Soil and Groundwater Sampling Report - 2018

Calder Limestone Mine
Calder Bay, Prince of Wales Island, Alaska
Hazard Identification Number 4069

Prepared for:
Columbia River Carbonates
300 North Pekin Road
Woodland, Washington

November 28, 2018

Prepared by:

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HydroCon Project No: 2015-010

Prepared by:

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1.0 INTRODUCTION

This Soil and Groundwater Sampling Report has been prepared to document site investigation and sampling results performed in 2018 at the Calder Mine facility on Prince of Wales Island, Alaska. This work was prompted by the Alaska Department of Environmental Conservation's (ADEC) request for additional sampling at the facility. Work performed by HydroCon followed the scope of work documented in the approved work plan[1].

1.1 *Site Description*

The site is located in the northwest portion of the Prince of Wales Island in Alaska (Figure 1). It is currently operating as a calcium carbonate mine, owned and operated by Columbia River Carbonates (CRC). The site includes an open-pit calcium carbonate mine, loading/barge area, fueling station, shop area, and camp site. Additional site improvements include gravel access roadways, diesel power generators, and a water treatment/storage system.

The potable water supply for the site comes from a spring located in the uplands above the Camp area. Water from the spring is routed via piping to a water treatment system consisting of poly storage tanks and a filtration system prior to use at the Camp.

1.2 *Geology*

Prince of Wales Island is located within the Alexander Archipelago of Southeast Alaska. This region is composed of complex geology. Some of the region's bedrock was formed within 15 degrees of the equator and has been transported northward via seafloor spreading and ocean plate movement to its present location. The ocean crust conveyor belt moved fragments of original bedrock across the northeastern Pacific and caused their accretion onto ancient North America. Within the last 30,000 years the Archipelago has been scoured and shaped by glaciation and subsequently flooded by sea level rise.

Local geology at the Calder Mine site includes limestone which has locally been overlain by marine sediment. Soil encountered during subsurface excavation in the Camp Generator area consists of fine grain marine sediment, shells, and abundant wood debris. Soil at the Fueling Station consists of limestone fill generated from mining activities overlying native limestone bedrock. The upper 2 to 3 feet of the native limestone is weathered and becomes more competent with depth.

1.3 *Site Environmental Investigation History*

In July 2004, Carson Dorn, Inc. (CDI) conducted a site assessment of the subject site. During the assessment, diesel contaminated soils were observed adjacent to the Camp Generator, downhill from the two 18,000-gallon diesel aboveground storage tanks (ASTs), also known as the Fueling Station, and in an

[1] HydroCon, *2018 Soil and Groundwater Sampling Work Plan*, March 2, 2018.

existing stockpile of soil. CDI also noted the presence of a drum storage area west of the Fueling Station. These and other site features are shown on Figure 2.

CDI collected five soil samples during the site assessment. Soil analytical results indicated that the existing 15 cubic yard stockpile (Sample C-1) had a diesel range organics (DRO) concentration of 4,780 milligrams per kilogram (mg/kg). The two soil samples collected from Camp Generator area had a DRO concentration of 9,750 mg/kg near the 500-gallon diesel AST used to supply the generator (Sample G-2) and 485,000 mg/kg at the door of the Camp Generator (Sample G-1). In the Fueling Station area, a sample collected from the end of the westerly 18,000 AST had a DRO concentration of 16,400 mg/kg. The Method Two Alaska Department of Environmental Conservation (ADEC) cleanup level for DRO is 230 mg/kg.

In August 2004, CDI performed a drum inventory at the site. A total of 93 drums were present. Eighty of the drums were located in the drum storage area next to the Fueling Station and the remainder of the drums was located in the Shop area. The contents of the drums included new and used gasoline, diesel, oil, grease, antifreeze, and water. The contents were consolidated into 51 drums and shipped off the island for recycling.

In September 2004, CDI provided oversight for the removal of contaminated soil by excavation from the Camp area and Fueling Station. An estimated total of 100 cubic yards of soil was generated from the two excavations and from the 15 cubic yard stockpile and placed into an approximately 22'W x 60'L x 2'H (~100 cubic yards) bioremediation cell constructed on the site. This stockpile is referred to as the CDI Stockpile.

On September 30, 2004, PNG Environmental (PNG) toured the site to observe site features and remedial action taken at the site by CDI as part of a due diligence investigation for a prospective purchaser. Mr. Larry Wilkenson (CDI's representative) and Mr. David Oliver (SeaCal's Vice President) provided access to the site and assistance in explanation of site operations. After the tour was complete, PNG returned to selected areas of potential concern to collect soil samples for chemical analysis. A description of these tasks is provided below.

Areas investigated included walking the fuel delivery line from the fuel header to the two 18,000-gallon diesel ASTs, observation of the former drum storage area, machine shop, laboratory, Fueling Station, landfill, bone yard, rock crushing area, active mining area, bioremediation cell, camp, and the parking area near the small dock used for small watercraft and float plane boarding. The location of these areas is shown on Figures 1 through 5 in the report[2].

PNG collected a total of 22 surface soil samples from selected areas of the site that exhibited hydrocarbon impacts (visible stain and/or odor) to assess soil conditions. PNG purposely collected surface soil samples in areas exhibiting hydrocarbon impact or in locations where worst-case conditions were likely to be present (i.e., under elevated heating oil fuel storage tanks, drum storage area, pipe joints, near aboveground storage tanks, landfill, etc.). Surface soil samples were collected

[2] PNG. *Soil Sampling at the Calder Limestone Mine*, November 11, 2004.

from these potential source areas as well as from two areas where soil remediation was conducted by CDI (Camp Generator and Fueling Station) using a clean shovel and a new pair of nitrile gloves. Samples were placed in labeled laboratory-prepared glass jars and sealed with a Teflon-lined lid. The samples were placed in a chilled cooler and shipped to Friedman & Bruya laboratory in Seattle, Washington along with chain-of-custody documentation for chemical analysis. The soil sample locations are shown on Figures 2 through 4 and the soil analytical data is summarized in Tables 1 through 4 of the report.

As noted in ADEC's December 18, 2017 opinion letter, several of the soil samples had concentrations of petroleum fuel related contaminants above their respective cleanup level. It should be noted that the soil samples were generally collected in areas of visibly stained surface soil and likely represented the worst case scenario as far as contaminant concentrations at each location that was sampled.

In 2012, CRC performed a remedial excavation near the Camp Generators. Visibly stained soil was removed from the area south of the generator. The excavation measured approximately 50' x 30'. The depth of the excavation was approximately 6 feet below ground surface (bgs). No confirmation samples were collected at that time. The contaminated soil was transported to the onsite bioremediation cell staging area. The soil was placed on and covered with heavy gauge plastic sheeting. Two stockpiles were created: 35'L x 16'W x 3.5'H (approximately 135 cubic yards) and 30'L x 10'W x 1.5'H (approximately 16 cubic yards). These stockpiles are referred to as the CRC1 and CRC2 Stockpiles, respectively. Anecdotal information indicated that most of the areas of surface staining identified by PNG during the due diligence investigation were excavated to remove petroleum impacted soil prior to CRC's ownership of the property. However, there's no report documenting this action.

In August 2015 HydroCon personnel mobilized to the site to provide oversight and direction of remedial excavation in the two areas of known contamination (Camp Generator and Fueling Station)[3]. Southeast Road Builders Construction Company (subcontractor for CRC) performed the excavation using a Cat 336E trackhoe. All PCS was placed into a dump truck and hauled to the newly constructed biotreatment cell area referred to as the HydroCon Stockpile (Figure 2). Excavation activities were completed in both areas until either field screening indicated that the contamination was no longer present or camp infrastructure (generator and ASTs) presented obstruction for further remedial activities. Confirmation soil samples were collected from both excavation areas. Soil removed from the excavation was placed in the HydroCon stockpile. The soil within the stockpile was fertilized at a rate of 400 pounds urea and 100 pounds of phosphorus potassium fertilizer mix per 100 cubic yards of soil. The soil was mixed using the excavator bucket. After mixing, 10 mm polyethylene liners were placed over the stockpiled soil. In addition, HydroCon completed sampling of the existing stockpiles (CDI, CRC1, and CRC2) to assess remediation progress.

On April 7, 2016, HydroCon returned to the site to perform additional remedial excavation work. Prior to HydroCon's arrival, CRC moved the generator and AST to a different area of the Camp to facilitate

[3] HydroCon. *Remedial Excavation and Soil Sampling Report*, October 25, 2015.

additional remedial excavation work. HydroCon directed remedial excavation of approximately 200 cubic yards of PCS at the Camp Generator area[4]. Excavation began at the northern limit of the 2015 excavation and proceeded northward to as close to the banks of the wetland drainage ditch, Camp mess hall, and water treatment system as possible. Southeast Road Builders Construction Company performed the excavation using a Cat 336E trackhoe. All PCS was placed into a dump truck and hauled to the HydroCon Stockpile (Figure 2). The PCS was placed on top of new 30-mil plastic geomembrane, as described in the approved work plan.

As the soil was excavated (using an approximately 1.5 cubic yard excavator bucket) it was fertilized at a rate of 6 pounds urea and 1.5 pounds of phosphorus potassium fertilizer mix per 1.5 cubic yards of soil. The soil was mixed as it was placed into the truck and again as it was placed into the stockpile. After the completion of excavation activities, 10 mm polyethylene liners were placed over the stockpiled soil.

On September 27, 2016, HydroCon returned to the site to direct the excavation of 9 exploratory test pits (TP-1 through TP-9) to delineate the lateral extent of PCS near the Fueling Station (Figure 3), as requested by ADEC. Southeast Road Builders Construction Company performed the excavations using a Cat 336E trackhoe. The test pits were advanced until bedrock was encountered [ranging from approximately 4 to 5.5 feet below ground surface (bgs)]. One exception was test pit TP-2 where buried electrical lines were encountered at a depth of approximately 3 feet bgs. A soil sample was collected from the bottom of each test pit for analysis. Diesel was detected in three samples (TP2-3, TP4-4, and TP8-4.5) at a concentration up to 160 mg/kg which is below the cleanup level for diesel. Results of the investigation indicated that the lateral extent of petroleum contaminated soil has been fully characterized at the Fueling Station area of the site.

On September 28, 2016, HydroCon sampled the existing stockpiles (CRC1 and HydroCon) to assess remediation progress. Soil analytical results from the CRC1 stockpile indicated that three of the twelve stockpile samples exceeded the cleanup level for DRO. Soil analytical results of the HydroCon stockpile indicated that all but one sample (HS-18) exceeded the cleanup level for DRO. HydroCon determined that further remediation and sampling was required before the stockpiles could be closed. HydroCon recommended that no additional sample be performed at the stockpiles until enough time (2 years) had passed to allow the enhanced natural attenuation processes to reduce the concentration of COCs in the two stockpiles.

1.4 *Recent Communications with ADEC*

On December 18, 2017, ADEC sent a letter to CRC[5] informing them that based on the results of the 2004 investigation, several areas of concern are located at the site. A list of these concerns is provided on page 2 of the letter. HydroCon has had multiple communications with ADEC's project manager (Ms. Danielle Duncan) to refine the scope of work necessary to comply with ADEC's requests for additional investigation at the site. HydroCon submitted and received approval of the work plan.

[4] HydroCon. *Remedial Excavation and Soil Sampling Report,* May 26, 2016.
[5] ADEC, *Request for Work Plan*, December 18, 2017.

2.0 SITE VISIT - 2018

HydroCon travelled to the site on September 17, 2018 to perform soil, surface water, and groundwater sampling. A description of the work performed at the site and analytical results are provided below.

2.1 *Pre-Sampling Activities*

At HydroCon's direction, CRC performed tilling and supplemental application of soil treatment additives beginning in late Spring using the following rates: Urea at a rate of 400 pounds per 100 cubic yards of soil; and phosphorus potassium fertilizer (20:20:0 mix) at a rate of 100 pounds per 100 cubic yards of soil.

The calculated volume of fertilizer applied to each stockpile is provided below.

- CRC1 Stockpile: 540 pounds of urea and 135 pounds of phosphorus potassium mix.
- HydroCon Stockpile: 2,320 pounds of urea and 580 pounds of phosphorus potassium mix.

Prior to HydroCon's arrival, CRC removed the plastic sheets covering the CRC1 and HydroCon stockpiles and tilled the soil.

2.2 *Drill Temporary Boring*

On August 17, 2018, CRC utilized an air rotary drill rig used at the Calder Mine facility to drill blast holes for mining operations to drill a 3-inch diameter boring (HC-1) at the Fueling Station area (Figure 4). The borehole was advanced in approximate 3 foot increments and then the driller lifted the drill bit to allow compressed air to remove cuttings from the borehole. This process was repeated until the targeted depth of 30 feet bgs was reached. HydroCon's geologist collected samples of the drill cuttings for observation purposes and screened them with a PID for the presence of volatile organic compounds. At approximately 7 feet below ground surface (bgs) the drilling became noticeably harder. This was interpreted to represent the contact of limestone bedrock. A soil sample (HC1-7) was collected at the contact. The soil at the contact was moist but not saturated. HydroCon lowered a clean electronic oil/water interface probe down the borehole and there was no indication of water being present. Based on the apparent absence of water in the formation HydroCon directed the driller to continue drilling down to the maximum target depth of 30 feet bgs. Soil cuttings were observed as above until the total depth of the boring was reached. HydroCon selected two additional samples collected at 15 and 30 feet bgs for laboratory analysis. Each sample was placed into labeled laboratory supplied glass jars. The sample jars were placed in individual ziplock bags and then placed in a chilled cooler.

HydroCon lowered the oil/water interface down the open borehole several times during the day and there was no indication of water being present in the borehole. On the following day the interface probe was lowered into the borehole and approximately 0.35 feet of water was measured in the bottom of the borehole. Considering the depth of water and the only indication of moisture being at the contact with bedrock (7' bgs), HydroCon concluded that the source of water was most likely from the shallow zone. If water was encountered in deeper limestone it would likely be under some confining pressure and the water level in the borehole would have reflected that. HydroCon decided to backfilled the borehole with

hydrated bentonite chips and drill a boring next to HC-1 so that a shallow monitoring well could be installed.

