PACIFIC AIR FORCES
REGIONAL SUPPORT CENTER

JOINT BASE ELMENDORF-RICHARDSON, ALASKA

2014 BLACK LAGOON BIOPILE TREATABILITY STUDY REPORT

PORT HEIDEN, ALASKA

FINAL
MAY 2015

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TABLE OF CONTENTS

SECTION **PAGE**

TABLE

APPENDICES

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
BLO	Black Lagoon Outfall
cy	cubic yard
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
GRO	gasoline-range organics
HDPE	high-density polyethylene
Jacobs	Jacobs Engineering Group Inc.
mg/kg	milligrams per kilogram
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
RRO	residual-range organics
RRS	radio relay station
RTK-GPS	real-time kinematic global positioning system
TCE	trichloroethene
TS	Treatability Study
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force

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EXECUTIVE SUMMARY

This Biopile Treatability Study Report describes the excavation of tetrachloroethylene (PCE)-contaminated soil and the construction of biopile treatment systems at the Black Lagoon Outfall, located just west of the former Composite Building and in the vicinity of the Former Radio Relay Station in Port Heiden, Alaska. The work described herein was conducted in accordance with the *Former Radio Relay Station Port Heiden, Alaska Site Investigation and Treatability Study Work Plan* (U.S. Air Force [USAF] 2013), which was developed under the Comprehensive Environmental Response, Compensation, and Liability Act. Jacobs Engineering Group Inc. (Jacobs) conducted this work on behalf of the Air Force Civil Engineer Center under the U.S. Army Corps of Engineers, Alaska District, Hazardous, Toxic, and Radioactive Waste Contract No. W911KB-11-D-0006, Task Order No. 0006. Cleanup levels referenced for this project are consistent with Alaska Administrative Code Title 18, Chapter 75, Part 341(c) Tables B1 and B2 (Alaska Department of Environmental Conservation [ADEC] 2012).

Jacobs performed the following tasks for the Biopile Treatability Study in 2014:

- Excavated approximately 3,800 cubic yards of PCE-contaminated soil from the Black Lagoon Outfall.
- Constructed two passively vented biopiles from the PCE-contaminated soil.
- Collected pre-construction soil samples from the biopiles and temporary roads used to reach the biopiles.
- Collected post-construction samples from the temporary roads used to reach the biopiles.
- Collected baseline samples from contaminated soil in the biopiles to document initial contamination levels for the treatability study.

The following activities will be conducted in 2015:

- Collect second round of samples from the contaminated soil in the biopile to evaluate system efficacy after one year of operation.
- Perform monthly biopile inspections.
- Prepare interim report based on samples collected in 2015 and biopile field inspections.

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1.0 INTRODUCTION

This Biopile Treatability Study (TS) Report describes the excavation of tetrachloroethene (PCE)-contaminated soil and the construction of two passively ventilated biopiles completed during the 2014 field season at the Black Lagoon Outfall (BLO) near the Former Radio Relay Station (RRS) in Port Heiden, Alaska. Jacobs Engineering Group Inc. (Jacobs) conducted this work for the Air Force Civil Engineer Center under the U.S. Army Corps of Engineers (USACE), Alaska District Hazardous, Toxic, and Radioactive Waste Contract No. W911KB-11-D-0006, Task Order No. 0006. Jacobs conducted the TS in accordance with the *Former Radio Relay Station Port Heiden, Alaska Site Investigation and Treatability Study Work Plan* (U.S. Air Force [USAF] 2013), which was developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (U.S. Code Title 42, Part 9601). The cleanup levels listed in Alaska Administrative Code (AAC) Title 18, Chapter 75.341(c), Tables B1 and B2 (18 AAC 75.341(c) and Alaska Department of Environmental Conservation [ADEC] 2012) were used to guide fieldwork.

1.1 REPORT ORGANIZATION

This TS Report is organized as follows:

- **Section 1.0** introduces the project, report organization, and presents an overview of the site history and background, discusses the scope of completed work, and Work Plan deviations.
- **Section 2.0** presents the excavation of PCE-contaminated soil and construction of the biopile treatment system.
- **Section 3.0** presents the soil sampling approach and results.
- **Section 4.0** presents the conclusion.
- **Section 5.0** presents the references.
- **Appendix A** contains the figures.
- **Appendix B** contains the Data Quality Assessment (DQA), analytical data, and laboratory documentation associated with sampling.
- **Appendix C** contains the survey data.
- **Appendix D** contains a photograph log.

- **Appendix E** contains the field logbook
- **Appendix F** contains responses to comments
- **Appendix G** contains the use of landfarm soil approval letter

1.2 SITE DESCRIPTION AND HISTORY OF INSPECTIONS

The former Port Heiden RRS is located approximately 3.5 miles north of the village of Port Heiden on the northwestern coast of the Alaska Peninsula (Appendix A, Figure A-1). The Port Heiden RRS was constructed in the late 1950s during the expansion of the Defense Early Warning System. The site became obsolete and was abandoned in November 1978 due to the advent of remote satellite communications and satellite earth stations in the 1970s. Cleanup of the former RRS began in 1981 and has been ongoing through the present (USAF 1996).

The BLO, located southwest of the former RRS, was the location of a series of holding ponds at the outfall of a pipe that conveyed effluent from a floor drain in the former Composite Building located 500 feet to the east of the outfall area (USAF 2006). The BLO was investigated in 2004 as part of the *Remedial Investigation/Feasibility Study* (USAF 2006). Diesel-range organics (DRO), residual-range organics (RRO), metals, polychlorinated biphenyls (PCB), volatile organic compounds, gasoline-range organics (GRO), polycyclic aromatic hydrocarbons, and herbicides were identified as potential contaminants of concern within surface and subsurface soil samples taken from the BLO. PCE and DRO were the only contaminants identified with concentrations above cleanup levels in 2004 (USAF 2006).

Surface and near-surface soil was investigated further in 2009 and 2011. Surface sampling in 2009 by Weston Solutions, Inc. (USAF 2010) found DRO and PCE at several locations within the BLO in excess of ADEC Method Two migration to groundwater cleanup levels (230 milligrams per kilogram [mg/kg] and 0.03 mg/kg, respectively, at the time of reporting) The current ADEC cleanup level for PCE is 0.024 mg/kg. A maximum DRO concentration of 15,000 mg/kg and a maximum PCE concentration of 0.72 mg/kg (both in the same sample) were reported. In 2011, the Native Village of Port Heiden excavated 13 test pits in and near the BLO and encountered exceedances for DRO, PCE, and trichloroethene (TCE) with

maximum concentrations of 4,250 mg/kg, 0.622 mg/kg, and 3.83 mg/kg, respectively (USAF 2012). As with the remedial inspection, all PCE and TCE detections were co-located with DRO exceedances, but not all DRO exceedances were associated with detectable levels of PCE and TCE.

In 2013, Jacobs, with contractor Hammer Drilling, advanced 58 soil borings at BLO to investigate the extent of soil contamination. PCE, TCE, DRO, and PCBs exceeded the ADEC cleanup levels in soil analytical samples. PCE was the most frequently detected contaminant of concern above the ADEC Method Two migration to groundwater cleanup level of 0.024 mg/kg. Twenty-two soil borings contained PCE above the cleanup level with the maximum detected concentration of 2.1 mg/kg in boring SB40.

The lateral and vertical extent of PCE-contaminated soil at the BLO was modeled based on soil boring sample results using RockWare Surfer 11 contour mapping software. Vertical concentration profiles were reviewed and values were interpreted for 10-, 20-, 30-, and 40-foot depths. The distribution of the PCE-contaminated soil identified during the site inspection is consistent with historical site knowledge (USAF 2006). The volume of soil exceeding the ADEC Method Two migration to groundwater cleanup level of 0.024 mg/kg from the surface to a depth of 20 feet (the practical limit of excavation) is estimated to be 3,281 cubic yards (cy). This volume estimate and model was used to guide excavation of up to an anticipated 3,500 cy of PCE-contaminated soil for the TS.

1.3 PROJECT OBJECTIVE

The purpose of this study is to evaluate biopile treatment systems as a remediation technique for PCE-contaminated soil at Port Heiden. Approximately 3,800 cy of PCE-contaminated soil was excavated from an area identified as contaminated in the *Final Black Lagoon Site Inspection Report* (USAF 2014). Two passively ventilated biopiles were constructed, one with soil from the zone of highest PCE concentrations and one from less contaminated soil with PCE levels above the ADEC Method Two migration to groundwater cleanup level.

1.4 WORK PLAN DEVIATIONS

According to calculations in ArcGIS, the total volume of PCE-contaminated soil in the biopiles is approximately 3,800 cy. The Work Plan indicates up to 3,500 cy would be excavated. The quantity of soil estimated in ArcGIS was calculated using the finished dimensions of the biopiles while the estimated quantity of contaminated soil was in situ. The increased soil quantity could be due to the soil expanding upon excavation, also known as "fluffing."

2.0 BIOPILE TREATMENT SYSTEM

2.1 SOIL EXCAVATION

Approximately 3,800 cy of contaminated soil identified by the *2013 Final Black Lagoon Site Inspection Report* (USAF 2014) was excavated from the BLO and placed directly into two passively ventilated biopiles located approximately 100 feet west-southwest of the excavation. Excavation targeted the areas containing the highest levels of PCE-contaminated soil down to the maximum depth accessible by the excavator. In most places, the excavation depth was 10 feet below ground surface (bgs), but two locations were excavated 20 feet bgs (the maximum reach of the excavator) to remove higher levels of PCE-contaminated soil. Approximate outlines of excavated areas are shown in Figure A-2. The excavation was backfilled with local clean material from the Alaska Department of Transportation (DOT) pit, remediated landfarmed soil, and overburden soil removed during the leveling of the biopile pads. The organic top layer of soil was removed from the biopile site in order to create a level surface for biopile construction; this soil was temporarily stockpiled at the site while the biopiles were constructed.

