DESIGN PARAMETERS)

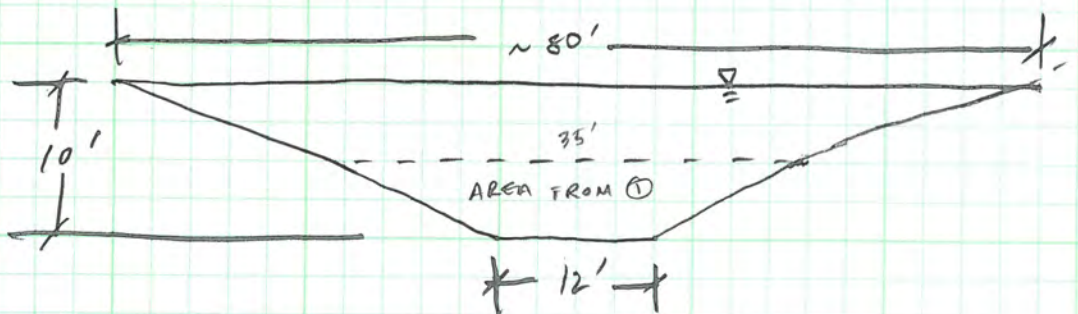
$$D_{50} = 1.5 \times 1.27 \text{ ft} = 1.91 \text{ ft} \approx 2' \Rightarrow \text{WSDOT HEAVY RIPRAP (} D_{50} = 2.2 \text{ ft)}$$

Project KOSMOS OIL SEEP - CAP DESIGN
 Calculations for PERMITTING

② PEAK FLOW / HIGHER WATER LEVELS

FROM STREAM STATS, 100-YEAR PEAK FLOW (Q_{100}) = 2,940 ft³/s

USING THE AVAILABLE SURVEY AND OBSERVATIONS OF WATER LEVELS, A ROUGH ESTIMATE OF THE ASSUMED CHANNEL CROSS SECTION IS BELOW:



$$\text{AREA} = 692.5 \text{ ft} \quad (\text{INCLUDES } 117.5 \text{ ft FROM SCENARIO 1})$$

$$Q_{100} = 2940 \text{ ft}^3/\text{s}$$

$$V = \frac{Q}{A} = \frac{2940}{692.5} = 4.25 \text{ ft/s}$$

RIPRAP SIZE USING USGS RIPRAP METHOD:

$$D_{50} = 0.01 V^{2.44} = 0.01 (4.25)^{2.44} = 0.34 \text{ ft}$$

SAFETY FACTOR: $D_{50} \times 1.5 = 0.51 \text{ ft}$ (WSDOT QUARRY SPALLS)

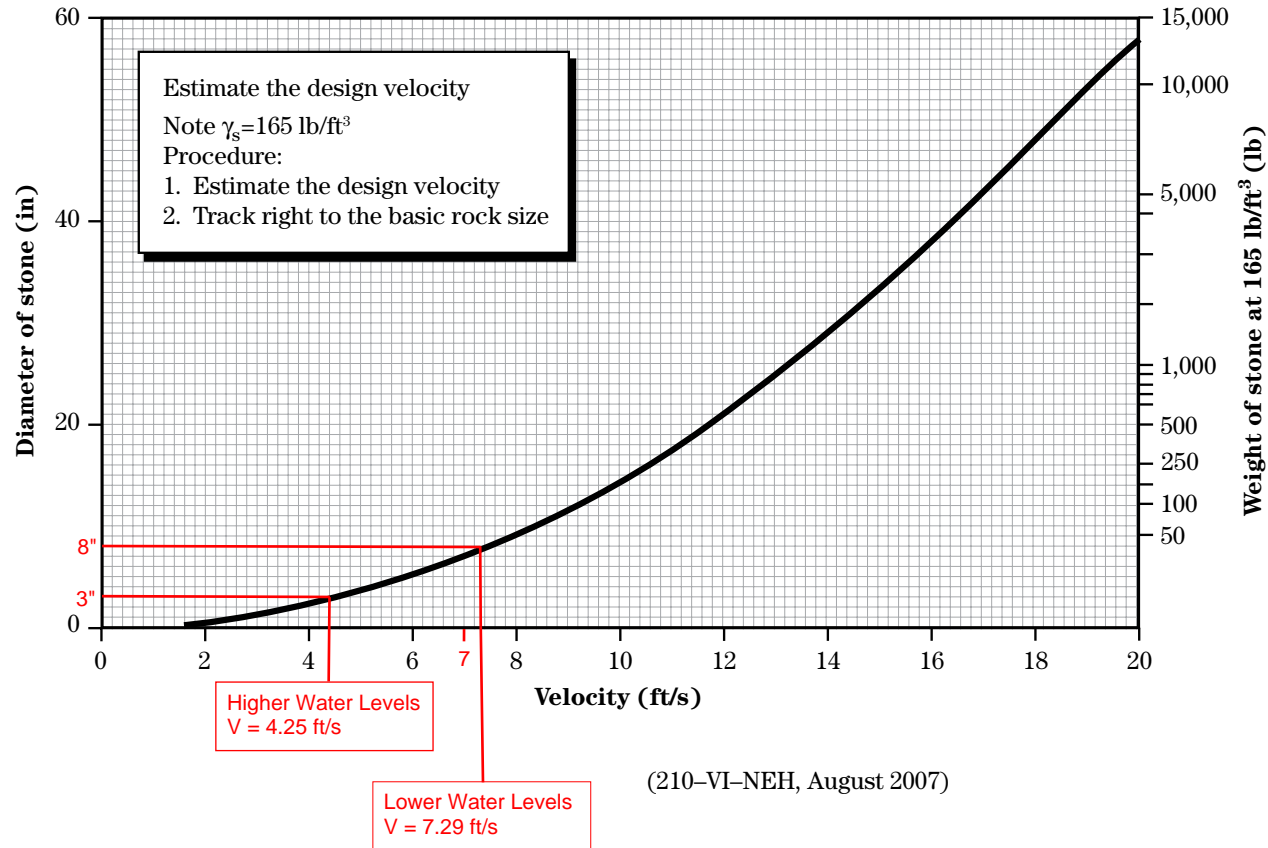
$D_{50} \times 3.0 = 1.02 \text{ ft}$ (WSDOT LIGHT LOOSE RIPRAP)
(EXTRA SF)