2.3 *Field Screening*

Field screening techniques were utilized by HydroCon during the field investigation to assess if there was any indication of petroleum contamination present at the site. Field screening consisted of volatile organic vapor measurements using a photoionization detector (PID), sheen testing, visual observations (staining, etc.), and olfactory observations. The PID was calibrated before use at the site to a test gas standard consisting of 100 ppm isobutylene. A portion of each soil sample was placed in a sealable plastic baggie. The tip of the PID was inserted into the plastic bag in the airspace above the soil sample and the PID measurement was recorded. Sheen testing consisted of placing a small portion of soil in clear water and observing the water for the presence of hydrocarbon sheen. All PID readings, sheen test results, and olfactory observations were documented on the boring logs (Attachment A).

2.4 *Monitoring Well Installation*

On September 19, 2018 a second borehole was drilled next to HC-1. This boring was drilled to a total depth of 9 feet bgs. The drill cuttings were observed by HydroCon but no soil samples were collected for laboratory analysis. The boring was completed as a 2-inch diameter monitoring well (MW-1). The well is constructed with a 5-foot length of 0.010-inch slotted pre-packed well screen, a 0.33-foot long threaded bottom cap, and 2-inch diameter solid PVC well casing. Graded (10-20) silica sand was used as a supplemental filter pack to the pre-packed well screen (which is constructed with a stainless steel mesh screen filled with graded silica sand over the entire length of the well screen). The mesh screen is attached to the well screen section by stainless steel fittings. The filter pack was placed from the bottom of the borehole to 2 feet bgs. A hydrated bentonite seal was placed from 0.5 to 2 feet bgs. A flush-grade monument was cemented in place over the top of the well. Photo documentation is provided in Attachment B. A description of the subsurface soil and bedrock, PID readings, soil sampling depths, and well construction details is provided in the attached boring log (Attachment A).

2.5 *Well Development*

HydroCon developed the well by surging and pumping techniques using a new length of low-density polyethylene (LDPE) tubing attached to a new submersible pump. The pump was used to surge and pump the well. After surging, the pump was turned on and water was removed from the well. This process was repeated until no further improvement in water clarity was observed. A total of 4 gallons was removed from the well. Well development details are provided on the Well Development field form (Attachment C).

2.6 *Groundwater Sampling*

A water sample was collected after well development was completed. It should be noted that less than 24 hours passed in between the completion of well development and groundwater sampling due to time constraints to meet scheduled airline flights.

Prior to sampling, the depth to water in the well was measured using a clean electronic oil/water interface probe from the scribed reference mark (north side of the top of the PVC casing) of the well. The well was purged using a submersible pump equipped with a new length of LDPE tubing. During purging, water quality parameters (temperature, pH, and specific conductance) are typically monitored. Unfortunately, the multi parameter meter brought to the site was inoperable and no readings were measured. Samples bottles were filled in uniquely labeled laboratory-prepared containers. Due to a limited amount of water in the well and the slow recharge rate a duplicate sample was not collected. The sample bottles were placed in a chilled cooler along with chain-of-custody documentation and transported to Alaska Air Cargo in Ketchikan Airport for transport to Freidman & Bruya Laboratory in Seattle, Washington for analysis. The sample was analyzed for the following analyses:

- DRO and RRO using Alaska Methods AK102 and AK103
- BTEX using EPA Method 8260
- PAHs using EPA Method 8270 SIM

2.7 *Soil Sample Collection – Historic Sampling Locations*

In 2004 a due diligence investigation was performed at the site by PNG. This investigation included the collection of soil samples from several areas of the site that had the potential to have environmental impacts due to site operations. On subsequent visits to the facility HydroCon was informed by contractors working at the site that one of the previous owners had performed remedial action after the due diligence investigation. There are no reports or analytical data to confirm this.

As requested by ADEC, HydroCon performed follow up soil sampling at historic sampling locations where elevated concentrations of contaminants of concern (COCs) were collected. The sampling was done using equipment operated by Southeast Road Builders Construction Company and/or a clean shovel, depending of the location and access. Samples were collected near the original sampling location. HydroCon removed the surface material (typically sand and gravel fill) to access the underlying soil. This depth was typically observed at 1 foot bgs at most of the sampling locations.

A discussion of each historic and recently collected sample is provided below and documented on the attached data tables. For discussion purposes, samples are grouped together based on their relative location at the site.

2.7.1 Camp Generator Area

Soil samples collected near the Camp Generator are included for discussion in this section of the report. The locations are shown on Figure 3. Photo documentation is included in Attachment B.

CS1 – This sample was collected south of the water treatment unit where historic sample Genset-East was collected. The overlying soil in this location was compacted gravel. Native soil was present at a depth of approximately 1 foot bgs. There was no field indication of contamination present with a PID reading of 0.3 ppm. A soil sample (CS1-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO, RRO, and PAH analysis.

CS2 – This sample was collected on the northwest end of the mess hall where a small above ground above-ground storage tank (AST) use to be located. The historic sample collected at this location was named Camp AST-1. The AST has been removed and the overlying soil in this location is mostly compacted gravel with some soil. Native soil was present at a depth of approximately 1 foot bgs. There was no field indication of contamination present with a PID reading of 0.4 ppm. A soil sample (CS2-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

CS3 – This sample was collected on the northeast end of the mess hall where a small AST use to be located. The historic sample collected at this location was named Camp AST-2. The AST has been removed and the overlying soil in this location is mostly compacted gravel with some soil. Native soil was present at a depth of approximately 1 foot bgs. There was no field indication of contamination present with a PID reading of 0.3 ppm. A soil sample (CS3-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

CS4 – This sample was collected on the west end of the southern bunk house where a small AST use to be located. The historic sample collected at this location was named Camp AST-3. The AST has been removed and the overlying soil in this location is compacted gravel with some soil. Native soil was present at a depth of approximately 1 foot bgs. There was no field indication of contamination present with a PID reading of 0.4 ppm. A soil sample (CS4-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

CS5 – This sample was collected on the northeast corner of residence trailer where a small AST use to be located. The historic sample collected at this location was named Camp AST-4. The AST has been removed and the overlying soil in this location is a mixture of soil and gravel. Native soil was present at a depth of approximately 1 foot bgs. There was no field indication of contamination present with a PID reading of 0.2 ppm. A soil sample (CS5-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

Step-out Borings – HydroCon did not perform these borings due to concerns for damaging buried underground utility lines. The purpose of these borings was to assess the lateral extent of petroleum contamination east and north of the remedial excavation performed in that area. Several high voltage power lines run from the generator to the water treatment system and the mess hall. As-built diagrams show these lines but their location is not exact on the figure. This work will have to be performed at a future date.

2.7.2 Fueling Station Area

Soil samples collected near the Fueling Station area are included for discussion in this section of the report. The locations are shown on Figure 4. Photo documentation is included in Attachment B.

CS6 – This sample was collected on the south end of the western-most 18,000 gallon AST. The historic sample collected at this location was named Twin AST-2. The soil in this location is composed of sandy gravel with silt fill. The native material in this area of the site is limestone bedrock. There was field indication of contamination from ground surface to approximately 1 foot bgs including slight petroleum staining, faint odor, and a PID reading of 3.7 ppm. A soil sample (CS6-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

CS7 – This sample was collected on the northeastern corner of the northern-most generator. The historic sample collected at this location was named SE Generator. The soil in this location is composed of sandy gravel with silt fill. The native material in this area of the site is limestone bedrock. There was no field indication of contamination present with a PID reading of 0.4 ppm. A soil sample (CS7-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

CS8 – This sample was collected on the eastern end of the southern-most generator. The historic sample collected at this location was named SW Generator. The soil in this location is composed of sandy gravel with silt fill. The native material in this area of the site is limestone bedrock. There was no field indication of contamination present with a PID reading of 1.3 ppm. A soil sample (CS8-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

CS9 – This sample was collected at the former drum storage area. Connex boxes used to store equipment, oil, etc. is located in this area of the site now. The historic sample collected at this location was named Drum Storage East. The soil in this location is composed of compact sandy gravel fill. The native material in this area of the site is limestone bedrock. There was no field indication of contamination present with a PID reading of 1.6 ppm. A soil sample (CS9-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO, RRO, PAH, and BTEX analysis.

CS10 – This sample was not collected due to concerns for damaging underground utilities. Several utility lines are located in this area including power and communications that goes down to the rock crushing area and barge loading area.

2.7.3 Fuel Header

The soil sample collected near the fuel header is included for discussion in this section of the report. The sample location is shown on Figure 4. Photo documentation is included in Attachment B.

CS11 – This sample was collected on the western end of the fuel header. A large stainless containment box has been constructed to capture minor spills that may occur during fueling. The historic sample collected at this location was named Fuel Header. The soil in this location is composed of compact sandy gravel fill. The native material in this area of the site is limestone bedrock. There was no field indication of contamination present with a PID reading of 0.8 ppm. A soil sample (CS11-1) was collected at approximately 1 foot bgs. The sample was submitted for DRO and RRO analysis.

2.7.4 Shop Building Area

The soil sample collected near the shop building is included for discussion in this section of the report. The sample location is shown on Figure 5. Photo documentation is included in Attachment B.

CS12 – This sample was collected on the northeastern corner of the shop near the diesel AST. The historic sample collected at this location was named Shop Building. The soil in this location is composed of compact sandy gravel fill. The native material in this area of the site is limestone bedrock. There was no field indication of contamination present with a PID reading of 1.1 ppm. A soil sample (CS12-1) and duplicate sample (CS100-1) were collected at approximately 1 foot bgs. The samples were submitted for DRO, RRO, PAH, and BTEX analysis.

2.8 *Soil Stockpile Sampling*

Two biotreatment soil stockpiles are currently active at the site (CRC1 and HydroCon stockpiles). The last sampling event was performed in September 2016. A new round of sampling was performed to assess remediation progress. The sampling locations for the CRC1 stockpile are shown on Figure 6 and the sampling locations for the HydroCon stockpile are shown on Figure 7.

ADEC requires collection of 3 samples for every 100 cubic yards of stockpiled soil plus 1 sample for each additional 100 cubic yards of stockpiled soil. In addition, a field duplicate sample must be collected for each stockpile. Samples were collected from an evenly spaced grid at various depths (one sample per grid point). Five soil samples (including a duplicate sample) were collected from the CRC1 stockpile and 7 samples (including a duplicate sample) were collected from the HydroCon stockpile.

All soil samples collected from the stockpiles were analyzed for the following laboratory analyses:

- DRO and RRO by Alaska's Method AK102 and AK103
- One sample per stockpile (plus a duplicate sample at each stockpile) was analyzed for PAHs using EPA Method 8270 SIM.

2.9 *Surface Water Sampling*

HydroCon collected a surface water sample from the drainage ditch that's located north of the remedial excavation at the Camp Generator area. Laboratory prepared bottles were filled by submerging the sample container under the water line until the bottle was full. A new pair of gloves was used to collect the sample. It should be noted that the water level in the drainage ditch was low and some sediment entered the duplicate sample bottle during sample collection.

The sample and duplicate sample was analyzed for the following analyses:

- DRO and RRO using Alaska's Methods AK102 and AK103
- BTEX using EPA Method 8260
- PAHs using EPA Method 8270 SIM

2.10 *Groundwater Sampling*

HydroCon collected a groundwater sample from monitoring well MW-1 on September 19, 2018. The well cap was removed and the water level was allowed to equilibrate before measurement. A new length of LDPE tubing attached to a clean submersible pump was used to purge and sample the well. The multi-meter used to measure groundwater stabilization parameters was not working so no measurements were

taken. The samples were placed in laboratory prepared and labeled glass jars, sealed with ziplock bags, and placed into a chilled cooler. The well had less than 2 feet of water and was pumped dry. The recharge rate is relatively slow in the well. The water produced from the well was slightly turbid and exhibited a petroleum hydrocarbon odor. Sampling details were recorded on a Groundwater Sample Collection form (Attachment D).

3.0 RESULTS OF INVESTIGATION

This section provides a discussion of the results of the sampling and analysis. The laboratory report and chain-of-custody documentation are included in Attachment E.

3.1 *Soil Analytical Results*

Soil results are reported as milligrams per kilogram (mg/kg) or parts per million (ppm). The results are summarized on Tables 1 and 2.

3.1.1 Historic Sampling Locations

All samples were analyzed for DRO and RRO, four samples were analyzed for PAHs (CS1-1, CS9-1, CS12-1, and CS100-1) and three samples were analyzed for BTEX (CS9-1, CS12-1, and CS100-1).

Analytical results indicated that none of the samples had RRO or BTEX above their respective ADEC Method 2 cleanup level. Four samples (CS1-1, CS4-1, CS6-1, and CS8-1) had DRO above the ADEC Method 2 cleanup level. One sample (CS1-1) had naphthalene above the ADEC Method 2 cleanup level.

3.1.2 Soil Stockpiles

Each sample collected from CRC1 stockpile had DRO ranging from 160 to 280 mg/kg. Three of the five samples had DRO concentrations that slightly exceeded the ADEC Method 2 cleanup level. RRO was detected in each sample ranging from 330 to 480 mg/kg. These concentrations are well below the ADEC Method 2 cleanup level. Very low concentrations of naphthalene, phenanthrene, and pyrene were detected in the two samples submitted for PAH analysis. All of the PAH compounds that were detected above their respective laboratory reporting limit (MRL) in the samples were below their respective ADEC Method 2 cleanup level.

Each sample collected from the HydroCon stockpile had DRO ranging from 220 to 460 mg/kg. Six of the seven samples had DRO concentrations that slightly exceeded the ADEC Method 2 cleanup level. It should be noted that a significant reduction in DRO concentrations was seen in this stockpile compared to the previous sampling results. RRO was detected in each sample at concentrations ranging from 170 to 440 mg/kg. These concentrations are well below the ADEC Method 2 cleanup level. Very low concentrations of naphthalene, phenanthrene, and pyrene were detected in the two samples submitted for PAH analysis. All of the PAH compounds that were detected above their respective MRL in the samples were below their respective ADEC Method 2 cleanup level.

3.1.3 Temporary Boring

DRO was detected in each sample ranging from 7.7 to 220 mg/kg with the highest concentration seen in the HC1-7 sample. RRO was detected in one sample (HC1-15) at a concentration of 270 mg/kg. None of

the sample results exceeded their respective ADEC Method 2 cleanup levels.

3.2 *Groundwater Analytical Results*

Groundwater results are reported as micrograms per liter (ug/L) or parts per billion (ppb). The results are summarized on Tables 3 and 4.