After contaminated soil was excavated and placed in the biopiles, the stockpiled soil was tested for PCB contamination and used to backfill the excavation. Results from the stockpile samples came back below the ADEC cleanup level of 1 mg/kg (Appendix B).

2.2 BIOPILE CONSTRUCTION

The biopile site was selected due to its proximity to the excavation location and orientation to prevailing winds, yet still provided some protection from the strongest winds to limit damage to the cover. Further, this site had been previously sampled for PCBs and was found to be clean.

Two biopiles were constructed in accordance with the *Former Radio Relay Station Port Heiden, Alaska Site Investigation and Treatability Study: 2013 Work Plan* (USAF 2013) and figures depicting their construction are included in this report as Figures A-3 and A-4 in

Appendix A. The purpose of the TS is to assess the effectiveness of biopiles in remediating PCE-contaminated soil in Port Heiden instead of excavating, containerizing, and shipping the contaminated soil to an offsite disposal facility. As this is a test study rather than a full cleanup effort, not all PCE-contaminated soil was removed from the BLO site.

Each biopile pad has a footprint of approximately 100 feet by 100 feet, measured to the outside of the surrounding berm. The outside berm is approximately 1.5 feet tall and 3 feet wide. After the berms were placed, a layer of heavy-duty felt was laid down and covered by a 20-mil, high-density polyethylene (HDPE) geomembrane liner. Once the bottom liner was in place, another layer of heavy-duty felt was laid down and covered with 0.5 feet of sand to protect the liner from damage during biopile construction.

In general, the soil with the highest PCE concentrations, according to the PCE contaminant modeling performed as part of the *Final Black Lagoon Site Inspection Report* (USAF 2014), was placed in the first biopile (BSB). Once Biopile BSB was full, the second biopile (BSA) was constructed from the remaining contaminated soil. Both biopiles were built according to Appendix B of the Work Plan (PH-SOP-06 *Passive Biopile Construction and Maintenance*). As contaminated soil was placed in the biopile, perforated, corrugated, 4-inch HDPE discharge pipes covered with a permeable geotextile stock were placed to construct a passive aeration network designed to provide ventilation. There are five vertical layers of piping in each biopile. The first four layers are 1.5 feet apart, with 2 feet between the fourth and fifth layer. The horizontal spacing for the pipes is 6 feet for the first and sixth layers and 5 feet for the second through fifth layers. The piles were constructed by dividing the 90 feet by 90 feet biopile into six cells parallel to the piping runs, each approximately 15 feet wide, a distance within reach of the excavator. The cells were built up vertically to the full height of the pile and then progressed horizontally until completion. During biopile construction, fertilizer was added to the biopile to increase the activity of biological organisms aiding in the remediation effort.

As the discharge pipes were laid in the pile, one end of each pipe was capped and buried, and the opposite end of the pipe was connected to a T-fitting, which connected two of the buried

discharge pipes to one stick-up outlet. Each stick-up outlet was fitted with a 6-inch wind turbine. The wind-driven turbine ventilators facilitate air movement through the biopiles. The biopiles were oriented to take advantage of the prevailing westerly wind direction in Port Heiden in the summer. The biopiles stand about 8 feet tall with sides that slope approximately 1.5:1 (consistent with the sloping required for excavations in non-cohesive [Class C] soil in 29 Code of Federal Regulations 1926 Subpart P Appendix B *Sloping and Benching* [OSHA]). In order to assess the performance of the biopiles, baseline soil samples were collected from both biopiles, as described in Section 3.1.

Once sampling was complete, the biopiles were covered with 12-mil HDPE liner that extended at least 2 feet beyond the edge of the pile, exceeding the requirements of 18 AAC 75 (ADEC 2012). The liner was anchored by an approximately 2-foot tall berm of clean soil and covered in netting. The netting has 25-pound (minimum) sand bags tied to it and spaced evenly over the pile. The netting and sandbags ensure the liner will stay in place during the high wind events that occur in Port Heiden during the winter.

2.3 BIOPILE OPERATION

As depicted in Figure A-5 (Appendix A) and described above, the biopiles have been constructed with interfingered ventilation pipes designed to passively move air through the soil and thereby promote the evaporation and removal of PCE, TCE, and any other volatile contaminants. Concurrently, ventilation will maintain aerobic conditions within the pile and promote the biodegradation of petroleum-derived contaminants. Biodegradation of PCE and TCE (and their breakdown products cis-1,2-dichloroethene and vinyl chloride, if present) occurs only under highly reducing conditions and is, therefore, not anticipated. The piles are designed to operate unattended and with no power input other than that from the wind.

Air circulation is driven by wind pressure on the intakes of the supply pipes and by slight suction generated by wind turbines on the discharge pipes. As may be seen in Photos 9 and 14 (Appendix D), the supply pipes stick up approximately 4 feet and are capped with elbows oriented facing west to capture the prevailing wind. The discharge pipes also stick up

approximately 4 feet but are capped with small wind turbines (Photo 13 in Appendix D), which will pull air from the piles whenever the wind blows from any direction. Analysis of weather data from 1998 to 2012 (WeatherSpark 2015) shows that the most frequent wind directions are from the northeast in December and January, from the southeast February through June, and from the west July through September. The supply-pipe intakes face west to maximize wind pressure during the period of warmest temperatures within the piles, when evaporation and biodegradation will be most rapid. Average wind speeds range from 11 miles per hour (mph) during summer to 15 mph during winter.

The supply and discharge pipes are interfingered on 5- to 6-foot centers horizontally and 1.5- to 2-foot centers vertically, so that all soil is within 3.3 feet of ventilation piping. This spacing was selected as a reasonable tradeoff between piping density and constructability. Although more piping would promote more thorough and rapid air exchange within the pile, management of more than 80 pipes during construction would not have been practical.

Several potential difficulties could reduce the effectiveness of the biopiles:

- Low permeability would result in low rates of air exchange. This problem was minimized by placing the soil without compaction.
- Air may flow along preferred pathways through the soil from supply pipes to discharge pipes. Such pathways would result in stagnant zones where air exchange occurs only by diffusion rather than advection. This problem was minimized by the process of excavation and pile construction, which homogenized the soil.
- The piles will dry out with time as water evaporates and is removed by air passing through the soil. Water is necessary for biodegradation of fuel-derived contaminants; if water is lost rapidly, biodegradation may be incomplete. However, evaporation of PCE, TCE, and other volatile contaminants would be favored by drying of the soil.

The effectiveness of passively ventilated biopiles constructed from Port Heiden soils will be determined by the interplay of wind-induced pressure differences, soil permeability, and temperature, all of which are subject to large uncertainties. Therefore, performance cannot be modeled with meaningful accuracy, and this TS is the best means of assessing their effectiveness.

3.0 SOIL SAMPLING AND RESULTS

3.1 SOIL SAMPLING APPROACH

Pre-construction soil samples were collected from the footprint of each biopile and from the temporary roads used to reach the biopile area. Samples were analyzed for PCE and its daughter products, as well as GRO, DRO, RRO, and PCBs. Pre-construction sample locations are shown on Figure A-2 (Appendix A). Pre-construction soil sample results are discussed in Section 3.2.

In order to assess the performance of the biopiles, eight baseline soil samples were collected from Biopile BSB, and seven baseline samples were collected from Biopile BSA at random locations and depths (ranging from 1 to 6.5 feet) within each pile using hand auger methods immediately following biopile completion. Following biopile construction, post-construction samples (15 primary, two duplicates, and one MS/MSD) were collected at a depth of 6 inches from the temporary roads used to reach the biopiles.

In 2015, following one year of operation, an additional 15 samples will be collected in an identical manner as the initial samples to evaluate system efficacy. Upon biopile decommissioning, post-construction samples will be collected from approximately the same locations as the pre-construction samples. Samples will be analyzed for PCE and its daughter products—GRO, DRO, and RRO. Biopile baseline sample locations are shown on Figure A-2 (Appendix A).

3.2 SOIL SAMPLING RESULTS

Results for all pre-construction samples for the biopiles were below ADEC Method Two migration to groundwater cleanup levels for all contaminants of concern. Baseline sampling results from Biopile BSA were above ADEC Method Two migration to groundwater cleanup levels for DRO (1,900 to 12,000 mg/kg) and PCE (0.036 to 0.32 mg/kg). Baseline sampling results from Biopile BSB were above ADEC Method Two migration to groundwater cleanup levels for DRO (860 to 11,000 mg/kg), PCE (0.059 to 0.68 mg/kg), and TCE (0.020 to

0.031 mg/kg). The results from the baseline sampling of BSA and BSB are presented in Table 3-1. Appendix B contains all analytical data for the 2014 field season.