RECOMMENDATIONS:

COULD USE HEAVY RIPRAP FOR RIPRAP SLOPE KEY AND LARGE SPALLS (OR LIGHT LOOSE RIPRAP IF MORE COST EFFECTIVE) FOR CAP COVER MATERIAL.

The Isbash curve is used for quick estimates or comparison to calculated riprap size.

Figure TS14C-5 Rock size based on Isbash curve



TS14C-3

For Higher Water Levels where $V = 4.25 \text{ ft/s}$, the Isbash Curve predicts a required stone diameter (D_{50}) of 3". Applying a safety factor (of 1.5 to 3): $D_{50} = 0.4'$ to $0.8'$, which makes sense since the USGS Method is a more conservative estimation of riprap sizing. This confirms that the proposed use of quarry spalls ($D_{50} = 0.5'$) or light loose riprap ($D_{50} = 1.1'$) is more than adequate.

Lower Water Levels $V = 7.29 \text{ ft/s}$, the Isbash Curve predicts a required stone diameter (D_{50}) of 8". Applying a safety factor (of 1.5 to 3): $D_{50} = 1'$ to $2'$, which again makes sense since the USGS Method is a more conservative estimation of riprap sizing. This confirms that the proposed heavy riprap ($D_{50} = 2.2'$) is more than adequate.

APPENDIX K
Photo Log



Photograph 1: Sea curtain at the bottom of the cap excavation area.



Photograph 2: Sea curtain lining creek at the bottom of cap excavation area.



Photograph 3: Booms placed downstream of excavation area.



Photograph 4: Boom containing water sheen from moving further downstream.



Photograph 5: Cap excavation area looking northeast.



Photograph 6: Northeast sidewall of excavation area.



Photograph 7: Stockpile SP1 – Overburden and observed non-impacted soil.



Photograph 8: Covered stockpile SP1.



Photographs 9 and 10: On-site dewatering system.



Photograph 11: Completed excavation for the cap installation.



Photograph 15: Installing RCM over clean sand layer.



Photograph 16: Installing RCM over clean sand. View looking north/northeast.



Photograph 17: Placing clean sand over the RCM.



Photograph 18: Placing high-strength geotextile over the clean sand layer.



Photograph 19: Keying in the RCM and geotextile at the top of the slope.



Photograph 20: Placing large quarry spalls over the geotextile.



Photograph 21: Completed cap and elevated water level. View looking east.



Photograph 22: Completed cap and elevated water level. View looking east, towards the former ravine drainage area.

APPENDIX L
Tacoma Power's Inspection Form



Survey/Inspection Report

Surveys/inspections are required to be performed weekly. Additional surveys/inspections are required if decreases in Riffe Lake Reservoir elevation approach five feet or more between subsequent monitoring events or follow-up to assess effectiveness of BMPs is needed.

PROJECT NAME: **Kosmos Mill Oil Clean-up**

DATE: _____

TIME: _____

SURVEYOR(S): _____

REPRESENTING: _____

LAKE ELEVATION (FT.): _____

TEMPERATURE (°F): _____

WEATHER CONDITIONS:

CLEAR

CLOUDY

MIST

RAIN

WIND

FOG

OBSERVATIONS/ACTIONS:

Inspect BMPs to assure performance/effectiveness/condition (*include stockpile staging area).

BMPs functioning properly

Maintenance/installation needed

Description:

Maintenance/installation performed

Description:

Additional follow-up needed (notify appropriate contact)

Description:

Photos attached

OBSERVATIONS/ACTIONS CONTINUED:

Inspect the Rainey Creek reach (banks and waterway) from 500 feet upstream of the temporary cap downstream to the confluence with the Riffe Lake Shoreline. If additional seeps or sheens are observed call Ecology to report an **ERTS (360.407.6300)**.

No new seep(s) or sheen observed

Additional seep(s) or sheen observed ERTS Tracking Number: _____

GPS location(s)

ID#: _____ Matrix: _____

Lat.: _____ Long.: _____

Description: _____

ID#: _____ Matrix: _____

Lat.: _____ Long.: _____

Description: _____

Sample(s) obtained

ID#: _____ Matrix: _____

ID#: _____ Matrix: _____

No dead, dying or distressed organisms observed

Presence of dead, dying or distressed organisms

Species: _____ Count: _____

GPS location(s)

Lat.: _____ Long.: _____

Description: _____

Species: _____ Count: _____

GPS location(s)

Lat.: _____ Long.: _____

Description: _____

Photos attached

Additional Notes (attach supplemental pages as needed): _____

I attest that the above information is true and correct to the best of my knowledge.

➔ PREPARED BY SIGNATURE: _____ DATE: _____