3.2.1 Monitoring Well MW-1

DRO (7,000 ug/L), RRO (390 ug/L), total xylenes (6 ug/L), naphthalene (0.74 ug/L), acenaphthene (0.45 ug/L), fluorene (1.5 ug/L), phenanthrene (1.2 ug/L), and pyrene (0.22 ug/L) were detected in the sample. The concentration of DRO exceeds the ADEC Method 2 cleanup level.

3.3 *Surface Water Analytical Results*

Surface water results are reported as micrograms per liter (ug/L) or parts per billion (ppb). The results are summarized on Tables 5 and 6.

3.3.1 Drainage Ditch

DRO up to 480 ug/L was detected in the SW-1 and duplicate sample (SW-101). No other analytes were detected above their respective MRL. Surface water results were compared to ADEC's Water Quality Standards for Water Supply Aquaculture. These standards use a combined total for BTEX results and PAH results. There was not detection of BTEX or PAHs in either sample, therefore the samples are in compliance with the referenced surface water standards.

3.4 *Data Quality Review*

HydroCon collected field duplicate samples from the historic soil sampling (CS100-1 sample was a duplicate of CS12-1), stockpile soil sampling (CRC-SP100 sample is a duplicate of CRC-SP4 and HC-SP100 sample is a duplicate of HC-SP1), and surface water sample sampling (SW-101 sample is a duplicate of SW-1). Results of those samples are summarized on the attached tables. A duplicate groundwater sample was not collected from MW-1.

A trip blank (water) was included in the sample cooler and analyzed for BTEX using EPA Method 8260. Results of the trip blank sample indicated that there was no detection of BTEX in the sample.

3.4.1 Laboratory Quality Assurance

HydroCon performed a quality assurance/quality control (QA/QC) review of the analytical results, which is presented the attached Laboratory Data Review Checklist (Attachment F). The laboratory results are considered to be valid, as reported.

4.0 DISCUSSION

This section provides a discussion of soil, surface water, and groundwater sampling results and recommendations for future action and sampling at the site.

4.1 *Results of Soil Sampling*

Soil sampling was performed at the site to assess soil quality at historic sampling locations that had elevated concentrations of contaminants during the 2004 due diligence investigation, assess remediation progress in the two soil stockpiles, and to assess soil quality in the temporary boring drilled next to monitoring well MW-1.

Soil analytical results of the sampling at the historic sampling locations indicated that, with the exception CS-4/Camp AST-3 sampling location, the soil quality has improved significantly compared to the 2004 results. Based on field observation (presence of clean gravel fill) and field screening results (the general absence of stained soil, petroleum odor, or PID readings), it appears that the anecdotal information provided to HydroCon that remedial action took place at the site at these locations is accurate. However, some of the sampling locations have concentrations of contaminants (primarily DRO) that require further remediation to comply with the ADEC Method 2 cleanup level. These locations include:

- CS1-1/Genset-East sample location
- CS4-1/Camp AST-3 sample location
- CS6-1/Twin AST-2 sample location
- CS8-1/SW Generator sample location

Soil analytical results of the stockpile sampling indicate that further remediation is required at both locations. Based on the results of this sampling event it appears that both stockpiles are very close to achieving regulatory closure.

Analytical results of the soil samples collected from HC-1 indicates that DRO and RRO are present but at concentrations below their respective ADEC Method 2 cleanup levels. Based on observation of the drill cuttings from HC-1 (as well as the 2015 remedial excavation), fill soil composed of sand, silt, and gravel is present from the ground surface to approximately 7 feet bgs. Limestone bedrock is the original surface in this area and is present from approximately 7 feet bgs to a depth greater than 30 feet bgs. Perched groundwater is present at the interface of the fill and bedrock. Groundwater was not encountered in the limestone to a depth of 30 feet bgs.

4.2 *Results of Surface Water Sampling*

As discussed in Section 3.3.1, the analytical results of the surface water sampling indicate that the water quality in the drainage ditch near the Camp Area is in compliance with ADEC's Water Quality Standards for Water Supply Aquaculture.

4.3 *Results of Groundwater Sampling*

Groundwater analytical results indicate that the concentration of DRO exceeds the ADEC Method 2 cleanup level. The majority of soil contamination at the Fueling Station area has been removed by remedial excavation. However, residual contamination was left in place due to the presence of the ASTs, product lines, and dispenser pump. This is the likely source of groundwater contamination observed in MW-1.

Based on this result, ADEC will likely require further assessment to understand the extent of contamination. Additional monitoring wells may be required to determine the direction of groundwater flow and the extent of groundwater contamination.

4.4 *Recommendations*

Based on the results of this investigation HydroCon recommends the following actions be taken:

- Augment the CRC1 soil stockpile with 540 pounds of urea and 135 pounds of phosphorus potassium fertilizer (20:20:0 mix). Till on a monthly basis to enrich the oxygen content. Keep the stockpile covered in between tilling and fertilizer application events.
- Augment the HydroCon soil stockpile with 2,320 pounds of urea and 580 pounds of phosphorus potassium fertilizer (20:20:0 mix). Till on a monthly basis to enrich the oxygen content. Keep the stockpile covered in between tilling and fertilizer application events.
- Collect confirmation soil samples at the two soil stockpiles in 2019.
- Perform local remedial excavation in the four historic sampling locations documented in Section 4.1 of this report that still have contaminants above their respective ADEC Method 2 cleanup level. Collect confirmation samples to demonstrate that the extent of contamination has been removed from each area.
- Hire an underground utility locate contractor to identify the location of the underground utilities in the Camp Area and near the fuel dispenser in the Fueling Station area. This would allow collection of soil data needed to delineate the lateral extent of soil contamination in the Camp Area and to assess current soil conditions at the historic “Pump Sample” (CS10).
- Wait for direction from ADEC on further assessment of groundwater contamination in the Fueling Station area.

4.5 *Establishment of Contaminants of Concern at the Site*

Based on soil, groundwater and surface water sampling results that have been performed at the site since 2004, HydroCon recommends that only contaminants that have exceeded their respective ADEC Method 2 cleanup level be analyzed in the future. The rationale for this is that the release of contaminants is from the same product used at the site (diesel fuel) and is the result of sloppy fuel handling. The majority of the contaminated soil at both of the spill locations (Camp Generator and Fueling Station) has been removed. The contamination that continues to be monitored at the site is the residual that remains because a lack of access at both areas prevented their removal. As a cost savings measure for CRC and to focus future investigation efforts, HydroCon petitions ADEC to establish DRO, RRO, BTEX, and naphthalene as the COCs at the site. All future laboratory analysis will include these COCs only, unless a new release occurs at the site.

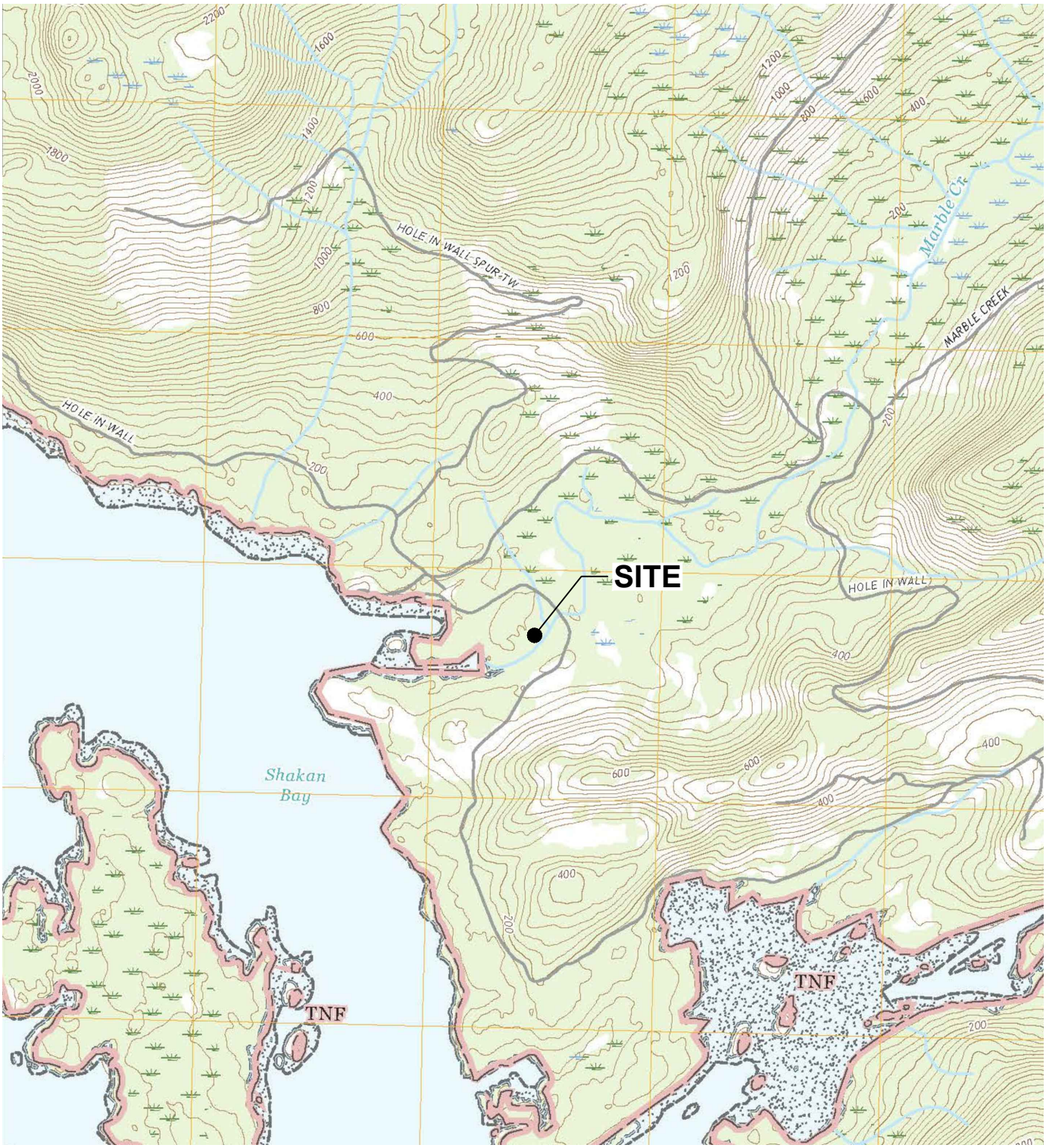
5.0 QUALIFICATIONS

HydroCon’s services will be performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. HydroCon makes no warranties, either expressed or implied, regarding the findings, conclusions or recommendations. Please note that HydroCon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report.

Findings and conclusions resulting from these services will be based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, nondetectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this monitoring. Subsurface conditions may vary from those encountered at specific sampling locations or during other surveys, tests, assessments, investigations, or exploratory services; the data, interpretations and findings are based solely upon data obtained at the time and within the scope of these services.

This work plan is intended for the sole use of **Columbia River Carbonates**. This report may not be used or relied upon by any other party without the written consent of HydroCon. The scope of services performed in execution of this work plan may not be appropriate to satisfy the needs of other users, and use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

FIGURES



NOTE(S):

USGS, PETERSBURG (A-5) NE QUADRANGLE
ALASKA
1:63 360 SERIES (TOPOGRAPHIC)

0 2000 4000

SCALE IN FEET
1" = 2000'

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S

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CHK: CH
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PROJECT NO: 2015-010

FIGURE 1
SITE LOCATION MAP

CALDER MINE
PRINCE WALES ISLAND
ALASKA

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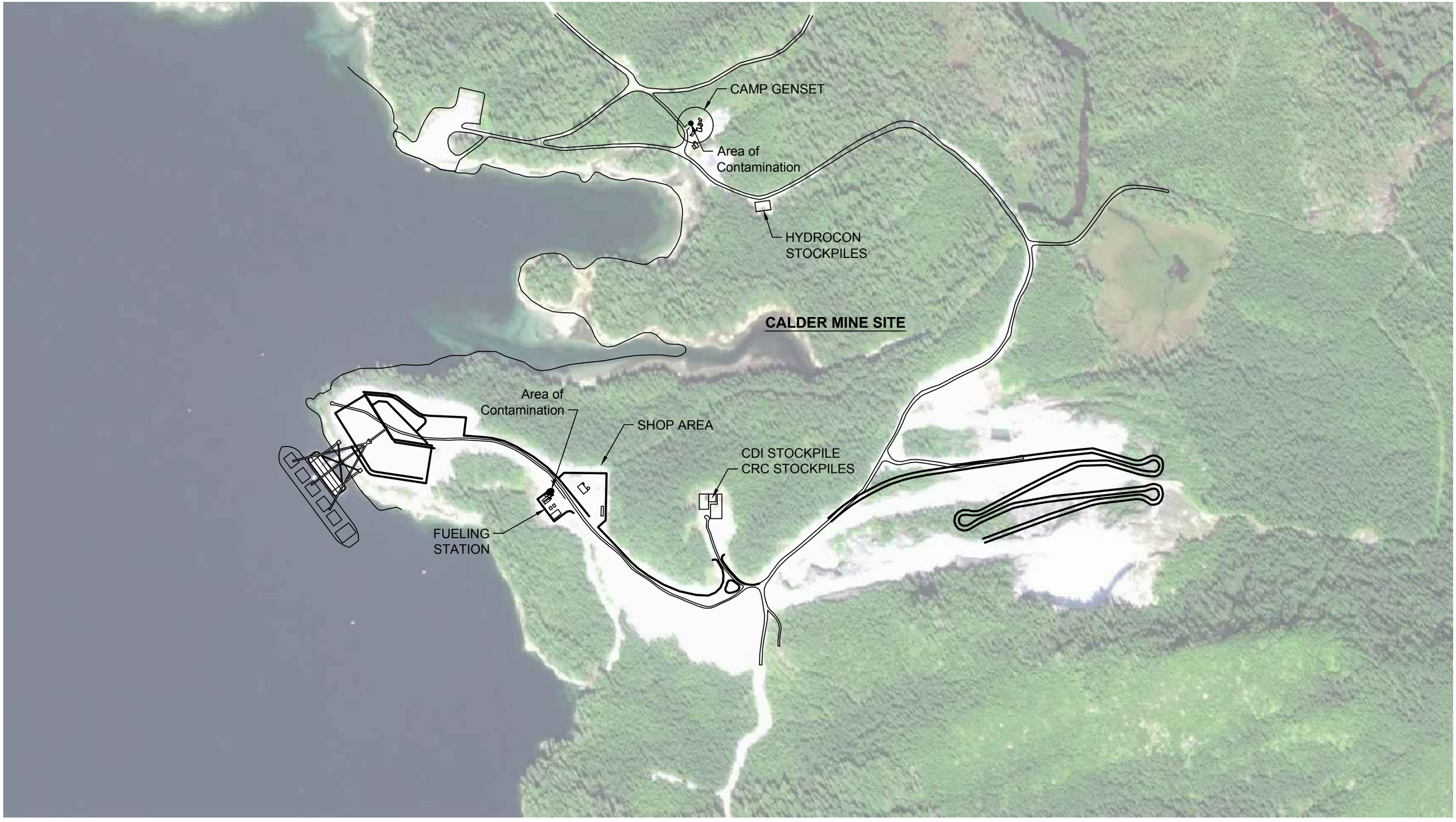