Table 3-1
Baseline Sampling Results for Biopiles BSA and BSB

Sample ID	Depth from top of Biopile (feet)	DRO Concentration (mg/kg) ADEC Cleanup Level[1] = 230 mg/kg	PCE Concentration (mg/kg) ADEC Cleanup Level[2] = 0.024 mg/kg	TCE Concentration (mg/kg) ADEC Cleanup Level[2] = 0.020 mg/kg
Biopile BSA				
14BL-BSA-01	2 - 2.5	6,200	0.086	ND
14BL-BSA-02	3 - 3.5	2,400	0.19	ND
14BL-BSA-03	4 - 4.5	1,900	0.11	ND
14BL-BSA-04	1 - 1.5	2,100	0.036	ND
14BL-BSA-05	2 - 2.5	2,700	0.065	ND
14BL-BSA-06	5 - 5.5	12,000	0.32	ND
14BL-BSA-07	3 - 3.5	2,900	0.12	ND
BSA		**4,300**	**0.13**	**ND**
Biopile BSB				
14BL-BSB-01	1.5 - 2	5,100	0.087	ND
14BL-BSB-02	3 - 3.5	11,000	0.2	**0.028**
14BL-BSB-03	2 - 2.5	860	0.23	**0.02**
14BL-BSB-04	3 - 3.5	1,800	0.68	**0.031**
14BL-BSB-05	3 - 3.5	1,400	0.22	ND
14BL-BSB-06	4 - 4.5	9,100	0.24	**0.024**
14BL-BSB-07	6 - 6.5	1,300	0.059	0.013
14BL-BSB-08	4 - 4.5	1,100	0.072	ND
BSB		**4,000**	**0.22**	0.015

Notes:
[1] ADEC Method Two migration to groundwater cleanup level from 18 AAC 75, Table B2 (ADEC 2012).
2 ADEC Method Two migration to groundwater cleanup level from 18 AAC 75, Table B1 (ADEC 2012).
Bold indicates that the result exceeds the ADEC cleanup level.
ND = nondetect.
ID = identification

3.3 DATA EVALUATION

Data quality was assessed through review of the laboratory case narrative, laboratory data deliverables, and the completion of ADEC Laboratory Data Review Checklists. A review of the analytical results and associated quality control samples was performed by the Jacobs Project Chemist, as per the Work Plan (USAF 2013).

Data quality was evaluated against the following requirements: U.S. Department of Defense *Quality Systems Manual*, version 4.2 (DoD 2010); ADEC and U.S. Environmental Protection Agency (EPA) analytical methods (ADEC 2002; EPA 2008); and laboratory limits. Qualifiers were applied to sample results that did not meet the project data quality objectives. Qualified results are considered estimated and, whenever possible, indicated as biased high or low.

The data assessment found the overall quality of the project data to be acceptable. The complete dataset and the details of the evaluation and associated samples is provided in the DQA (Appendix B).

3.4 LAND SURVEY

Locations of the biopiles, the temporary roads used to reach the biopiles, and soil samples were determined using a Leica Real-Time Kinematic Global Positioning System (RTK-GPS) in accordance with the *Manual for Electronic Deliverables* (USACE 2011). Horizontal coordinates, reported in meters, are based on Universal Transverse Mercator Zone 4 North (UTM6N) projection of the World Geodetic System 1984 (WGS84) geographic coordinate system. Elevations are recorded in meters relative to the North American Vertical Datum of 1988. Calculated project accuracy is 0.195 meters horizontally and 0.070 meters vertically. Survey data are presented in Appendix C.

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4.0 CONCLUSIONS

In the summer of 2014, two passively ventilated biopiles were constructed to assess the effectiveness of biopiles as a remediation technique for PCE-contaminated soil. The biopiles were constructed with interfingered ventilation pipes designed to passively move air through the soil and thereby promote the evaporation and removal of PCE, TCE, and any other volatile contaminants. Concurrently, this will maintain aerobic conditions within the soil and promote the biodegradation of petroleum-derived contaminants. Fertilizer added during construction will also facilitate biodegradation.

Pre-construction samples were collected from the footprints of each biopile and from the temporary roads used to reach the biopiles; post-construction samples of the temporary roads used to reach the biopiles were collected at the end of the field season. All of the pre-construction sample results were less than the ADEC Method Two under 40-inch zone most stringent cleanup levels (ADEC 2014).

In order to provide a baseline for remediation, 15 samples were collected from the two biopiles at varying depths. Sample results demonstrate that soil in the biopiles contains DRO, PCE, and TCE concentrations above ADEC Method Two migration to groundwater cleanup levels. In 2015, another set of samples will be collected from the biopiles to gauge the effectiveness of the remediation strategy.

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5.0 REFERENCES

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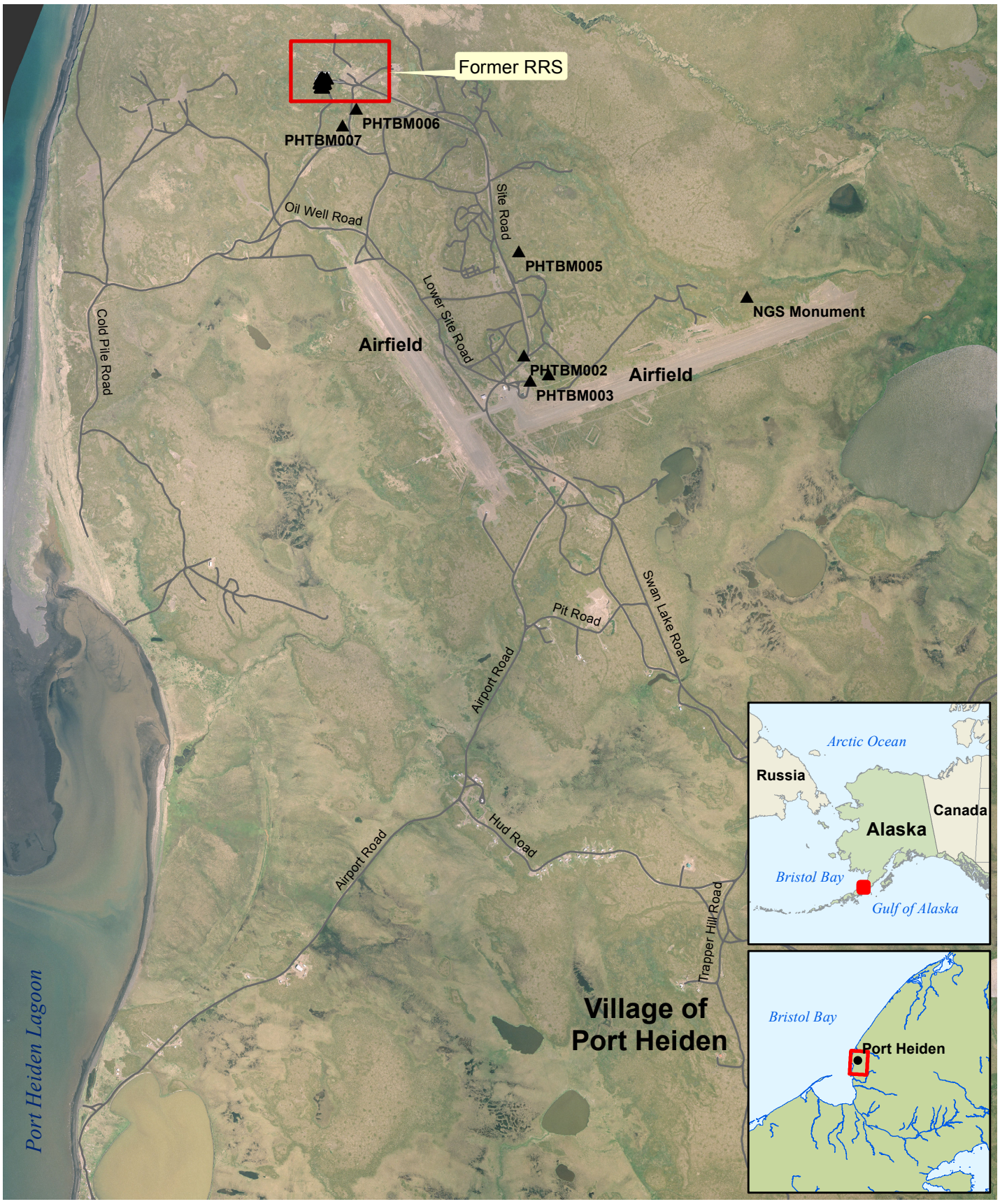
APPENDIX A

Figures



N

0 0.25 0.5 0.75 1

Miles

WGS 1984 UTM Zone 4N Imagery: Aerometric 2002

▲ Survey Control Point

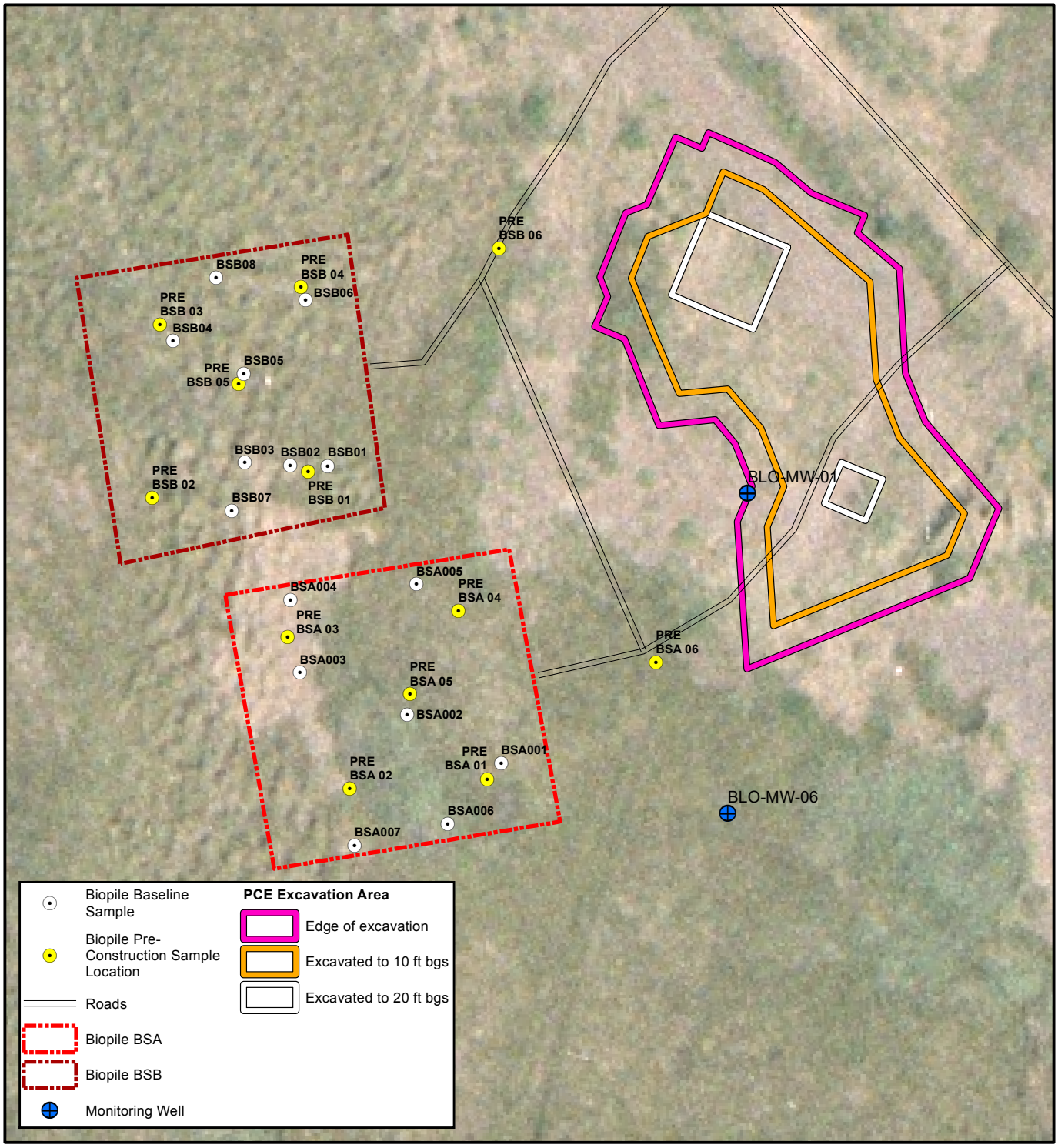
Roads

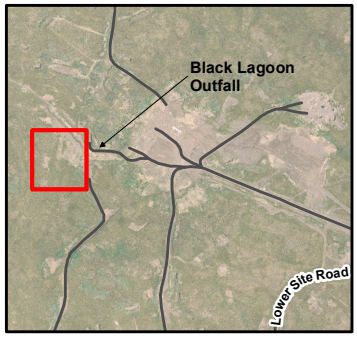
SITE LOCATION AND VICINITY FOR PORT HEIDEN SITE INVESTIGATION

PORT HEIDEN, ALASKA

JACOBS	DATE: 11 MAY 2015	PROJECT MANAGER: K. MCGOVERN	FIGURE NO: A-1

P:\PortHeiden\GIS\MXD\HTRW_TO06\14RRS_TS_Report\Fig A-1 Location&Vicinity.mxd wattta





N

All Locations Are Approximate

0 25 50 75 100

Feet

WGS 1984 UTM Zone 4N Transverse Mercator

BLACK LAGOON OUTFALL TREATABILITY STUDY
BIOPILE SAMPLE LOCATIONS

PORT HEIDEN, ALASKA

JACOBS	DATE: 11 MAY 2015	PROJECT MANAGER: K. MCGOVERN	FIGURE NO: A-2

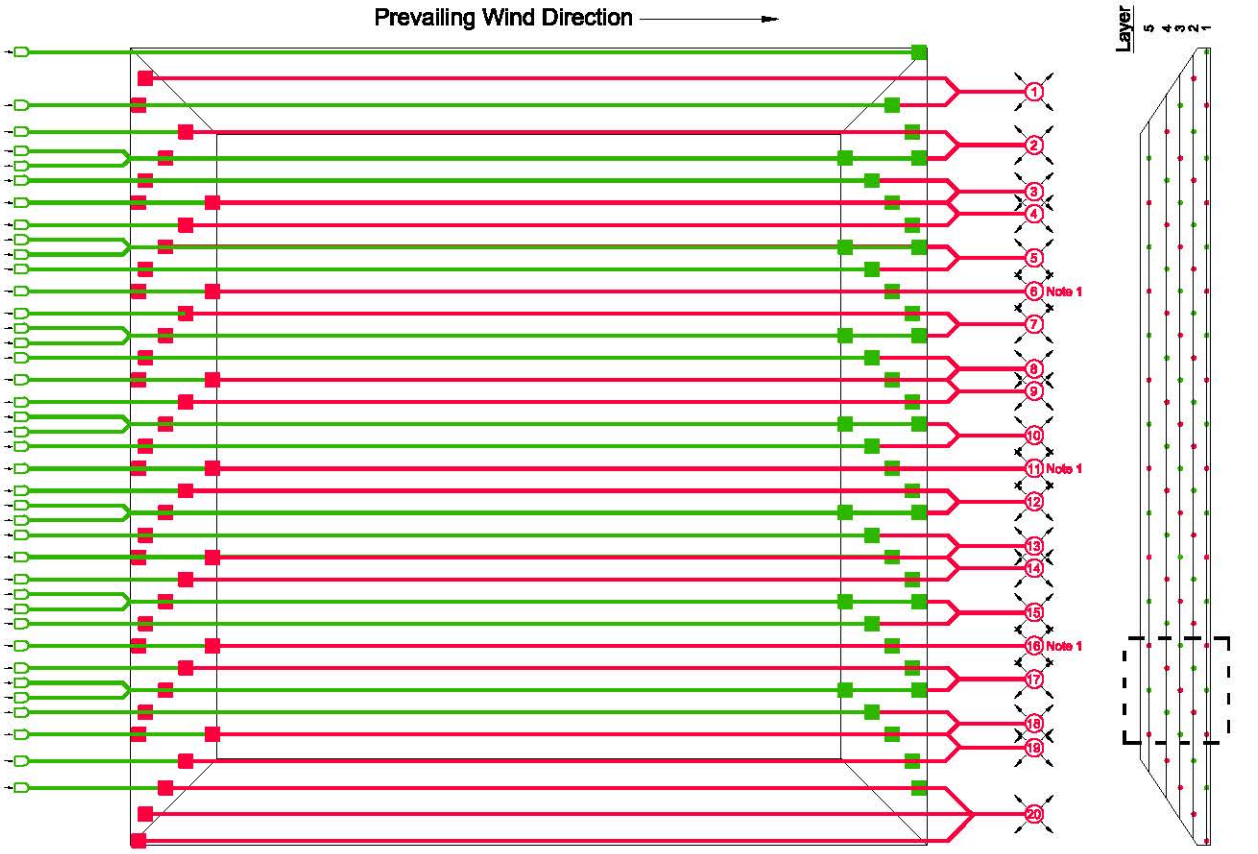
P:\PortHeiden\GIS\MXD\HTRW_TO06\14RRS_TS_Report\Figure A-2 2014 Biopile Sample Locations.mxd watta

Stockpile Dimensions

Footprint = 90.0 x 90.0 ft
Berm Height = 1.0 ft above floor
Pile Height = 8.0 ft above floor
Side Slope = 1.5:1 (Class C soil)
Volume = 2,008 yd³

Piping Dimensions

Number of supply pipe runs = 39
Number of discharge pipe runs = 41
Horizontal spacing = 5.0 ft (6.0 ft in first and last four intervals)
Vertical spacing = 1.5 ft (2.0 ft between layers 4 and 5)



Plan View

Cross Section

Legend

- Supply piping (fresh air)
- Discharge piping (soil air)
- Supply intake pipe
- Discharge vent turbine
- Pipe end cap
- Basis for Biopile Schematic (Fig A-5)

0 10 20 40
Scale in Feet

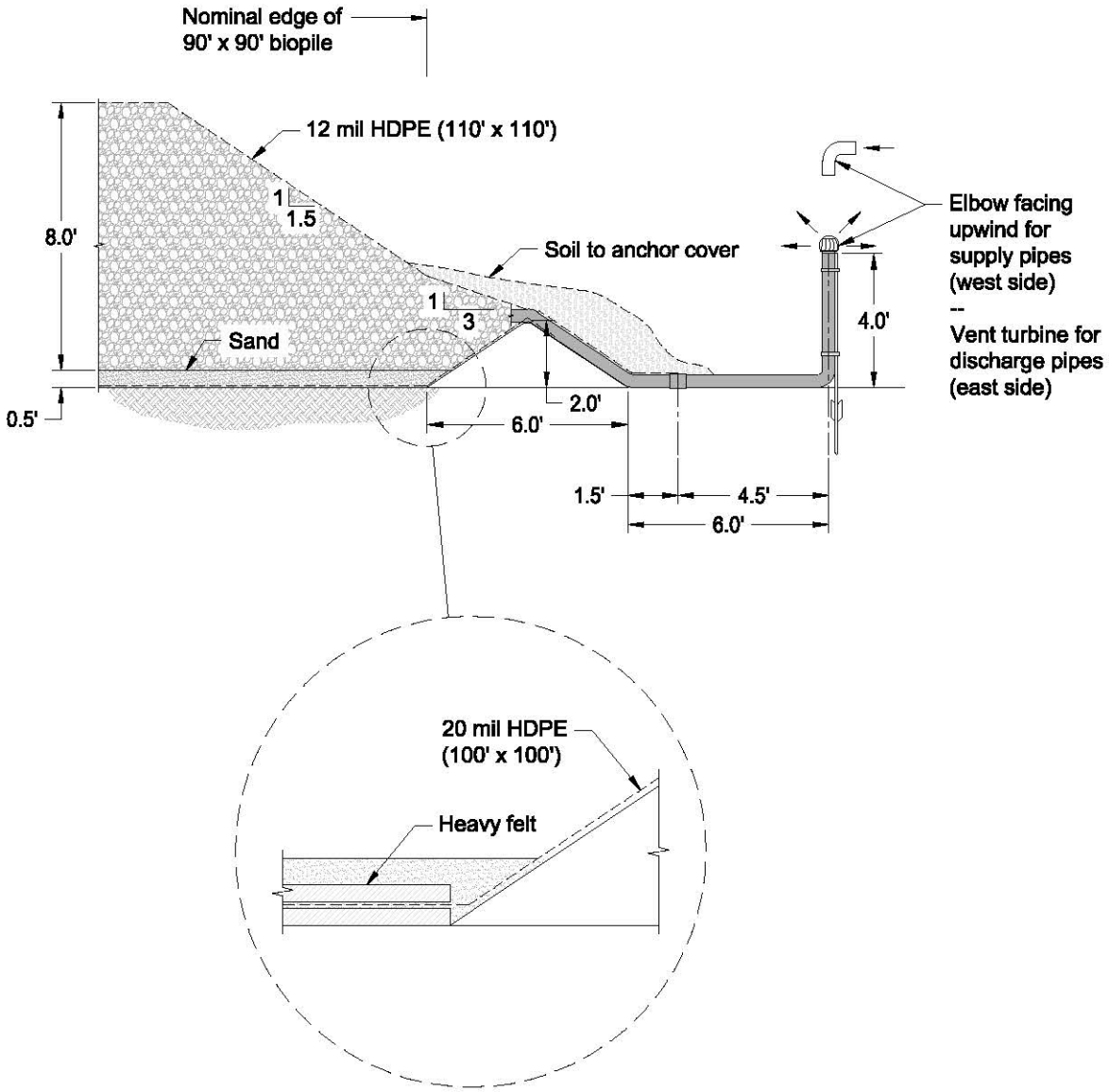
Notes:

1. Layer 1 and Layer 5 discharge vent.

PIPING DESIGN FOR A PASSIVELY VENTILATED BIOPILE

Port Heiden, Alaska

JACOBS	Date: 04 MAY 2015	Project Manager: K. MCGOVERN	Figure: A-3



0 2.5 5 10

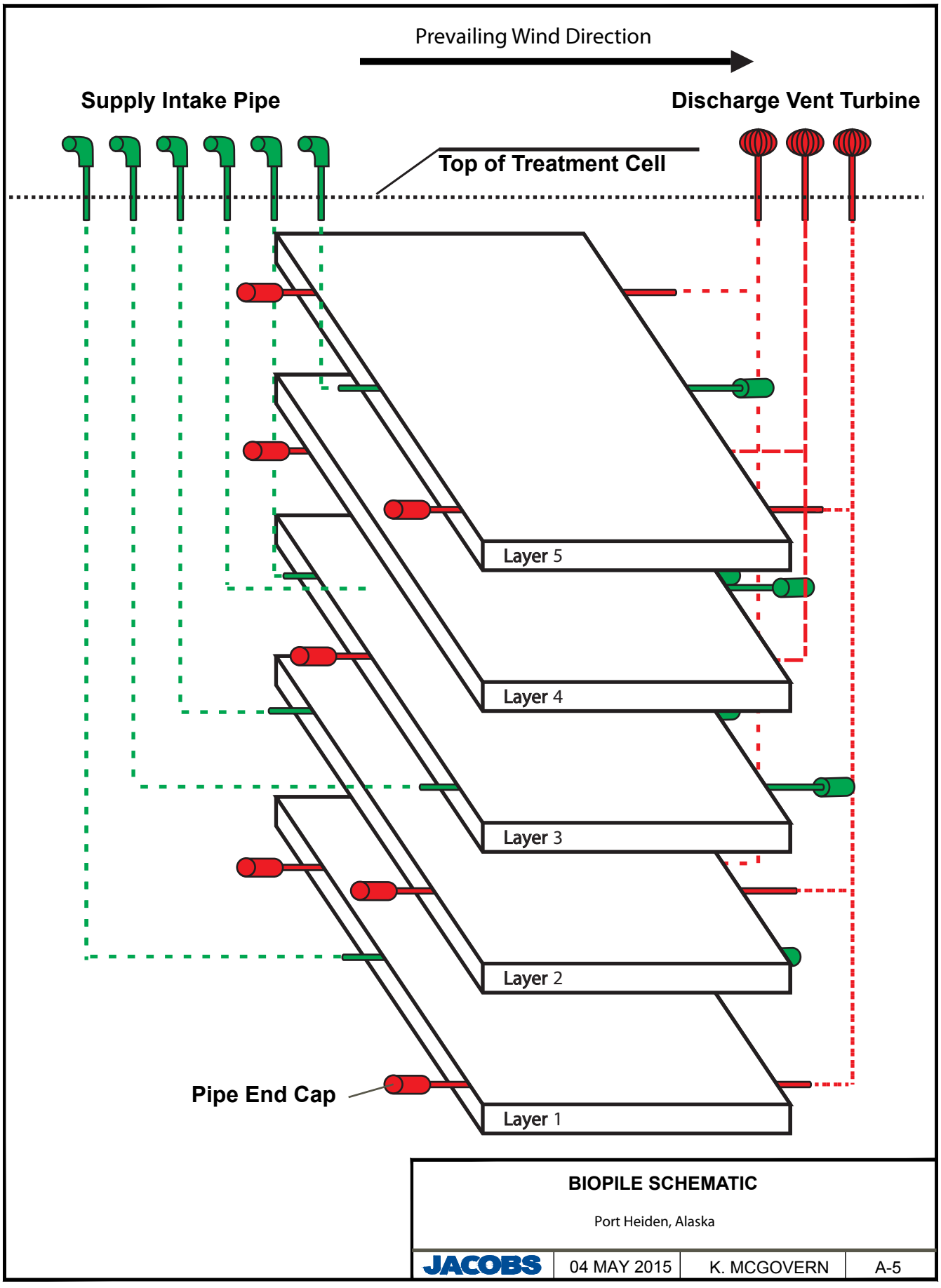
Scale in Feet

BERM, LINER, COVER AND PIPING DETAIL

Port Heiden, Alaska

JACOBS	Date: 01 APRIL 2013	Project Manager: K. MCGOVERN	Figure: A-4

I:\AE-HTRW\TO06-Port Heiden\COMMON\Biopile Design\Fig A-1-PH Biopile Design.dwg FIG A-4 BIOPILE SECTION 01 Apr 2013 - jarontj



BIOPILE SCHEMATIC

Port Heiden, Alaska

JACOBS	04 MAY 2015	K. MCGOVERN	A-5

APPENDIX B

Analytical Results and Data Quality Assessment

PACIFIC AIR FORCES
REGIONAL SUPPORT CENTER

PORT HEIDEN, ALASKA

2014 BLACK LAGOON TREATABILITY STUDY REPORT

PORT HEIDEN, ALASKA

APPENDIX B
DATA QUALITY ASSESSMENT

FINAL
MAY 2015

TABLE OF CONTENTS

TABLES

ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
ADEC	Alaska Department of Environmental Conservation
CCV	continuing calibration verification
CoC	chain-of-custody
DL	detection limit
DRO	diesel-range organics
DoD	Department of Defense
DQA	Data Quality Assessment
EPA	Environmental Protection Agency
GRO	gasoline-range organics
Jacobs	Jacobs Engineering Group Inc.
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
mg/kg	milligram per kilogram
MS	matrix spike
MSD	matrix spike duplicate
QC	quality control
QSM	Quality Systems Manual
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
RPD	relative percent difference
RRO	residual-range organics
SDG	sample delivery group
TCE	trichloroethene
USAF	U.S. Air Force
UCL	upper control limit
VOA	volatiles analysis

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1.0 INTRODUCTION

The following Data Quality Assessment (DQA) and Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklists (Attachment B-3) assess the overall quality and usability of data from the 2014 Black Lagoon Treatability Study at Port Heiden, Alaska.

As part of the PCE Treatability Study at Black Lagoon for 2014, 29 primary soil samples and four field duplicate samples were collected for analysis for tetrachloroethene (PCE) and its daughter products, GRO, DRO, and RRO. A total of 17 primary soil samples and two field duplicate samples were collected for polychlorinated biphenyl (PCB) analysis. The sample results presented in this DQA were reported by ALS Environmental of Kelso, Washington, for the analyses summarized in Table B-1.

Table B-1
Field Quality Control Sample Quantities

Method	Analyte(s)	Primary Samples	Field Duplicate Samples	MS/MSD Samples[1]
Treatability Study Soil Samples				
AK101	GRO	29	4	3
AK102	DRO	29	4	3
AK103	RRO	29	4	3
SW8082	PCB	17	2	1
SW8260	PCE + daughter products	29	4	3

Note:
[1] MS/MSD count includes MS/MSD samples requested on the CoCs and MS/MSD samples analyzed by the lab, but not specified on the CoC.
For definitions, see the Acronyms and Abbreviations section.

The attachments to this DQA contain the sample summary and analytical data tables (Attachment B-1), tables of sample results that did not meet the project data quality objectives (Attachment B-2), ADEC Laboratory Data Review Checklists (Attachment B-3), and laboratory deliverables (Attachment B-4, which will be available separately on CD).

1.1 QUALITY CONTROL CRITERIA

Jacobs Engineering Group Inc. (Jacobs) performed this DQA and completed ADEC Laboratory Data Review Checklists for records associated with the analytical data, as per the

2013 Site Investigation and Treatability Study Work Plan (U.S. Air Force [USAF] 2013). Data quality was evaluated against the following requirements: the U.S. Department of Defense (DoD) *Quality Systems Manual for Environmental Laboratories* (QSM), version 4.2 (DoD 2010); ADEC and U.S. Environmental Protection Agency (EPA) analytical methods (ADEC 2002; EPA 2008); and laboratory limits.