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0 500 1000
SCALE IN FEET
1" = 500'

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2015-010

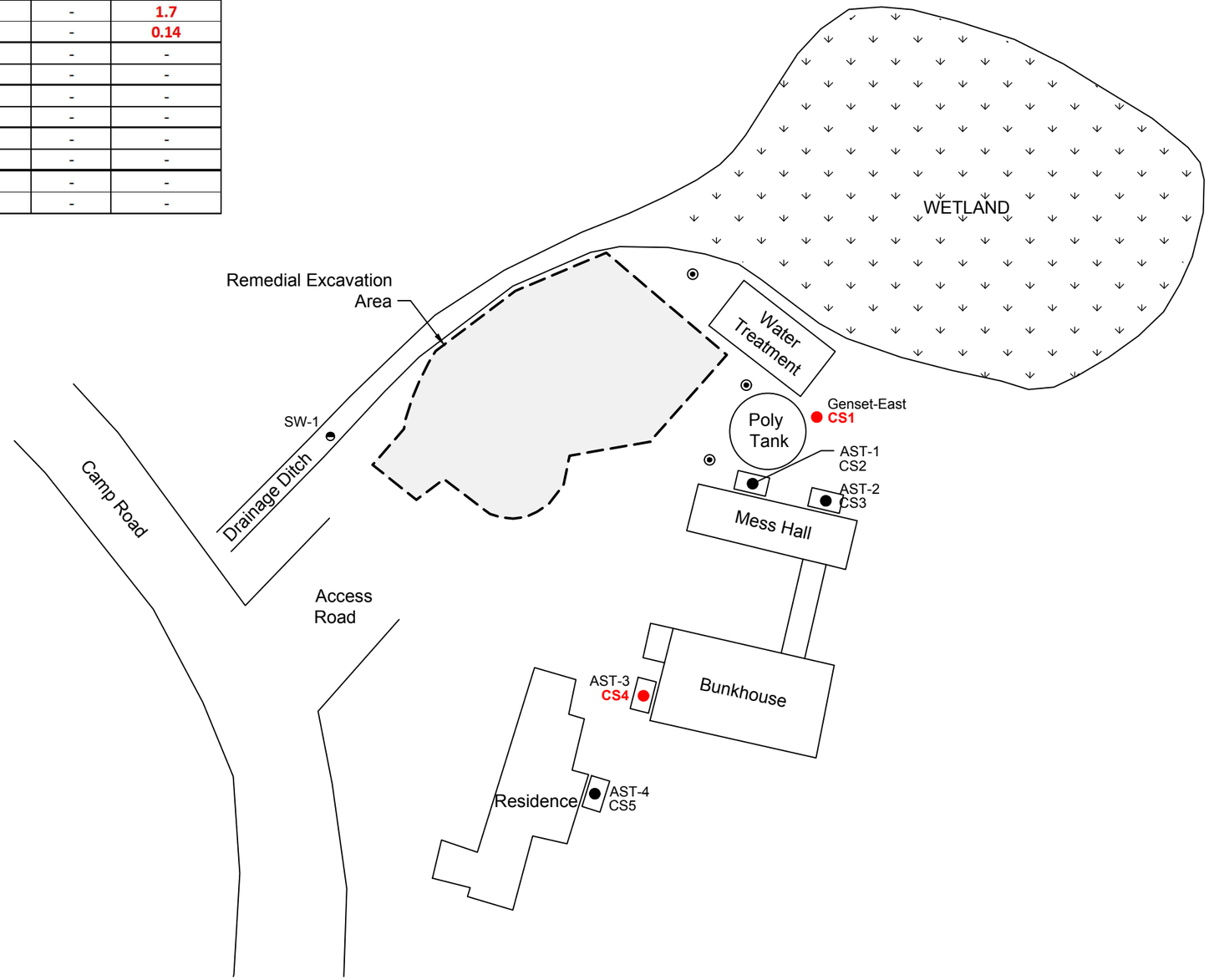
FIGURE 2
SITE FEATURES

CALDER MINE
PRINCE OF WALES ISLAND
ALASKA

C:\Users\Josh\Desktop\Autocad Files\Hydrocon-Autocad\2015-010 Calder Mine\2018\Nov 2018\2015-010_BM-CMS-110618.dwg 2.17.2014

Field ID	Date	Analytical Results (mg/kg)						
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
ADEC Method 2 - Over 40" Zone		**230**	**9,700**	**0.022**	**6.7**	**0.13**	**1.5**	**0.038**
Camp Generator Area								
Genset-East	9/30/2004	**4,100**	240	-	-	-	-	**1.7**
CS1-1	9/19/2018	**350**	49 x	-	-	-	-	**0.14**
Camp AST-1	9/30/2004	**7,500**	130	-	-	-	-	-
CS2-1	9/19/2018	5.5 x	<25	-	-	-	-	-
Camp AST-2	9/30/2004	**440**	50	-	-	-	-	-
CS3-1	9/19/2018	27	<25	-	-	-	-	-
Camp AST-3	9/30/2004	**550**	<50	-	-	-	-	-
CS4-1	9/19/2018	**480**	99 x	-	-	-	-	-
Camp AST-4	9/30/2004	**2,700**	79	-	-	-	-	-
CS5-1	9/19/2018	<5	<25	-	-	-	-	-

Notes:
1Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram
j - The analyte concentration is reported below the lowest calibration standard. The value reported is anestimate.
x - The sample chromatographic pattern does not resemble the fuel standard used for quantification.



LEGEND

- SITE BOUNDARY
- EXISTING ACCESS ROAD
- Genset-West ● SAMPLE LOCATIONS (PNG, 2004)
- CS1 ● 2018 SAMPLE LOCATIONS
- EXISTING STRUCTURES
- EXCAVATION LOCATION
- DELINEATION SAMPLE LOCATIONS - UNABLE TO SAMPLE DO TO POTENTIAL UNDERGROUND UTILITIES
- SW-1 ◓ SURFACE WATER SAMPLE

N W E S

0 20 40
SCALE IN FEET
1" = 20'

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FIGURE 3
CAMP AREA SAMPLE LOCATIONS

CALDER MINE
PRINCE OF WALES ISLAND
ALASKA

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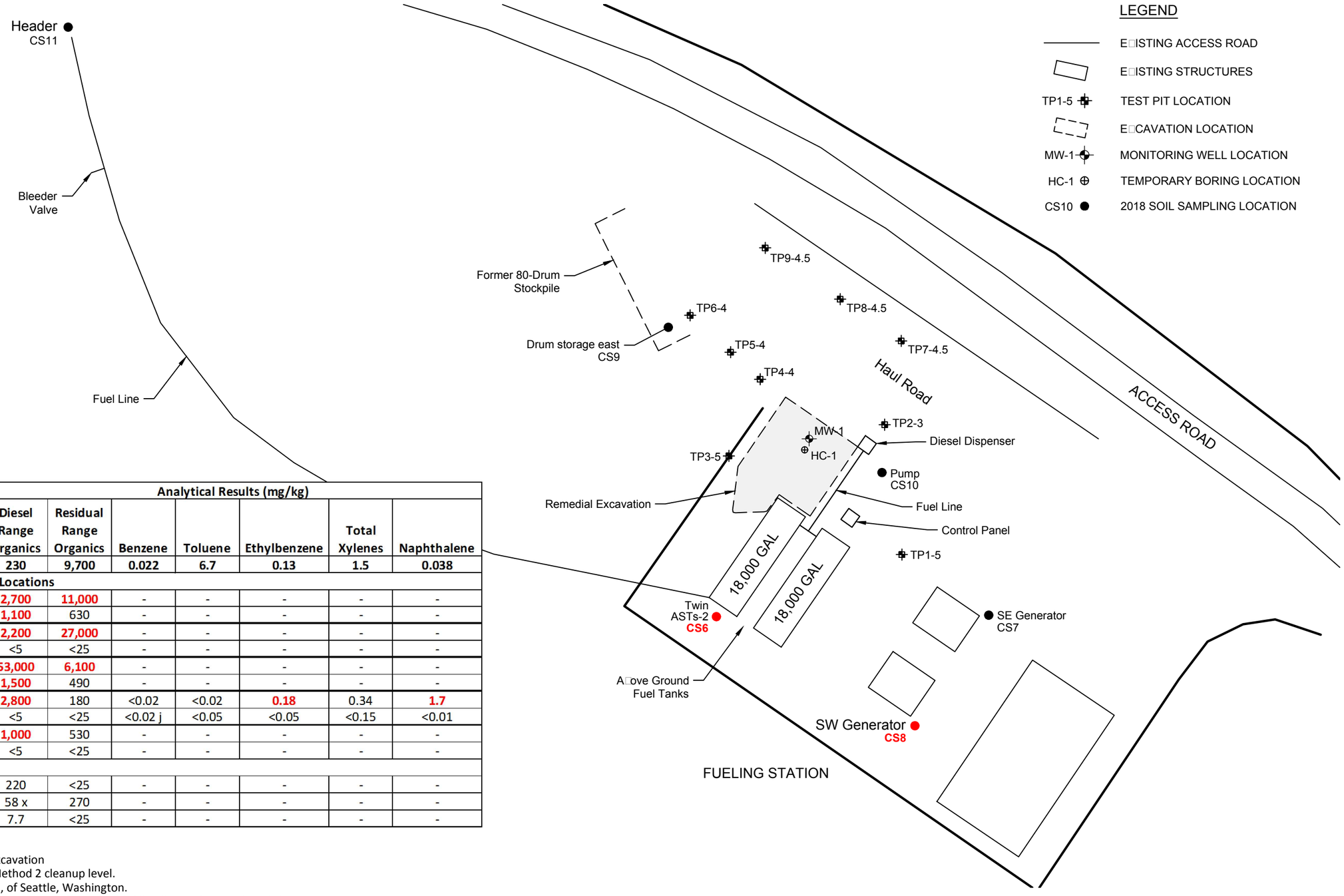

Field ID	Date	Analytical Results (mg/kg)						
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
ADEC Method 2 - Over 40" Zone		**230**	**9,700**	**0.022**	**6.7**	**0.13**	**1.5**	**0.038**
Fueling Station, Laboratory, and Other Locations								
Twin AST-2	9/30/2004	**2,700**	**11,000**	-	-	-	-	-
CS6-1	9/18/2018	**1,100**	630	-	-	-	-	-
SE Generator	9/30/2004	**2,200**	**27,000**	-	-	-	-	-
CS7-1	9/18/2018	<5	<25	-	-	-	-	-
SW Generator	9/30/2004	**53,000**	**6,100**	-	-	-	-	-
CS8-1	9/18/2018	**1,500**	490	-	-	-	-	-
Drum Storage East	9/30/2004	**2,800**	180	<0.02	<0.02	**0.18**	0.34	**1.7**
CS9-1	9/18/2018	<5	<25	<0.02 j	<0.05	<0.05	<0.15	<0.01
Fuel Header	9/30/2004	**1,000**	530	-	-	-	-	-
CS11-1	9/18/2018	<5	<25	-	-	-	-	-
Boring HC-1								
HC1-7	9/17/2018	220	<25	-	-	-	-	-
HC1-15	9/17/2018	58 x	270	-	-	-	-	-
HC1-30	9/17/2018	7.7	<25	-	-	-	-	-

Notes:
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram
j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
x - The sample chromatographic pattern does not resemble the fuel standard used for quantification.

N W E S

0 30 60
SCALE IN FEET
1" = 30'

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FIGURE 4
FUELING STATION AREAS
SAMPLING LOCATIONS
CALDER MINE
PRINCE WALES ISLAND
ALASKA

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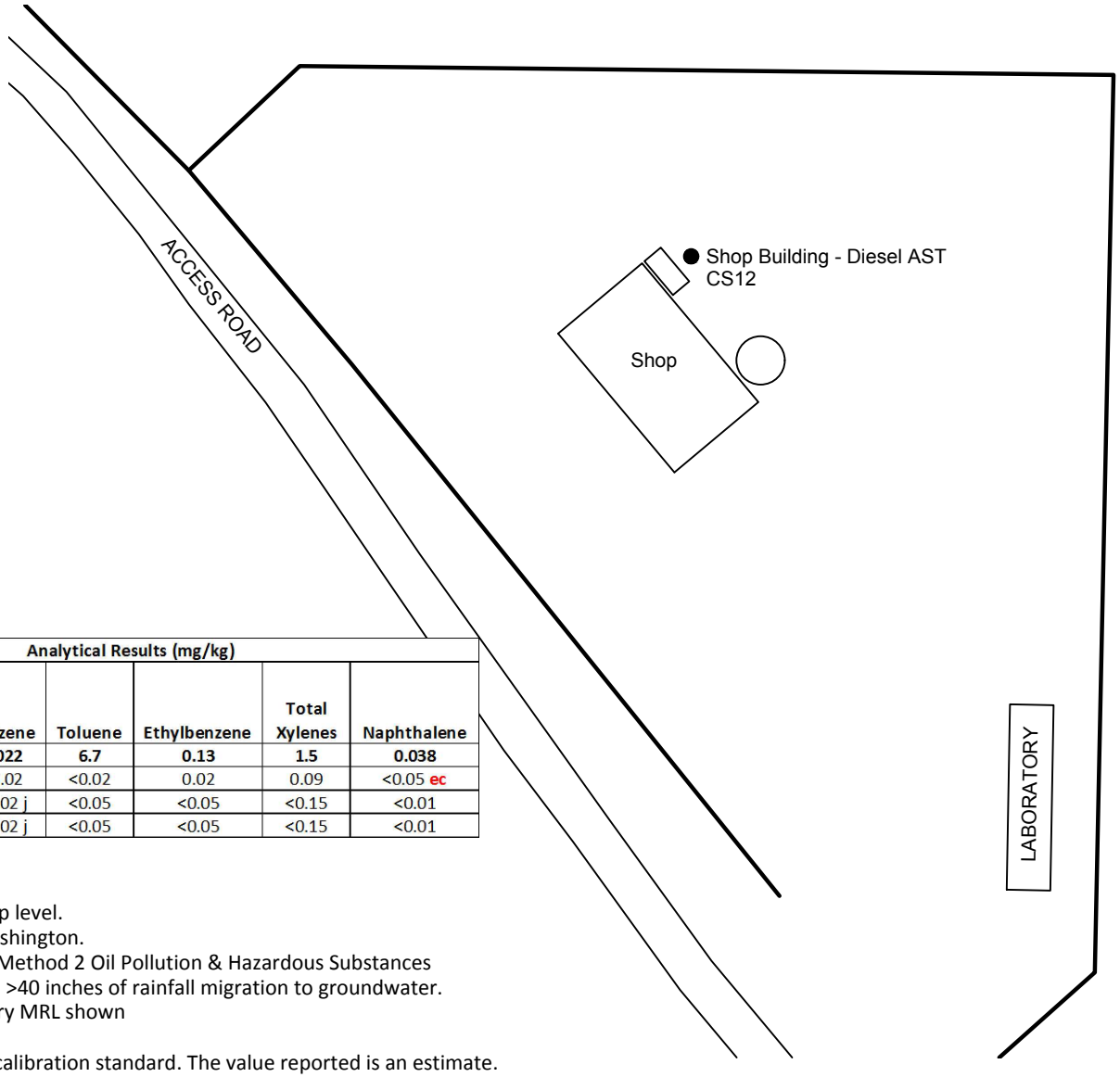
LEGEND

Existing Structures

CS12 ● 2018 Sample Location



Field ID	Date	Analytical Results (mg/kg)						
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
ADEC Method 2 - Over 40" Zone		**230**	**9,700**	**0.022**	**6.7**	**0.13**	**1.5**	**0.038**
Shop Building- Diesel AST	9/30/2004	6,000	110	<0.02	<0.02	0.02	0.09	<0.05 ec
CS12-1	9/18/2018	22	110	<0.02 j	<0.05	<0.05	<0.15	<0.01
CS100-1	9/18/2018	27	130	<0.02 j	<0.05	<0.05	<0.15	<0.01

Notes:

[1]Soil was removed by additional remedial excavation

Red denotes concentration exceeds ADEC Method 2 cleanup level.

Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.

Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.

< = not detected at a concentration exceeding the laboratory MRL shown

mg/kg = milligrams per kilogram

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

ec - exceeds referenced ADEC cleanup level.

N W E S

0 50 100

SCALE IN FEET

1" = 50'

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FIGURE 5
SHOP BUILDING □ LABORATORY
SAMPLING LOCATION

CALDER MINE
PRINCE OF WALES ISLAND, AK.

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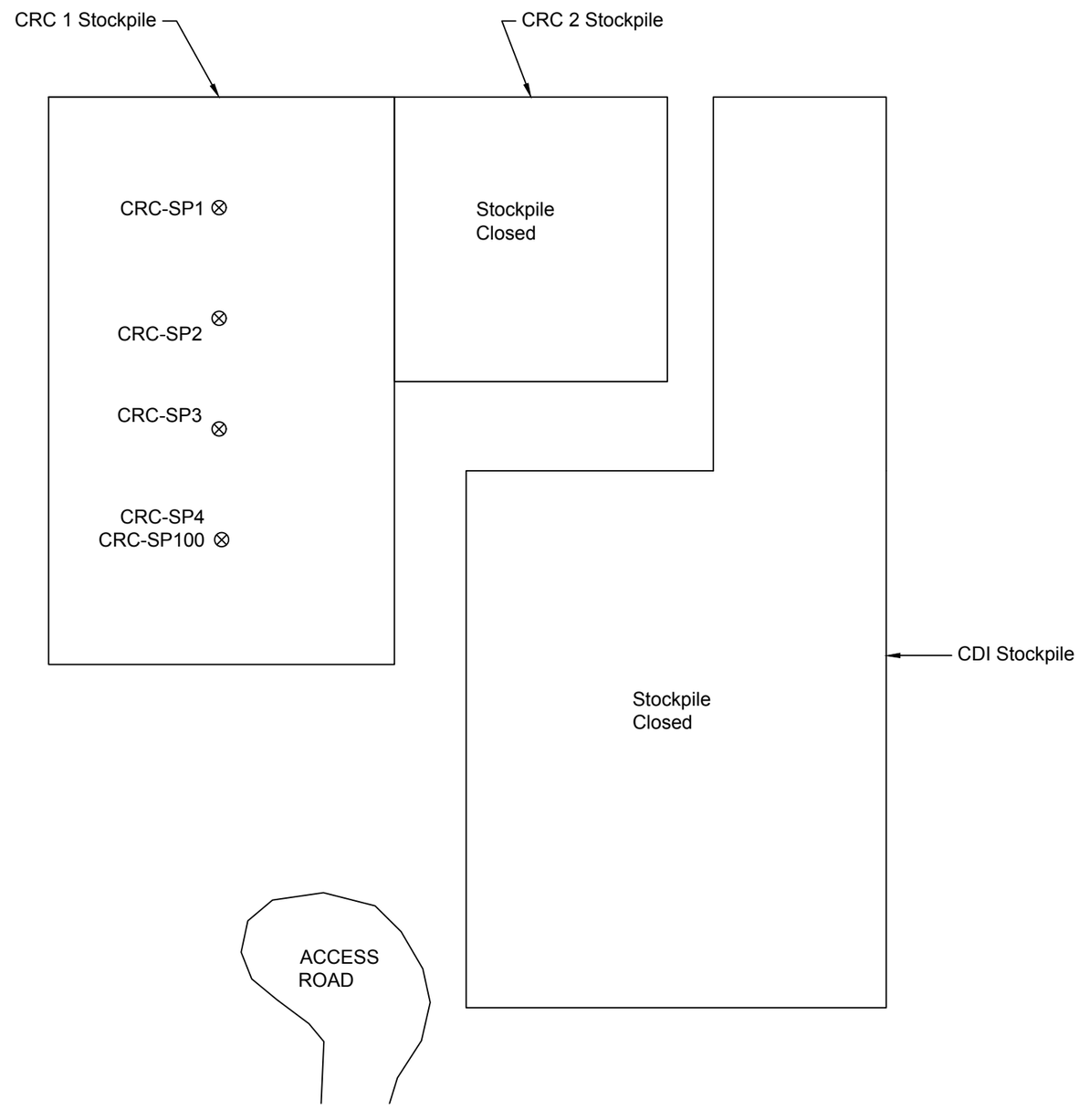
Field ID	Date	Analytical Results (mg/kg)						
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
ADEC Method 2 - Over 40" Zone		**230**	**9,700**	**0.022**	**6.7**	**0.13**	**1.5**	**0.038**
CRC1 Stockpile								
CRC-SP1	9/18/2018	200	450	-	-	-	-	-
CRC-SP2	9/18/2018	**230**	450	-	-	-	-	-
CRC-SP3	9/18/2018	**240**	450	-	-	-	-	-
CRC-SP4	9/18/2018	**280**	480	-	-	-	-	<0.01
CRC-SP100	9/18/2018	160	330	-	-	-	-	0.011

Notes:
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram

LEGEND

- E□ISTING ACCESS ROAD
- STOCKPILE
- CRC-SP1 ⊗ STOCKPILE SOIL SAMPLE LOCATIONS



N W E S

0 20 40
SCALE IN FEET
1" = 20'

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FIGURE 6
CRC 1 STOCKPILE SAMPLE LOCATIONS

CALDER MINE
PRINCE OF WALES ISLAND
ALASKA

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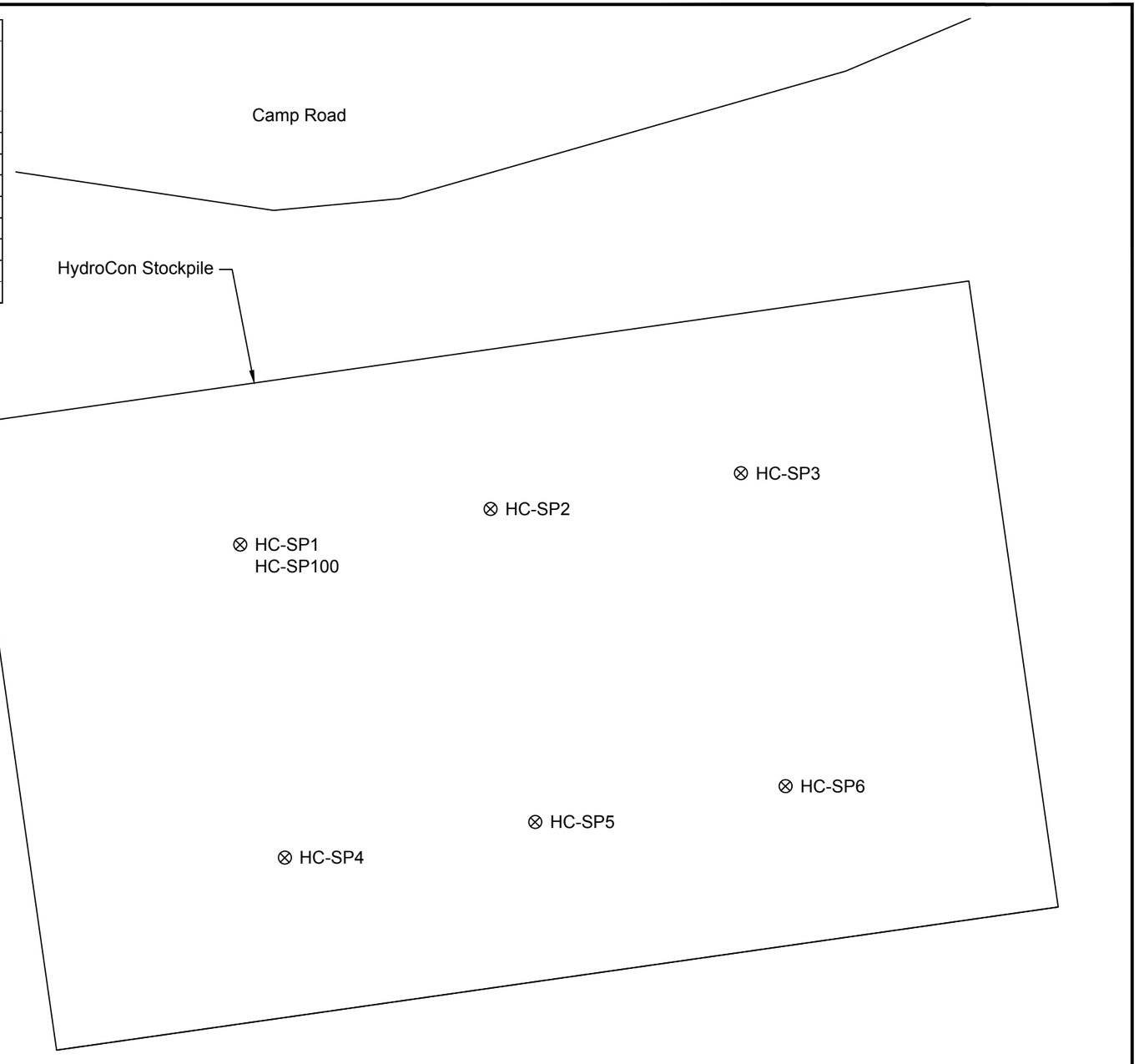
Field ID	Date	Analytical Results (mg/kg)						
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
ADEC Method 2 - Over 40" Zone		**230**	**9,700**	**0.022**	**6.7**	**0.13**	**1.5**	**0.038**
HydroCon Stockpile								
HC-SP1	9/18/2018	**300**	240	-	-	-	-	0.01
HC-SP2	9/18/2018	**310**	240	-	-	-	-	<0.01
HC-SP3	9/18/2018	220	170	-	-	-	-	-
HC-SP4	9/18/2018	**310**	260	-	-	-	-	-
HC-SP5	9/18/2018	**460**	440	-	-	-	-	-
HC-SP6	9/18/2018	**310**	210	-	-	-	-	-
HC-SP100	9/18/2018	**290**	270	-	-	-	-	-

Notes:
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram

LEGEND

- Existing Access Road
- Stockpile
- ⊗ Stockpile Soil Sample Locations



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SCALE IN FEET
1" = 20'

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FIGURE 7
HYDROCON STOCKPILE
SAMPLE LOCATIONS
CALDER MINE
PRINCE OF WALES ISLAND
ALASKA

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TABLES

Table 1
Soil Analytical Results
DRO, RRO, and BTEX
Calder Mine
Prince of Wales Island, Alaska

		AK 102	AK103	EPA 8260			
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ADEC Method 2 - Over 40" Zone		**230**	**9,700**	**0.022**	**6.7**	**0.13**	**1.5**
Field ID	**Date**						
Camp Generator Area							
Genset-East	9/30/2004	**4,100**	240	-	-	-	-
CS1-1	9/19/2018	**350**	49 x	-	-	-	-
Camp AST-1	9/30/2004	**7,500**	130	-	-	-	-
CS2-1	9/19/2018	5.5 x	<25	-	-	-	-
Camp AST-2	9/30/2004	**440**	50	-	-	-	-
CS3-1	9/19/2018	27	<25	-	-	-	-
Camp AST-3	9/30/2004	**550**	<50	-	-	-	-
CS4-1	9/19/2018	**480**	99 x	-	-	-	-
Camp AST-4	9/30/2004	**2,700**	79	-	-	-	-
CS5-1	9/19/2018	<5	<25	-	-	-	-
Fueling Station, Laboratory, and Other Locations							
Twin AST-2	9/30/2004	**2,700**	**11,000**	-	-	-	-
CS6-1	9/18/2018	**1,100**	630	-	-	-	-
SE Generator	9/30/2004	**2,200**	**27,000**	-	-	-	-
CS7-1	9/18/2018	<5	<25	-	-	-	-
SW Generator	9/30/2004	**53,000**	**6,100**	-	-	-	-
CS8-1	9/18/2018	**1,500**	490	-	-	-	-
Drum Storage East	9/30/2004	**2,800**	180	<0.02	<0.02	**0.18**	0.34
CS9-1	9/18/2018	<5	<25	<0.02 J	<0.05	<0.05	<0.15
Fuel Header	9/30/2004	**1,000**	530	-	-	-	-
CS11-1	9/18/2018	<5	<25	-	-	-	-
Shop Building- Diesel AST	9/30/2004	**6,000**	110	<0.02	<0.02	0.02	0.09
CS12-1	9/18/2018	22	110	<0.02 J	<0.05	<0.05	<0.15
CS100-1	9/18/2018	27	130	<0.02 J	<0.05	<0.05	<0.15
Boring HC-1							
HC1-7	9/17/2018	220	<25	-	-	-	-
HC1-15	9/17/2018	58 x	270	-	-	-	-
HC1-30	9/17/2018	7.7	<25	-	-	-	-
CRC1 Stockpile							
CRC-SP1	9/18/2018	200	450	-	-	-	-
CRC-SP2	9/18/2018	**230**	450	-	-	-	-
CRC-SP3	9/18/2018	**240**	450	-	-	-	-
CRC-SP4	9/18/2018	**280**	480	-	-	-	-
CRC-SP100	9/18/2018	160	330	-	-	-	-
HydroCon Stockpile							
HC-SP1	9/18/2018	**300**	240	-	-	-	-
HC-SP2	9/18/2018	**310**	240	-	-	-	-
HC-SP3	9/18/2018	220	170	-	-	-	-
HC-SP4	9/18/2018	**310**	260	-	-	-	-
HC-SP5	9/18/2018	**460**	440	-	-	-	-
HC-SP6	9/18/2018	**310**	210	-	-	-	-
HC-SP100	9/18/2018	**290**	270	-	-	-	-

Notes
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram
j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
x - The sample chromatographic pattern does not resemble the fuel standard used for quantification.