The Jacobs Project Chemist performed a completeness check of the electronic data to verify that data packages and electronic files included all of the requested information. All analytical data were reviewed, including the chain-of-custody (CoC) and sample receipt records, laboratory case narratives, and laboratory data. Analytical data were reviewed for methodology; sample holding times; laboratory blanks; limit of quantitation (LOQ); limit of detection (LOD); detection limits (DL); surrogate recoveries; laboratory control sample (LCS) recoveries; laboratory control sample duplicate (LCSD) recoveries; matrix spike (MS) and MS duplicate (MSD) recoveries; and precision.

Analytical data quality objectives were considered met when the quality of the sample data met precision, accuracy, representativeness, completeness, comparability, and sensitivity requirements. The overall quality of the data was acceptable as qualified. Flagged data are considered usable, but estimated.

The following data qualifiers are applicable to the 2014 Black Lagoon Treatability Study analytical data:

J The analyte was positively identified; however, the associated result was less than the LOQ but greater than or equal to the DL.

E The result is nondetect and the LOD exceeds the cleanup level.

JC The result was estimated because the relative response factor in the CCV did not meet the quality control (QC) limits.

JD The result was estimated because the relative percent difference (RPD) between the primary sample and the field duplicate sample exceeded 50 percent for soil

JM- The result was estimated because the analyte failed recovery criteria in the MS or MSD sample, or both; results were biased low because the recovery was less than the lower control limit (LCL).

JM+ The result was estimated because the analyte failed recovery criteria in the MS or MSD sample, or both; results were biased high because the recovery was greater than the upper control limit (UCL).

JS- The result was estimated because one or more surrogate recovery failed criteria; results were biased low because recoveries were less than the LCL.

JS+ The result was estimated because at least one surrogate recovery failed criteria; results were biased high because recoveries were greater than the UCL.

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2.0 DATA QUALITY SUMMARY

In general, the overall quality of project data was acceptable. The following anomalies were associated with analytical data and required qualification of sample results:

2.1 REPORTING LIMIT ASSESSMENT

Laboratory LODs for nondetect samples were evaluated against the corresponding cleanup level for soil. Three analytes – PCE, TCE, and vinyl chloride had LODs greater than their associated cleanup level for the Method SW8260 medium-level analysis. Method SW8260 low level analysis was performed for samples that were nondetect in accordance with the Work Plan (USAF 2013). According to the case narrative, several samples could not be analyzed using the low level 8260 analysis due to high concentrations of target analytes.

Nondetect medium-level sample results that had LODs exceeding the cleanup level were flagged E and are shown in italics in Attachment B-1. The vinyl chloride result for the samples with a LOD greater than the cleanup level and without a corresponding low level result is presented in Table B-2-1. The impact is minimal since vinyl chloride was not detected in any low level sample analyzed for the treatability study.

2.2 SURROGATE SPIKE RECOVERIES

Several samples had surrogate recoveries outside of the control limit mostly due to matrix interference. The sample results were qualified JS-, JS+, or JS to indicate an estimated result with a possible low, high, or indeterminate bias. Sample results for Method SW8260 were only qualified if two or more surrogate recoveries were outside of QC limits.

For Method AK101, several samples were qualified JS+ due to the high recovery in the field surrogate, 4-bromofluorobenzene. The data quality for these samples is only minimally affected since the GRO (C6-C10) results are well below the ADEC cleanup level.

Table B-2-2 (Attachment B-2) provides a summary of the surrogate recovery outliers and the affected sample results.

2.3 MATRIX SPIKES

The MS/MSD recoveries for several analytes and analyses were outside of the QC criteria. When necessary, parent sample results were flagged JM- or JM+ to indicate an estimated result with a possible low or high bias. The impact is minimal since the qualified parent sample result was either nondetect with a LOD below the cleanup level, or a detection well below the cleanup level.

Sample 14BL-BSA-06 was qualified JM+ for cis-1,2-dichloroethene due to the high MS recovery. The data quality for these samples is only minimally affected since the cis-1,2-dichloroethene result is well below the ADEC cleanup level. Sample 14BL-PST-BSA-06 did not meet MS recovery criteria (biased low) for RRO. A data flag was not required because the RRO concentration in the sample was greater than the spike amount; however the RPD between the MS and the MSD exceeded the limit and the RRO result was qualified JD.

Table B-2-3 (Attachment B-2) provides a summary of the MS and/or MSD recovery and RPD outliers and the affected sample results.

2.4 FIELD DUPLICATES

Four field duplicates were submitted with 29 field samples. The goal of 10 percent field duplicates was met for the treatability study samples. Field duplicate precision was evaluated against the recommended RPD limit of 50 percent for soil (ADEC 2009), as stated in the ADEC Laboratory Data Review Checklists (Attachment B-3). Sample/field duplicate results with RPDs greater than 50 percent were qualified JD and were considered estimated. The higher/detected result will be used for reporting and decision making purposes. Table B-2-4 (Attachment B-2) provides a summary of the sample and field duplicate results qualified JD due to RPDs greater than 50 percent.

2.5 CCV RESPONSE FACTOR

The CCV minimum response factor criterion for trichloroethene (TCE) was not met for one CCV for the low level 8260 analysis. The affected sample results were qualified JC and are considered estimated. The laboratory analyzed a method reporting limit check standard to

confirm adequate response at a concentration that was less than the cleanup level. Table B-2-5 of Attachment B-2 presents the sample results qualified due to CCV response factor outliers.

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3.0 CONCLUSION

In general, the overall quality of project data was acceptable. The completeness goal of 95 percent was met for all parameters. All of the reported data were considered usable for the purpose of the site inspection; limitations are discussed in this DQA and ADEC Laboratory Data Review Checklists (Attachment B-3). The qualifications applied during data validation did not adversely affect data usability.

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4.0 REFERENCES

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ADEC. 2009 (March).*Environmental Laboratory Data and Quality Assurance Requirements; Technical Memorandum.* Division of Spill Prevention and Response. Contaminated Sites Program.

ADEC 2002. *Underground Storage Tanks Procedures Manual*. Division of Spill Prevention and Response. Contaminated Sites Program.

DoD (U.S. Department of Defense) 2010 (October). *Quality Systems Manual for Environmental Laboratories*. DoD Environmental Quality Workgroup, Department of the Navy, Lead Service. Version 4.2

EPA (U.S. Environmental Protection Agency) 2008 (January). *Test Methods for Evaluating Solid Waste*. SW846, Third Edition, Update IVB.

USAF (U.S. Air Force). 2013 (June). *Former Radio Relay Station Port Heiden, Alaska Site Investigation and Treatability Study: 2013 Work Plan*. Prepared by Jacobs Engineering Group Inc.

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ATTACHMENT B-1
Sample Summary and
Analytical Data Tables

Table B-1-1
2014 Black Lagoon Treatability Study Sample Summary

COCSampleID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QCType	TAT	Notes	COC Number	Cooler Name	Cooler Date	Lab	SDG	Start Sample Depth	End Sample Depth	Depth UOM
14BL-PRE-BSA-01	BSA-01	02-Jul-2014	1018	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-01	BSA-01	02-Jul-2014	1018	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-02	BSA-02	02-Jul-2014	1032	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-02	BSA-02	02-Jul-2014	1032	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-03	BSA-03	02-Jul-2014	1039	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-03	BSA-03	02-Jul-2014	1039	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-04	BSA-04	02-Jul-2014	1048	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-04	BSA-04	02-Jul-2014	1048	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-04-9	BSA-04	02-Jul-2014	1048	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	Dup	3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-04-9	BSA-04	02-Jul-2014	1048	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082	Dup	3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-05	BSA-05	02-Jul-2014	1054	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-05	BSA-05	02-Jul-2014	1054	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-06	BSA-06	02-Jul-2014	1100	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSA-06	BSA-06	02-Jul-2014	1100	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-06	BSB-06	02-Jul-2014	1455	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-06	BSB-06	02-Jul-2014	1455	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-01	BSB-01	02-Jul-2014	1505	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-01	BSB-01	02-Jul-2014	1505	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-01-9	BSB-01	02-Jul-2014	1505	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	Dup	3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-01-9	BSB-01	02-Jul-2014	1505	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082	Dup	3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-02	BSB-02	02-Jul-2014	1510	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-02	BSB-02	02-Jul-2014	1510	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-03	BSB-03	02-Jul-2014	1513	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-03	BSB-03	02-Jul-2014	1513	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-04	BSB-04	02-Jul-2014	1518	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-04	BSB-04	02-Jul-2014	1518	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-05	BSB-05	02-Jul-2014	1520	JC/EH	2	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	MS/MSD	3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-PRE-BSB-05	BSB-05	02-Jul-2014	1520	JC/EH	2	Amber	9 oz	4C	SO	AK102, AK103, SW8082	MS/MSD	3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	6.00	Inches
14BL-ST01-01	ST01-01	02-Jul-2014	1730	JC/EH	1	Amber	4 oz	4C	SO	SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	12.00	Inches
14BL-ST01-02	ST01-02	02-Jul-2014	1731	JC/EH	1	Amber	4 oz	4C	SO	SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	12.00	Inches
14BL-ST01-03	ST01-03	02-Jul-2014	1732	JC/EH	1	Amber	4 oz	4C	SO	SW8082		3 day		14PH003	The Wall	7-Jul-14	ALS	K1406940	0.00	12.00	Inches
14BL-PRE-BSB-01	BSB-01	03-Jul-2014	0956	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSB-02	BSB-02	03-Jul-2014	0958	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSB-03	BSB-03	03-Jul-2014	1002	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSB-04	BSB-04	03-Jul-2014	1008	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSB-04-9	BSB-04	03-Jul-2014	1008	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	Dup	3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSB-05	BSB-05	03-Jul-2014	1010	JC/EH	2	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	MS/MSD	3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSB-06	BSB-06	03-Jul-2014	1016	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-02	BSA-02	03-Jul-2014	1018	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-01	BSA-01	03-Jul-2014	1022	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-03	BSA-03	03-Jul-2014	1023	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-05	BSA-05	03-Jul-2014	1026	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-05-9	BSA-05	03-Jul-2014	1026	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	Dup	3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-04	BSA-04	03-Jul-2014	1030	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-PRE-BSA-06	BSA-06	03-Jul-2014	1032	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH004	The Hound	7-Jul-14	ALS	K1406938	0.00	6.00	Inches
14BL-BSB-01	BSB-01	12-Jul-2014	0855	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	1.50	2.00	feet
14BL-BSB-01	BSB-01	12-Jul-2014	0855	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	1.50	2.00	feet
14BL-BSB-02	BSB-02	12-Jul-2014	0902	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-02	BSB-02	12-Jul-2014	0902	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-03	BSB-03	12-Jul-2014	0910	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	2.00	2.50	feet
14BL-BSB-03	BSB-03	12-Jul-2014	0910	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	2.00	2.50	feet
14BL-BSB-04	BSB-04	12-Jul-2014	0915	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-04	BSB-04	12-Jul-2014	0915	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-04-9	BSB-04	12-Jul-2014	0915	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103	Dup	3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-04-9	BSB-04	12-Jul-2014	0915	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	Dup	3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-05	BSB-05	12-Jul-2014	0920	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-05	BSB-05	12-Jul-2014	0920	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-06	BSB-06	12-Jul-2014	0922	JC/EH	2	Amber	9 oz	4C	SO	AK102, AK103	MS/MSD	3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	4.00	4.50	feet
14BL-BSB-06	BSB-06	12-Jul-2014	0922	JC/EH	2	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	MS/MSD	3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	4.00	4.50	feet
14BL-BSB-07	BSB-07	12-Jul-2014	0930	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	6.00	6.50	feet
14BL-BSB-07	BSB-07	12-Jul-2014	0930	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	6.00	6.50	feet
14BL-BSB-08	BSB-08	12-Jul-2014	0935	JC/EH	1	Amber	9 oz	4C	SO	AK102, AK103		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	4.00	4.50	feet
14BL-BSB-08	BSB-08	12-Jul-2014	0935	JC/EH	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH005	Fleabottom	17-Jul-14	ALS	K1407398	4.00	4.50	feet
14BL-BSB-01	BSB-01	12-Jul-2014	0855	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	1.50	2.00	feet
14BL-BSB-02	BSB-02	12-Jul-2014	0902	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-03	BSB-03	12-Jul-2014	0910	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	2.00	2.50	feet
14BL-BSB-04	BSB-04	12-Jul-2014	0915	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-04-9	BSB-04	12-Jul-2014	0915	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	Dup	3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-05	BSB-05	12-Jul-2014	0920	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	3.00	3.50	feet