Table 2
Soil Analytical Results
PAHs
Calder Mine
Prince of Wales Island, Alaska

		EPA 8270 SIM															
		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(ghi)perylene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ADEC Method 2 - Over 40" Zone		**0.038**	**18**	**37**	**36**	**39**	**390**	**590**	**87**	**0.28**	**82**	**0.27**	**2.7**	**27**	**8.8**	**0.87**	**15,000**
Field ID	**Date Sampled**																
Camp Generator Area																	
Genset Diesel AST	9/30/2004	**1.7**	<0.5	0.9	4.0	8.6	<0.5	3.5	<0.5	<0.5 **ec**	<0.5	<0.5 **ec**	<0.5	<0.5	<0.5	<0.5	<0.5
CS1-1	9/19/2018	**0.14**	<0.01	<0.01	0.028	0.11	<0.01	<0.01	0.45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fueling Station, Laboratory, and Other Locations																	
Drum Storage East	9/30/2004	**1.7**	<0.5	0.9	4	8.6	<0.5	3.5	<0.5	<0.5 **ec**	<0.5	<0.5 **ec**	<0.5	<0.5	<0.5	<0.5	<0.5
CS9-1	9/18/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Shop Bldg Diesel AST	9/30/2004	<0.05 **ec**	<0.05	0.052	<0.05	0.31	<0.05	<0.05	0.33	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CS12-1	9/18/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CS100-1	9/18/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CRC1 Stockpile																	
CRC-SP4	9/18/2018	<0.01	<0.01	<0.01	<0.01	0.016	<0.01	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CRC-SP100	9/18/2018	0.011	<0.01	<0.01	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
HydroCon Stockpile																	
HC-SP1	9/18/2018	0.01	<0.01	<0.01	<0.01	0.013	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
HC-SP100	9/18/2018	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,
Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram
ec = exceeds referenced cleanup level
J -The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
x - The sample chromatographic pattern does not resemble the fuel standard used for quantification.

Table 3
Groundwater Analytical Results
DRO, RRO, and BTEX
Calder Mine
Prince of Wales Island, Alaska

		AK 102	AK103	EPA 8260			
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
ADEC Method 2		1,500	1,100	4.6	1,100	15	190
Field ID	**Date**						
Fueling Station Area							
MW-1	9/30/2004	7,000	390 x	<0.35	<1	<1	6

Notes
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations,Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram
x - The sample chromatographic pattern does not resemble the fuel standard used for quantification.

Table 4
Groundwater Analytical Results
PAHs
Calder Mine
Prince of Wales Island, Alaska

		EPA 8270 SIM															
		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(ghi)perylene
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
ADEC Method 2		1.7	260	530	290	170	43	260	120	0.12	2.0	0.034	0.34	0.80	0.19	0.034	0.26
Field ID	**Date Sampled**																
Fueling Station Area																	
MW-1	9/19/2018	0.74	<0.06	0.45	1.5	1.2	<0.06	<0.06	0.22	<0.06	<0.06	<0.03j	<0.06	<0.06	<0.06	<0.03j	<0.06

Notes
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds ADEC Method 2 cleanup level.
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC) Method 2 Oil Pollution & Hazardous Substances Pollution Control Regulations, Table B2, 18 AAC75, based on >40 inches of rainfall migration to groundwater.
< = not detected at a concentration exceeding the laboratory MRL shown
mg/kg = milligrams per kilogram
j -The analyte concentration is reported below the lowest calibration standard; the value reported is an estimate.

Table 5
Surface Water Analytical Results
DRO, RRO, and BTEX
Calder Mine
Prince of Wales Island, Alaska

		AK 102	AK103	EPA 8260			
		Diesel Range Organics	Residual Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Water Quality Standards 18 AAC 70				**Total BTEX 10 ug/L**			
Field ID	**Date**						
Fueling Station Area							
SW-1	9/19/2018	130	<250	<0.35	<1	<1	<3
SW-101	9/19/2018	480	<300	<0.35	<1	<1	<3

Notes
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds Water Quality Standards - Water Supply Aquaculture
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC)
< = not detected at a concentration exceeding the laboratory MRL shown
ug/L = micrograms per Liter

Table 6
Surface Water Analytical Results
PAHs
Calder Mine
Prince of Wales Island, Alaska

		EPA 8270 SIM															
		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(ghi)perylene
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Water Quality Standards 18 AAC 70		**Total PAHs 15 ug/L**															
Field ID	**Date Sampled**																
Fueling Station Area																	
SW-1	9/18/2018	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.03j	<0.06	<0.06	<0.06	<0.03j	<0.06
SW-101	9/18/2018	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.03j	<0.06	<0.06	<0.06	<0.03j	<0.06

Notes
[1]Soil was removed by additional remedial excavation
Red denotes concentration exceeds Water Quality Standards - Water Supply Aquaculture
Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.
Alaska Department of Environmental Conservation (ADEC)
< = not detected at a concentration exceeding the laboratory MRL shown
ug/L = micrograms per Liter
j -The analyte concentration is reported below the lowest calibration standard; the value reported is an estimate.

ATTACHMENT A

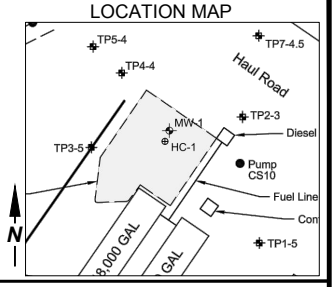
BORING LOGS

Hydro Con
314 W 15th Street
Vancouver, WA 98626
Phone: 360-703-6079

WELL/BORING NUMBER: HC1

PROJECT NAME: Calder Mine
PROJECT NUMBER: 2015-010
PROJECT LOCATION: Prince of Wales Island, AK
LOGGED BY: C. Hultgren
REVIEWED BY: J. Horowitz
DATE: 09-17-18

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
SANDY SILTY GRAVEL (GM), light gray, non-plastic fines with sand. Gravel consists of limestone, dry to moist at 7' bgs.	0							
Note: Bedrock contact made at 7' bgs.	5			HC1-7	0.5			
LIMESTONE (bedrock), light gray, crystaline, massive, dry.	10				0.5			
Note: At 14' bgs, dropped water level indicator probe in borehole before making connection. No water or moisture on probe.	15			HC1-15	0.4			
Note: Allowed borehole to sit for several hours.	20			HC1-20	1.1			
Note: At 30' bgs, again dropped water level indicator probe in borehole before making connection. No water or moisture on probe.	25				0.3			
BOTTOM OF BORING AT 30' B.G.S. Boring backfilled with hydrated bentonite upon completion.	30			HC1-30	0.5			
	35							

LEGEND:
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS/BACKFILL
- WATER LEVEL DURING DRILLING

DRILLING CONTRACTOR: CRC
DRILLING METHOD: Air rotary
BOREHOLE DIAMETER: 3-inch
SAMPLING METHOD: Grab
START CARD NUMBER:

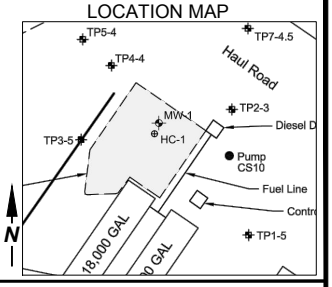
CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES:
COORDINATES:

Hydro Con
314 W 15th Street
Vancouver, WA 98626
Phone: 360-703-6079

WELL/BORING NUMBER MW-1

PROJECT NAME: Calder Mine
PROJECT NUMBER: 2015-010
PROJECT LOCATION: Prince of Wales Island, AK
LOGGED BY: C. Hultgren
REVIEWED BY: J. Horowitz
DATE: 09-19-18

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
SANDY SILTY GRAVEL (GM), light to medium gray, 20% sand, 20% non-plastic fines, 60% fine to coarse angular gravel, moist at 7' bgs.	0							
Note: Bedrock contact made at 7' bgs.	5							
LIMESTONE (bedrock), light gray, crystaline, massive, dry.								
BOTTOM OF BORING AT 9' B.G.S.	10							
Boring backfilled with hydrated bentonite upon completion.	15							
	20							
	25							
	30							
	35							

WELL CONSTRUCTION

Depths (feet bgs)

Borehole: 9
Sump: 7.67 - 8.00
Screen: 2.67 - 7.67
Casing: 0 - 2.67
Backfill: 8.5 - 9.0
Sand Pack: 2 - 9
Bentonite: 0.5 - 2
Concrete: 0 - 0.5
Stabilizers:

MATERIALS USED

Casing: 1x5' 2"-diameter PVC
Well Screen: 1x5' Prepack
End Cap: 1x 0.33'
Sand Pack: 0.5 50lb bag
Bentonite: 0.5 60lbs bag
Concrete: 2 60lbs bag
Monument: Flush
Well Cap: Locking J-plug
Other:

LEGEND:

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS/BACKFILL
- WATER LEVEL DURING DRILLING

DRILLING CONTRACTOR: CRC
DRILLING METHOD: Air rotary
BOREHOLE DIAMETER: 3-inch
SAMPLING METHOD: Grab
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES:
COORDINATES:

ATTACHMENT B

PHOTO DOCUMENTATION

PHOTO DOCUMENTATION
Calder Limestone Mine ■ Calder Bay, Prince of Wales Island, Alaska
Project No. 2015-010 ■ September 2018

Photo #1 Fuel Header

Photo #2 Header Spill Containment

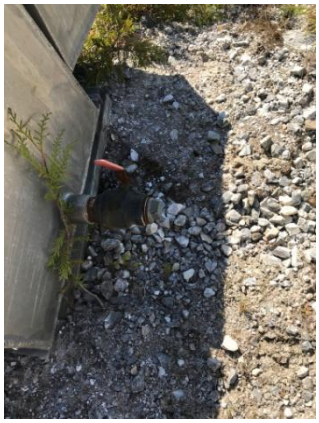


Photo #3 CS1 Sample Location under valve

Photo #4 Twin Diesel Generators Fueling Station

Photo #5 South of Twin ASTs

Photo #6 CS6 Sample Location

Photo #7 CS8 Sample Location

Photo #8 CS7 Sample Location

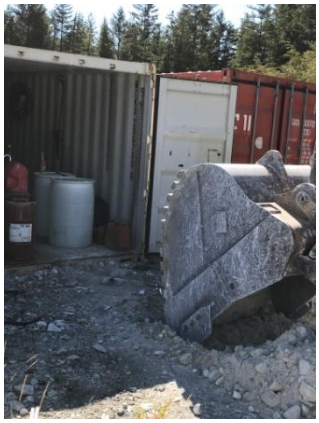


Photo #9 CS9 Sample Location

Photo #10 CS12 Sample Location

Photo #11 Monitoring Well MW-1

Photo #12 CS4 Sample Location

Photo #13 CS5 Sample Location

Photo #14 CS3 Sample Location

Photo #15 CS2 Sample Location

Photo #16 CS1 Sample Location

Photo #17 Area in between Camp Generator & Poly Tank

Photo #18 Water Treatment Unit & Poly Tank with Camp Generator in background

Photo #19 Drainage Ditch in Camp Area SW-1 Sample Location

Photo #20 HydroCon Stockpile

Photo #21 CRC1 Stockpile

ATTACHMENT C

WELL DEVELOPMENT FORMS

WELL DEVELOPMENT

Well ID #: MW-1 | Project name: Calder Mine
Date: 9-18-18 | Project #: 2015-010
Time: 1500 | Engineer: Hultgren

WELL INFORMATION

Monument condition [X] Good [ ] Needs repair ____
Well cap condition [X] Good [ ] Locked [ ] Replaced [ ] Needs replacement
Headspace reading [X] Not measured ____ ppm
Elevation mark [ ] Yes [ ] Added [ ] Other ____
Well diameter [ ] 1.5-inch [X] 2-inch [ ] 4-inch [ ] Other ____
[ ] Odor ____ [ ] Comments ____

WELL MEASUREMENTS

End / Start

Total well depth 7.93 ft [X] Clean bottom [X] Muddy bottom [ ] Not measured
Depth to product 0 ft
Depth to water 6.50 ft
Casing volume 1.43 ft (H_2O) X 0.16 gpf = 0.23
Casing volumes 1"=0.04 gpf 1.5"=0.09 gpf 2"=0.16 gpf 4"=0.65 gpf 6"= 1.47 gpf

PURGING INFORMATION

Pump type [ ] Peristaltic [X] Submersible [ ] Centrifugal [ ] Other ____
Purge tubing [X] New LDPE [ ] New HDPE [ ] New Teflon [ ] Other ____
Bailer type [ ] Disposable [ ] Stainless [ ] PVC [ ] Other Surge well with pump
Bailer cord used [ ] Monofillament [ ] Other ____
Purge start time 1500 Purge stop time 1610 Purge Rate (GPM) 0.75
Total Volume Purged (gallons) 4.0 when pumping

FIELD PARAMETERS

Meters used [ ] FlowThru Cell [ ] Hach [ ] Hanna [ ] Other ____

Gallons	pH	Temp.	Conductivity	Turbidity	Dissolved Oxygen	ORP

NOTE: meter NOT working

NOTES/COMMENTS

Surge well using submersible pump. Pump water until well pumped dry let recharge and repeat process. Improvement in water clarity observed. FAINT Diesel odor in water.

Engineer's Signature ____ Date 9-18-18

ATTACHMENT D

GROUNDWATER SAMPLE COLLECTION FORMS

GROUNDWATER SAMPLE COLLECTION FORM

Well I.D. Number:

Project Name: Calder mine
Hydrocon Project #: 2015-010
Date 9-19-18

Sample I.D. mw-1 Time: 1900
Field Duplicate I.D. _____ Time: _____
Personnel: Hultgren

WELL INFORMATION

Monument condition: ☒ Good ☐ Needs repair _____ ☐ Water in Monument
Well cap condition: ☒ Good ☐ Replaced ☐ Needs replacement ☐ Surface Water in Well
Headspace reading: ☒ Not measured _____ ppm ☐ Odor _____
Well diameter: ☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other _____
Comments _____

PURGING INFORMATION

Total well depth 7.93 ft Bottom: ☐ Hard ☐ Soft ☐ Not measured Screen Interval(s): _____
Depth to product 0 ft
Depth to water 2.43 ft Intake Depth (BTOC) _____ Begin Purging Well: _____
Casing volume 1.65 ft (H_2O) X 0.16 gal/ft = 0.23 gal. X 3 = _____ gal.
Volume Conversion Factors: 3/4"=0.02 gal/ft 1"=0.04 gal/ft 2"=0.16 gal/ft 4"=0.65 gal/ft 6"= 1.47 gal/ft

PURGING/DISPOSAL METHOD

Pump type ☐ Peristaltic ☐ Centrifugal ☐ Dedicated Bladder ☐ Non-Dedicated Bladder Other Submersible
Bailer type: _____ Water Disposal:: ☐ Drummed ☐ Remediation System ☐ Other _____

FIELD PARAMETERS

Odor and/or Sheen: diesel odor / No sheen

Time	Water Level (BTOC)	Purge Rate (L/min)	Temp. (°C)	Sp. Cond. (mS/cm) (±3%)	Dissolved Oxygen (±10% or ≤1.00 ±0.2)	pH (SU) (±0.1)	ORP (mV)	Turbidity (NTU) (± 10% or ≤10)
NOTE: meter not working								

Stabilization achieved if three successive measurements for pH, Conductivity and Turbidity or Dissolved Oxygen are recorded within their perspective stabilization criteria. A minimum of six measurements should be recorded.
Purging Comments: water had slight gray coloration & faint diesel odor

SAMPLE INFORMATION

Container Type	Bottle Count	Preservative	Field Filtered?	Analysis
Amber	2		No 0.45 0.10	NWTPH-Dx + PAH
VOA	3	HCL	No 0.45 0.10	BTEX
			No 0.45 0.10	
			No 0.45 0.10	
			No 0.45 0.10	

Sampling Comments: Ship to Friedman & Bruya Lab in Seattle for Analysis

ATTACHMENT E

LABORATORY REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 24, 2018

Craig Hultgren, Project Manager
HydroCon
510 Allen St, Suite B
Kelso, WA 98626

Dear Mr Hultgren:

Included is the amended report from the testing of material submitted on September 20, 2018 from the Calder Mine Alaska 2015-10, F&BI 809356 project. The PAH reporting limits were lowered per the site requirements.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
HDC1018R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 18, 2018

Craig Hultgren, Project Manager
HydroCon
510 Allen St, Suite B
Kelso, WA 98626

Dear Mr Hultgren:

Included are the additional and amended results from the testing of material submitted on September 20, 2018 from the Calder Mine Alaska 2015-10, F&BI 809356 project. There are 40 pages included in this report. AK 103 results were uploaded and added to the report, and the VOC list was shortened to BTEX only per the chain of custody.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
HDC1018R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 20, 2018 by Friedman & Bruya, Inc. (ADEC laboratory approval number 17-017) from the HydroCon Calder Mine Alaska 2015-10, F&BI 809356 project. The samples were received at 3 °C in good condition and were refrigerated upon receipt. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	HydroCon	Date Sampled
809356 -01	HCI-7	09/17/18
809356 -02	HCI-15	09/17/18
809356 -03	HCI-20	09/17/18
809356 -04	HCI-30	09/17/18
809356 -05	HC-SP1	09/18/18
809356 -06	HC-SP2	09/18/18
809356 -07	HC-SP3	09/18/18
809356 -08	HC-SP4	09/18/18
809356 -09	HC-SP5	09/18/18
809356 -10	HC-SP6	09/18/18
809356 -11	HC-SP100	09/18/18
809356 -12	CRC-SP1	09/18/18
809356 -13	CRC-SP2	09/18/18
809356 -14	CRC-SP3	09/18/18
809356 -15	CRC-SP4	09/18/18
809356 -16	CRC-SP100	09/18/18
809356 -17	CS6-1	09/18/18
809356 -18	CS7-1	09/18/18
809356 -19	CS8-1	09/18/18
809356 -20	CS9-1	09/18/18
809356 -21	CS11-1	09/18/18
809356 -22	CS12-1	09/18/18
809356 -23	CS100	09/18/18
809356 -24	SW-1	09/18/18
809356 -25	SW101	09/18/18
809356 -26	CS1-1	09/19/18
809356 -27	CS2-1	09/19/18
809356 -28	CS3-1	09/19/18
809356 -29	CS4-1	09/19/18
809356 -30	CS5-1	09/19/18
809356 -31	MW-1	09/19/18
809356 -32	Trip	09/19/18

CASE NARRATIVE (continued)

The samples were analyzed as follows.

DRO/RRO (water) - Analysis Method AK 102/103, Extraction Method 3510C
The AK103 results were reported using pentacosane as the surrogate. All quality control requirements were acceptable.

BTEX (water) - Analysis Method 8260C, Extraction Method 5030B
All quality control requirements were acceptable.

PNAs (water) - Analysis Method 8270D SIM, Extraction Method 3510C
All quality control requirements were acceptable.

DRO/RRO (soil) - Analysis Method AK 102/103, Extraction Method 3550B
The AK103 results were reported using pentacosane as the surrogate. All quality control requirements were acceptable.

PNAs (soil) - Analysis Method 8270D SIM, Extraction Method 3550B
All quality control requirements were acceptable.

BTEX (soil) - Analysis Method 8260C, Extraction Method 5035
The samples were extracted from a four ounce glass jar for 8260C analysis. The data were flagged accordingly.

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18, 09/24/18, and 10/04/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK102

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Surrogate (% Recovery) (Limit 50-150)
HCI-7 809356-01	220	68
HCI-15 809356-02	58 x	65
HCI-30 809356-04	7.7	72
HC-SP1 809356-05	300	67
HC-SP2 809356-06	310	67
HC-SP3 809356-07	220	63
HC-SP4 809356-08	310	60
HC-SP5 809356-09	460	63
HC-SP6 809356-10	310	60
HC-SP100 809356-11	290	67
CRC-SP1 809356-12	200	64
CRC-SP2 809356-13	230	65

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18, 09/24/18, and 10/04/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK102

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Surrogate (% Recovery) (Limit 50-150)
CRC-SP3 809356-14	240	67
CRC-SP4 809356-15	280	67
CRC-SP100 809356-16	160	72
CS6-1 809356-17	1,100	56
CS7-1 809356-18	<5	73
CS8-1 809356-19	1,500	84
CS9-1 809356-20	<5	85
CS11-1 809356-21	<5	80
CS12-1 809356-22	22	76
CS100 809356-23	27	73
CS1-1 809356-26	350	85
CS2-1 809356-27	5.5 x	72

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18, 09/24/18, and 10/04/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK102

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Surrogate (% Recovery) (Limit 50-150)
CS3-1 809356-28	27	71
CS4-1 809356-29	480	87
CS5-1 809356-30	<5	76
Method Blank 08-2146 MB	<5	65
Method Blank 08-2147 MB	<5	73

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK102

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Surrogate (% Recovery) (Limit 50-150)
SW-1 809356-24	130	93
SW101 809356-25	480	96
MW-1 809356-31	7,000	66
Method Blank 08-2101 MB2	<50	90

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18 and 10/04/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS MOTOR OIL USING METHOD AK103

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
HCI-7 809356-01	<25	65
HCI-15 809356-02	270	68
HCI-30 809356-04	<25	71
HC-SP1 809356-05	240	72
HC-SP2 809356-06	240	72
HC-SP3 809356-07	170	71
HC-SP4 809356-08	260	69
HC-SP5 809356-09	440	73
HC-SP6 809356-10	210	82
HC-SP100 809356-11	270	77
CRC-SP1 809356-12	450	62
CRC-SP2 809356-13	450	67

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18 and 10/04/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS MOTOR OIL USING METHOD AK103

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
CRC-SP3 809356-14	450	70
CRC-SP4 809356-15	480	69
CRC-SP100 809356-16	330	71
CS6-1 809356-17	630	77
CS7-1 809356-18	<25	76
CS8-1 809356-19	490	82
CS9-1 809356-20	<25	87
CS11-1 809356-21	<25	76
CS12-1 809356-22	110	79
CS100 809356-23	130	74
CS1-1 809356-26	49 x	86

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18 and 10/04/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS MOTOR OIL USING METHOD AK103

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
CS2-1 809356-27	<25	73
CS3-1 809356-28	<25	73
CS4-1 809356-29	99 x	77
CS5-1 809356-30	<25	78
Method Blank 08-2146 MB	<25	60
Method Blank 08-2147 MB	<25	72

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted: 09/21/18
Date Analyzed: 09/21/18

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS MOTOR OIL USING METHOD AK103

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
SW-1 809356-24	<250	94
SW101 809356-25 1/1.2	<300	98
MW-1 809356-31	390 x	64
Method Blank 08-2101 MB2	<250	88

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SW-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/25/18	Lab ID:	809356-24 1/2
Date Analyzed:	09/26/18	Data File:	092604.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	102	31	160
Benzo(a)anthracene-d12	106	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.06
Acenaphthylene	<0.06
Acenaphthene	<0.06
Fluorene	<0.06
Phenanthrene	<0.06
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.03 j
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.03 j
Benzo(g,h,i)perylene	<0.06

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SW101	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/25/18	Lab ID:	809356-25 1/2
Date Analyzed:	09/26/18	Data File:	092605.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	105	31	160
Benzo(a)anthracene-d12	108	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.06
Acenaphthylene	<0.06
Acenaphthene	<0.06
Fluorene	<0.06
Phenanthrene	<0.06
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.03 j
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.03 j
Benzo(g,h,i)perylene	<0.06

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/25/18	Lab ID:	809356-31 1/2
Date Analyzed:	09/26/18	Data File:	092606.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	106	31	160
Benzo(a)anthracene-d12	106	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	0.74
Acenaphthylene	<0.06
Acenaphthene	0.45
Fluorene	1.5
Phenanthrene	1.2
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	0.22
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.03 j
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dbenz(a,h)anthracene	<0.03 j
Benzo(g,h,i)perylene	<0.06

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	HydroCon
Date Received:	NA	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/25/18	Lab ID:	08-2158 mb
Date Analyzed:	09/25/18	Data File:	092509.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	106	31	160
Benzo(a)anthracene-d12	106	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.03
Acenaphthylene	<0.03
Acenaphthene	<0.03
Fluorene	<0.03
Phenanthrene	<0.03
Anthracene	<0.03
Fluoranthene	<0.03
Pyrene	<0.03
Benz(a)anthracene	<0.03
Chrysene	<0.03
Benzo(a)pyrene	<0.03
Benzo(b)fluoranthene	<0.03
Benzo(k)fluoranthene	<0.03
Indeno(1,2,3-cd)pyrene	<0.03
Dibenz(a,h)anthracene	<0.03
Benzo(g,h,i)perylene	<0.03

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	HC-SP1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-05 1/5
Date Analyzed:	09/26/18	Data File:	092612.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	92	31	163
Benzo(a)anthracene-d12	97	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	0.010
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	0.013
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	0.014
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	HC-SP100	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-11 1/5
Date Analyzed:	09/26/18	Data File:	092613.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	96	31	163
Benzo(a)anthracene-d12	103	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	0.012
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	0.016
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	CRC-SP4	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-15 1/5
Date Analyzed:	09/26/18	Data File:	092614.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	163
Benzo(a)anthracene-d12	103	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	0.016
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	0.012
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	CRC-SP100	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-16 1/5
Date Analyzed:	09/26/18	Data File:	092615.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	96	31	163
Benzo(a)anthracene-d12	105	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	0.011
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	0.013
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	CS9-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-20 1/5
Date Analyzed:	09/25/18	Data File:	092523.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	163
Benzo(a)anthracene-d12	103	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	CS12-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-22 1/5
Date Analyzed:	09/25/18	Data File:	092524.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	93	31	163
Benzo(a)anthracene-d12	105	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	CS100	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-23 1/5
Date Analyzed:	09/25/18	Data File:	092525.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	163
Benzo(a)anthracene-d12	104	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	CS1-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	809356-26 1/5
Date Analyzed:	09/25/18	Data File:	092526.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	97	31	163
Benzo(a)anthracene-d12	105	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	0.14
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	0.028
Phenanthrene	0.11
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	0.045
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	HydroCon
Date Received:	Not Applicable	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/24/18	Lab ID:	08-2148 mb 1/5
Date Analyzed:	09/25/18	Data File:	092518.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	98	31	163
Benzo(a)anthracene-d12	99	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	CS9-1 pc	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-20
Date Analyzed:	09/21/18	Data File:	092116.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.02 j
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	CS12-1 pc	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-22
Date Analyzed:	09/21/18	Data File:	092117.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.02 j
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	CS100 pc	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-23
Date Analyzed:	09/21/18	Data File:	092118.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.02 j
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	HydroCon
Date Received:	Not Applicable	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	08-2131 mb
Date Analyzed:	09/21/18	Data File:	092115.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.02 j
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	SW-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-24
Date Analyzed:	09/21/18	Data File:	092132.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	SW101	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-25
Date Analyzed:	09/21/18	Data File:	092133.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-1	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-31
Date Analyzed:	09/21/18	Data File:	092134.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	2.2
o-Xylene	3.8