Table B-1-1
2014 Black Lagoon Treatability Study Sample Summary

COCSampleID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QCType	TAT	Notes	COC Number	Cooler Name	Cooler Date	Lab	SDG	Start Sample Depth	End Sample Depth	Depth UOM
14BL-BSB-06	BSB-06	12-Jul-2014	0922	JC/EH	2	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	MS/MSD	3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	3.00	3.50	feet
14BL-BSB-07	BSB-07	12-Jul-2014	0930	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	6.00	6.50	feet
14BL-BSB-08	BSB-08	12-Jul-2014	0935	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH006	Hodor	17-Jul-14	ALS	K1407398	4.00	4.50	feet
14BL-BSA-01	BSA-01	17-Jul-2014	1240	PB	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	2.00	2.50	feet
14BL-BSA-01	BSA-01	17-Jul-2014	1240	PB	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	2.00	2.50	feet
14BL-BSA-01	BSA-01	17-Jul-2014	1240	PB	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	2.00	2.50	feet
14BL-BSA-02	BSA-02	17-Jul-2014	1250	PB	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	3.00	3.50	feet
14BL-BSA-02	BSA-02	17-Jul-2014	1250	PB	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	3.00	3.50	feet
14BL-BSA-02	BSA-02	17-Jul-2014	1250	PB	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	3.00	3.50	feet
14BL-BSA-03	BSA-03	17-Jul-2014	1300	PB	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	4.00	4.50	feet
14BL-BSA-03	BSA-03	17-Jul-2014	1300	PB	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	4.00	4.50	feet
14BL-BSA-03	BSA-03	17-Jul-2014	1300	PB	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	4.00	4.50	feet
14BL-BSA-04	BSA-04	18-Jul-2014	1158	PB/KM	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	1.00	1.50	feet
14BL-BSA-04	BSA-04	18-Jul-2014	1158	PB/KM	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	1.00	1.50	feet
14BL-BSA-04	BSA-04	18-Jul-2014	1158	PB/KM	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	1.00	1.50	feet
14BL-BSA-04-9	BSA-04	18-Jul-2014	1158	PB/KM	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	Dup	3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	1.00	1.50	feet
14BL-BSA-04-9	BSA-04	18-Jul-2014	1158	PB/KM	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082	Dup	3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	1.00	1.50	feet
14BL-BSA-04-9	BSA-04	18-Jul-2014	1158	PB/KM	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	Dup	3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	1.00	1.50	feet
14BL-BSA-05	BSA-05	18-Jul-2014	1208	PB/KM	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	2.00	2.50	feet
14BL-BSA-05	BSA-05	18-Jul-2014	1208	PB/KM	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	2.00	2.50	feet
14BL-BSA-05	BSA-05	18-Jul-2014	1208	PB/KM	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	2.00	2.50	feet
14BL-BSA-06	BSA-06	18-Jul-2014	1218	PB/KM	2	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101	MS/MSD	3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	5.00	5.50	feet
14BL-BSA-06	BSA-06	18-Jul-2014	1218	PB/KM	2	Amber	9 oz	4C	SO	AK102, AK103, SW8082	MS/MSD	3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	5.00	5.50	feet
14BL-BSA-06	BSA-06	18-Jul-2014	1218	PB/KM	2	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL	MS/MSD	3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	5.00	5.50	feet
14BL-BSA-07	BSA-07	18-Jul-2014	1228	PB/KM	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	3.00	3.50	feet
14BL-BSA-07	BSA-07	18-Jul-2014	1228	PB/KM	1	Amber	9 oz	4C	SO	AK102, AK103, SW8082		3 day		14PH007	Shadow	21-Jul-14	ALS	K1407612	3.00	3.50	feet
14BL-BSA-07	BSA-07	18-Jul-2014	1228	PB/KM	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day		14PH008	John Snow	21-Jul-14	ALS	K1407612	3.00	3.50	feet
14BL-PST-BSA-06	PST-BSA-06	20-Sep-2014	1110	GR/MH/LD	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		30 day		14PH015	Canada	22-Sep-14	ALS	K1410237	0.00	0.50	feet
14BL-PST-BSA-06	PST-BSA-06	20-Sep-2014	1110	GR/MH/LD	1	Amber	9 oz	4C	SO	AK102, AK103		30 day		14PH015	Canada	22-Sep-14	ALS	K1410237	0.00	0.50	feet
14-BL-PST-BSB-06	PST-BSB-06	20-Sep-2014	1058	GR/MH/LD	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		30 day		14PH015	Canada	22-Sep-14	ALS	K1410237	0.00	0.50	feet
14BL-PST-BSB-06	PST-BSB-06	20-Sep-2014	1058	GR/MH/LD	1	Amber	9 oz	4C	SO	AK102, AK103		30 day		14PH015	Canada	22-Sep-14	ALS	K1410237	0.00	0.50	feet
14BL-PST-BSA-06	PST-BSA-06	20-Sep-2014	1110	GR/MH/LD	1	Clear	40 mL	DI H2O, < 0C	SO	SW8260LL		30 day		14PH016	Pile of Bio	22-Sep-14	ALS	K1410237	0.00	0.50	feet
14-BL-PST-BSB-06	PST-BSB-06	20-Sep-2014	1058	GR/MH/LD	1	Clear	40 mL	DI H2O, < 0C	SO	SW8260LL		30 day		14PH016	Pile of Bio	22-Sep-14	ALS	K1410237	0.00	0.50	feet
14PH-TB01	-	07-Jul-2014	1215	JC/EH	1	Clear	40ml	MeOH, 4C	SO	SW8260, AK101		3 day	MeOH Trip Blank	14PH003	The Wall	7-Jul-14	ALS	K1406940			
14BL-TB02	-	07-Jul-2014	1240	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8082LL		3 day	DI H2O Trip Blank	14PH004	The Hound	7-Jul-14	ALS	K1406938			
14BL-TB03	-	07-Jul-2014	1240	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8082LL		3 day	DI H2O Trip Blank	14PH004	The Hound	7-Jul-14	ALS	K1406938			
14BL-TB04	-	12-Jul-2014	1100	JC/EH	1	Clear	40 mL	MeOH, 4C	SO	SW8260, AK101		3 day	MeOH Trip Blank	14PH005	Fleabottom	17-Jul-14	ALS	K1407398			
14BL-TB05	-	12-Jul-2014	1100	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day	DI H2O Trip Blank	14PH006	Hodor	17-Jul-14	ALS	K1407398			
14BL-TB06	-	12-Jul-2014	1100	JC/EH	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day	DI H2O Trip Blank	14PH006	Hodor	17-Jul-14	ALS	K1407398			
14BL-TB07	-	18-Jul-2014	1200	PB	1	Clear	40 mL	MeOH, 4C	SO	SW8260, AK101		3 day	MeOH Trip Blank	14PH007	Shadow	21-Jul-14	ALS	K1407612			
14BL-TB08	-	18-Jul-2014	1100	PB/KM	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day	DI H2O Trip Blank	14PH008	John Snow	21-Jul-14	ALS	K1407612			
14BL-TB09	-	18-Jul-2014	1105	PB/KM	1	Clear	40 mL	DI H_2O, < 0C	SO	SW8260LL		3 day	DI H2O Trip Blank	14PH008	John Snow	21-Jul-14	ALS	K1407612			
14BL-TB10	-	20-Sep-2014	1045	GR/MH/LD	1	Amber	4 oz	MeOH, 4C	SO	SW8260, AK101		30 day	MeOH Trip Blank	14PH015	Canada	22-Sep-14	ALS	K1410237			