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Trip	Client:	HydroCon
Date Received:	09/20/18	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	809356-32
Date Analyzed:	09/21/18	Data File:	092135.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	HydroCon
Date Received:	Not Applicable	Project:	Calder Mine Alaska 2015-10, F&BI 809356
Date Extracted:	09/21/18	Lab ID:	08-2129 mb
Date Analyzed:	09/21/18	Data File:	092114.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK 102

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel	mg/kg (ppm)	500	96	90	75-125	6

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK 102

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel	mg/kg (ppm)	500	96	90	75-125	6

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL USING METHOD AK 102

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel	ug/L (ppb)	2,500	96	104	75-125	8

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR PAHS BY EPA METHOD 8270D SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	1	88	92	67-116	4
Acenaphthylene	ug/L (ppb)	1	101	106	65-119	5
Acenaphthene	ug/L (ppb)	1	101	104	66-118	3
Fluorene	ug/L (ppb)	1	107	110	64-125	3
Phenanthrene	ug/L (ppb)	1	92	96	67-120	4
Anthracene	ug/L (ppb)	1	93	98	65-122	5
Fluoranthene	ug/L (ppb)	1	99	101	65-127	2
Pyrene	ug/L (ppb)	1	94	91	62-130	3
Benz(a)anthracene	ug/L (ppb)	1	94	97	60-118	3
Chrysene	ug/L (ppb)	1	92	95	66-125	3
Benzo(b)fluoranthene	ug/L (ppb)	1	93	90	55-135	3
Benzo(k)fluoranthene	ug/L (ppb)	1	89	95	62-125	7
Benzo(a)pyrene	ug/L (ppb)	1	89	95	58-127	7
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	96	100	36-142	4
Dibenz(a,h)anthracene	ug/L (ppb)	1	92	100	37-133	8
Benzo(g,h,i)perylene	ug/L (ppb)	1	91	95	34-135	4

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR PAHS BY EPA METHOD 8270D SIM

Laboratory Code: 809391-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	86	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	98	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	96	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	102	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	87	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	86	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	94	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	83	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	88	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	87	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	89	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	86	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	83	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	87	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	89	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	81	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	90	90	58-121	0
Acenaphthylene	mg/kg (ppm)	0.17	100	99	54-121	1
Acenaphthene	mg/kg (ppm)	0.17	99	99	54-123	0
Fluorene	mg/kg (ppm)	0.17	100	104	56-127	4
Phenanthrene	mg/kg (ppm)	0.17	90	92	55-122	2
Anthracene	mg/kg (ppm)	0.17	88	88	50-120	0
Fluoranthene	mg/kg (ppm)	0.17	91	98	54-129	7
Pyrene	mg/kg (ppm)	0.17	89	93	53-127	4
Benz(a)anthracene	mg/kg (ppm)	0.17	91	92	51-115	1
Chrysene	mg/kg (ppm)	0.17	90	91	55-129	1
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	99	102	56-123	3
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	96	100	54-131	4
Benzo(a)pyrene	mg/kg (ppm)	0.17	86	84	51-118	2
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	79	72	49-148	9
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	78	69	50-141	12
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	79	72	52-131	9

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: 809356-22 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	mg/kg (ppm)	2.5	<0.02 j	90	88	26-114	2
Toluene	mg/kg (ppm)	2.5	<0.05	96	93	34-112	3
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	94	90	34-115	4
m,p-Xylene	mg/kg (ppm)	5	<0.1	94	91	25-125	3
o-Xylene	mg/kg (ppm)	2.5	<0.05	96	92	27-126	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	2.5	95	72-106
Toluene	mg/kg (ppm)	2.5	98	74-111
Ethylbenzene	mg/kg (ppm)	2.5	97	75-112
m,p-Xylene	mg/kg (ppm)	5	97	77-115
o-Xylene	mg/kg (ppm)	2.5	98	76-115

Date of Report: 10/18/18
Date Received: 09/20/18
Project: Calder Mine Alaska 2015-10, F&BI 809356

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: 809310-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Benzene	ug/L (ppb)	50	<0.35	98	75-114
Toluene	ug/L (ppb)	50	<1	101	73-117
Ethylbenzene	ug/L (ppb)	50	<1	98	66-124
m,p-Xylene	ug/L (ppb)	100	<2	97	63-128
o-Xylene	ug/L (ppb)	50	<1	99	64-129

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	50	93	97	75-116	4
Toluene	ug/L (ppb)	50	96	100	79-115	4
Ethylbenzene	ug/L (ppb)	50	90	96	83-111	6
m,p-Xylene	ug/L (ppb)	100	90	95	84-112	5
o-Xylene	ug/L (ppb)	50	93	98	81-117	5

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

809356

SAMPLE CHAIN OF CUSTODY ME 09/20/18 VW1 / CD3/~~CD9~~

Page # 1 of 001

Send Report To ~~Craig~~ Craig Hultgren

Company HydroCon

Address 1339 Commerce Ave, Suite 211

City, State, ZIP Longview, WA 98632

Phone #(360) 998-2902 Fax #

SAMPLERS (signature) CH

PROJECT NAME/NO. CALDER MINE ALASKA

PO# 2015-10

REMARKS

TURNAROUND TIME
- ☑ Standard (2 Weeks)
- ☐ RUSH
- Rush charges authorized by

SAMPLE DISPOSAL
- ☑ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS	AK 102	BTEX 8260D	PAH 8270E	AK 103			Notes
												ANALYSES REQUESTED						◆ AK103 per CH 10/10/18
HC1-7	01	9/17/18	1420	Soil	1							X			◆			ME
HC1-15	02	↓	1430	↓	1							X			↓			
HC1-20	03		1435		1							~~X~~ CH						Hold
HC1-25			1440		1							~~X~~ CH						Hold Did not receive 9/19 RB
HC1-30	04	↓	1445		1							X						
HC-SP1	05	9/18/18	1030		1							X		X				
HC-SP2	06	↓	1035		1							X						
HC-103	07		1040		1							X						
HC-SP4	08		1045		1							X						
HC-SP5	~~09~~	↓	1050	↓	1							X			↓			

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: CH	CRAIG HULTGREN	HYDROCON	9/18/18	1750
Received by:	JAMES BRUYA	F&B	9/20	1531
Relinquished by:				
Received by:		Samples received at 3 °C		

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

809356

SAMPLE CHAIN OF CUSTODY

ME 09/20/18 VW1 | 2 CI3 | CO4

Page # 1 of 2

Send Report To Craig Hultgren
Company HydroCon
Address 1339 Commerce Ave, Suite 211
City, State, ZIP Longview, WA 98632
Phone # (360) 998-2902 Fax #

SAMPLERS (signature) CH

PROJECT NAME/NO. CALDEN MINE ALASKA

PO# 2015-10

REMARKS

TURNAROUND TIME
☑ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by

SAMPLE DISPOSAL
☑ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS	AK102	BTEX 8260D	PAH 8270E	AK103			Notes
HC-SP6	10	9/18/18	1055	Soil	1							X			◆			
HC-SP100	11				1							X		X				
CRC-SP1	12		1105		1							X						
CRC-SP2	13		1110		1							X						
CRC-SP3	14		1115		1							X						
CRC-SP4	15		1120		1							X		X				
CRC-SP100	16		~~1215~~ CH		1							X		X				
CS6-1	17		~~1245~~ 1240		1							X						
CS7-1	18		1240		1							X						
CS8-1	19		1230		1							X						

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	CRAIG HULTGREN	HydroCon	9/18/18	1750
Received by:	James Bruya	FEBI	9/20/18	1531
Relinquished by:				
Received by:		Samples received at 3 °C		

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

809356

SAMPLE CHAIN OF CUSTODY

ME 09/20/18 JW1 / CD3 / ~~AD4~~ CD4

Page # 3 of ____

Send Report To Craig Hultgren
Company HydroCon
Address 1339 Commerce Ave, Suite 211
City, State, ZIP Longview, WA 98632
Phone #(360) 998-2902 Fax #

SAMPLERS (signature) CH

PROJECT NAME/NO. CALDER MINE

PO# 2015-10

REMARKS

TURNAROUND TIME
☑ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by

SAMPLE DISPOSAL
☑ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS	AK102	BTEX_8260D	PAH 8270E	AK103			Notes
CS9-1	20	9/18/18	1250	Soil	1							X	X	X	◆			
CS11-1	21		1515		1							X						
CS12-1	22		1300		1							X	X	X				Time on label 1200
CS100	23			WATECH	1							X	X	X				
SW-1	24 AE		1600	Water	5							X	X	X				
SW 101	25			"	5							X	X	X				
CS1-1	26	9/19/18	1010	Soil	1							X		X				
CS2-1	27		1000		1							X						Time on label 1000
CS3-1	28		0940		1							X						1005
CS4-1	29		0930		1							X						0940

ANALYSES REQUESTED

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Craig Hultgren	HydroCon	9/18/18	1200
Received by:	(James Broyles)	FEBI	9/20/18	1531
Relinquished by:				
Received by:		Samples received at 3 °C		

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

809356

SAMPLE CHAIN OF CUSTODY

ME 09/20/18 VW1 / CD3 / 4 ~~A04~~ COC

Page # 1 of 1

Send Report To Craig Hultgren
Company HydroCon
Address 1379 Commerce Ave, Suite 211
City, State, ZIP Longview, WA 98632
Phone # (360) 798-2902 Fax #

SAMPLERS (signature) CH

PROJECT NAME/NO. Calder mine

PO# 2015-10

REMARKS

TURNAROUND TIME
☑ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by

SAMPLE DISPOSAL
☑ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS	AK 102	BTEX 8260D	PAHs 8270E	AK 103			Notes
CS5-1	30	9/19/18	0930	Soil	1							X			◆			
MW-1	31A-C	↓	1900	water	5							X	X	X	↓			
Trip	32A-C	↓		↓	3								X		↓			

ANALYSES REQUESTED

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: CH	Craig Hultgren	HydroCon	9/19/18	1930
Received by: Jim Bruya	(Take Bldg)	FEBE	9/20/18	1531
Relinquished by:				
Received by:		Samples received at 3 °C		

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FORMS\COC\COC.DOC

ATTACHMENT F

LABORATORY DATA REVIEW CHECKLIST

Laboratory Data Review Checklist

Completed By:

HydroCon Environmental LLC, Brian Pletcher

Title:

Senior Geologist

Date:

11/2/18

CS Report Name:

Calder Mine Alaska 2015-10

Report Date:

October 25, 2018

Consultant Firm:

HydroCon Environmental LLC

Laboratory Name:

Friedman & Bruya, Inc

Laboratory Report Number:

809356

ADEC File Number:

1532.38.001

Hazard Identification Number:

4069

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1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   (•) Yes ( ) No Comments:

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

   ( ) Yes ( ) No Comments:

2. Chain of Custody (CoC)

   a. CoC information completed, signed, and dated (including released/received by)?

   (•) Yes ( ) No Comments:

   b. Correct Analyses requested?

   (•) Yes ( ) No Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

   (•) Yes ( ) No Comments:

   Samples received at 3 degrees C

   b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

   ( ) Yes (•) No Comments:

   No methanol preserved samples, Methanol not approved on commercial aircraft. Samples were extracted from a four ounce jar for 8260C anaylsis. The data were flagged accordingly.

   c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

   ( ) Yes (•) No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

(●) Yes ( ) No Comments:

Time on sample label different on COC for samples CS12-1, CS3-1 and CS4-1

e. Data quality or usability affected?

Comments:

Data quality usability not affected

4. Case Narrative

a. Present and understandable?

(●) Yes ( ) No Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

( ) Yes (●) No Comments:

c. Were all corrective actions documented?

( ) Yes ( ) No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(●) Yes ( ) No Comments:

b. All applicable holding times met?

(●) Yes ( ) No Comments:

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c. All soils reported on a dry weight basis?

(●) Yes ( ) No Comments:

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

(●) Yes ( ) No Comments:

e. Data quality or usability affected?

( ) Yes ( ) No Comments:

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(●) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(●) Yes ( ) No Comments:

See j flags on the benzene and benzo(a) pyrene & Dibenz(a,h) anthracene soil results

iii. If above LOQ, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

(●) Yes ( ) No Comments:

Yes- given "j" qualifier indicating that the analyte concentration is reported below the lowest calibration standard, therefore the value reported is an estimate.

v. Data quality or usability affected?

Comments:

No

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b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

(•) Yes ( ) No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

( ) Yes (•) No Comments:

No metals/inorganics analyzed

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

( ) Yes ( ) No Comments:

Laboratory duplicate not associated with samples.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

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c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

(•) Yes ( ) No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

(•) Yes ( ) No Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA-no failed surrogate recoveries in this report

iv. Data quality or usability affected?

Comments:

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

( ) Yes (•) No Comments:

Trip blank for water only

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

( ) Yes ( ) No Comments:

Not indicated on COC. Only one cooler was used for sample transportation to lab

iii. All results less than LOQ?

(•) Yes ( ) No Comments:

iv. If above LOQ, what samples are affected?

Comments:

v. Data quality or usability affected?

Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

○ Yes ◉ No Comments:

Yes for soil and surface water. No for groundwater – well has low recharge rate and time didn't permit collection of a duplicate sample form MW-1.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

○ Yes ◉ No Comments:

Field duplicate from parent soil sample CRC-SP4 has an RPD of 54% for DRO and 54% for RRO.
Field duplicate from parent soil sample HC-SP1 has an RPD of 3.3% for DRO and 12% for RRO.
Field duplicate from parent groundwater sample SW-1 has an RPD of 114% for DRO.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Field duplicates were outside of acceptance criteria.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below).

○ Yes ◉ No ○ Not Applicable

i. All results less than LOQ?

○ Yes ○ No Comments:

ii. If above LOQ, what samples are affected?

Comments:

iii. Data quality or usability affected?

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

● Yes ○ No Comments:

Results for DRO using method AK 102 for samples HCI-15, and CS2-1, were given the lab qualifier "X" defined as –"The sample chromatographic pattern does not resemble the fuel standard used for quantitation."