Table B-1-2
2014 Black Lagoon Treatability Study Alaska Method Soil Results

			Location ID	BSA-01	BSA-02	BSA-03	BSA-04	BSA-04	BSA-05
			Sample ID	14BL-PRE-BSA-01	14BL-PRE-BSA-02	14BL-PRE-BSA-03	14BL-PRE-BSA-04	14BL-PRE-BSA-04-9	14BL-PRE-BSA-05
			Lab Sample ID	K1406940-001	K1406940-002	K1406940-003	K1406940-004	K1406940-005	K1406940-006
			SDG	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940
			Collection Date	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Primary	Primary	Duplicate	Primary
Method	Analyte	Units	ADEC Cleanup Criteria[1]						
AK101	C6 - C10 GRO	mg/Kg	300	ND [2.8]	ND [5.4]	ND [5.8]	ND [2.6]	ND [2.8]	ND [2.6]
AK 102	C10 - C25 DRO	mg/Kg	250	1.8 [3.9] J	8.5 [4.3] J	18 [4.7] J	2.4 [3.8] J	1.8 [3.8] J	2.4 [3.7] J
AK 103	C25 - C36 RRO	mg/Kg	10000	9.6 [9.8] J	230 [11]	330 [12]	11 [9.4] J	7.2 [9.4] J	22 [9.3] J

Notes:

1 18 AAC 75 Table B2 Method Two, most stringent 'Under 40 Inch Zone' Soil Cleanup Level (ADEC 2012).

– = not analyzed
[ ] = limit of detection
Bold = The result exceeds the cleanup level.
J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JS± = The result was estimated because one or more surrogate failed recovery criterion.
ND = nondetect
SDG = sample delivery group
SO = soil
CASK = ALS Environmental, Kelso, WA

Table B-1-2
2014 Black Lagoon Treatability Study Alaska Method Soil Results

			Location ID	BSA-06	BSB-01	BSB-01	BSB-02	BSB-03	BSB-04
			Sample ID	14BL-PRE-BSA-06	14BL-PRE-BSB-01	14BL-PRE-BSB-01-9	14BL-PRE-BSB-02	14BL-PRE-BSB-03	14BL-PRE-BSB-04
			Lab Sample ID	K1406940-007	K1406940-009	K1406940-010	K1406940-011	K1406940-012	K1406940-013
			SDG	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940
			Collection Date	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Duplicate	Primary	Primary	Primary
Method	Analyte	Units	ADEC Cleanup Criteria[1]						
AK101	C6 - C10 GRO	mg/Kg	300	ND [3.2]	ND [4.3]	ND [4.5]	1.9 [2.7] J	ND [2.8]	ND [2.7]
AK 102	C10 - C25 DRO	mg/Kg	250	6.1 [3.8] J	4.3 [4] J, JD	9 [4.1] J, JD	2.7 [3.8] J	2.7 [4.1] J	2.3 [3.8] J
AK 103	C25 - C36 RRO	mg/Kg	10000	110 [9.5] J	72 [10] J, JD	170 [11] JD	27 [9.5] J	29 [11] J	23 [9.5] J

Notes:

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Table B-1-2
2014 Black Lagoon Treatability Study Alaska Method Soil Results

			Location ID	BSB-05	BSB-06	BSA-01	BSA-02	BSA-03	BSA-04
			Sample ID	14BL-PRE-BSB-05	14BL-PRE-BSB-06	14BL-BSA-01	14BL-BSA-02	14BL-BSA-03	14BL-BSA-04
			Lab Sample ID	K1406940-014	K1406940-008	K1407612-001	K1407612-002	K1407612-003	K1407612-004
			SDG	K1406940	K1406940	K1407612	K1407612	K1407612	K1407612
			Collection Date	7/2/2014	7/2/2014	7/17/2014	7/17/2014	7/17/2014	7/18/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Primary	Primary	Primary	Primary
Method	Analyte	Units	ADEC Cleanup Criteria[1]						
AK101	C6 - C10 GRO	mg/Kg	300	ND [3.2]	ND [4.2]	78 [2.5] JS+	120 [2.5] JS+	35 [2.5] JS+	13 [2.5] J, JD
AK 102	C10 - C25 DRO	mg/Kg	250	9.4 [4.2] J	25 [4.2] J	**6200 [7.5]**	**2400 [8]**	**1900 [7.7]**	**1500 [7.8]**
AK 103	C25 - C36 RRO	mg/Kg	10000	130 [11]	380 [11]	1600 [19]	720 [20]	850 [20]	760 [20]

Notes:

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SDG = sample delivery group
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Table B-1-2
2014 Black Lagoon Treatability Study Alaska Method Soil Results

				Location ID	BSA-04	BSA-05	BSA-06	BSA-07	BSB-01	BSB-02
				Sample ID	14BL-BSA-04-9	14BL-BSA-05	14BL-BSA-06	14BL-BSA-07	14BL-BSB-01	14BL-BSB-02
				Lab Sample ID	K1407612-005	K1407612-006	K1407612-007	K1407612-008	K1407398-001	K1407398-002
				SDG	K1407612	K1407612	K1407612	K1407612	K1407398	K1407398
				Collection Date	7/18/2014	7/18/2014	7/18/2014	7/18/2014	7/12/2014	7/12/2014
				Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
				QA/QC	Duplicate	Primary	Primary	Primary	Primary	Primary
Method	Analyte	Units	ADEC Cleanup Criteria[1]							
AK101	C6 - C10 GRO	mg/Kg	300	22 [2.8] JS+, JD	15 [2.5]	77 [2.5] JS+	36 [2.5] JS+	37 [3] JS+	63 [2.9] JS+
AK 102	C10 - C25 DRO	mg/Kg	250	**2100 [7.9]**	**2700 [8.1]**	**12000 [7.8]**	**2900 [7.9]**	**5100 [4.3]**	**11000 [42]**
AK 103	C25 - C36 RRO	mg/Kg	10000	860 [20]	920 [21]	2600 [20]	1000 [20]	1700 [11]	5500 [110]

Notes:

1 18 AAC 75 Table B2 Method Two, most stringent 'Under 40 Inch Zone' Soil Cleanup Level (ADEC 2012).

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JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JS± = The result was estimated because one or more surrogate failed recovery criterion.
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SDG = sample delivery group
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Table B-1-2
2014 Black Lagoon Treatability Study Alaska Method Soil Results

			Location ID	BSB-03	BSB-04	BSB-04	BSB-05	BSB-06	BSB-07	BSB-08
			Sample ID	14BL-BSB-03	14BL-BSB-04	14BL-BSB-04-9	14BL-BSB-05	14BL-BSB-06	14BL-BSB-07	14BL-BSB-08
			Lab Sample ID	K1407398-003	K1407398-004	K1407398-005	K1407398-006	K1407398-007	K1407398-008	K1407398-009
			SDG	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398
			Collection Date	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Duplicate	Primary	Primary	Primary	Primary	Primary
Method	Analyte	Units	ADEC Cleanup Criteria[1]							
AK101	C6 - C10 GRO	mg/Kg	300	84 [3.7] JS+	82 [3] JS+	59 [2.5] JS+	87 [2.8] JS+	150 [3] JS+	57 [2.7] JS+	51 [3.3] JS+
AK 102	C10 - C25 DRO	mg/Kg	250	**860 [4.2]**	**980 [4.1] JD**	**1800 [3.9] JD**	**1400 [4]**	**9100 [19]**	**1300 [4.1]**	**1100 [4.3]**
AK 103	C25 - C36 RRO	mg/Kg	10000	510 [11]	580 [11]	880 [9.7]	700 [10]	2400 [47] JD	550 [11]	550 [11]

Notes:

1 18 AAC 75 Table B2 Method Two, most stringent 'Under 40 Inch Zone' Soil Cleanup Level (ADEC 2012).

– = not analyzed
[ ] = limit of detection
Bold = The result exceeds the cleanup level.
J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JS± = The result was estimated because one or more surrogate failed recovery criterion.
ND = nondetect
SDG = sample delivery group
SO = soil
CASK = ALS Environmental, Kelso, WA

Table B-1-2
2014 Black Lagoon Treatability Study Alaska Method Soil Results

			Location ID	PST-BSA-06	PST-BSB-06	Trip Blank	Trip Blank	Trip Blank	Trip Blank
			Sample ID	14BL-PST-BSA-06	14BL-PST-BSB-06	14BL-TB01	14BL-TB02	14PH-TB01	14BL-TB10
			Lab Sample ID	K141023702	K141023703	K1407398-010	K1407612-009	K1406940-021	K141023704
			SDG	K1410237	K1410237	K1407398	K1407612	K1406940	K1410237
			Collection Date	9/20/2014	9/20/2014	7/12/2014	7/18/2014	7/7/2014	9/20/2014
			Matrix	SO	SO	SOIL	SOIL	SOIL	SO
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Method	Analyte	Units	ADEC Cleanup Criteria[1]						
AK101	C6 - C10 GRO	mg/Kg	300	ND [3]	ND [3.2]	ND [3.3]	ND [2.5]	ND [2.5]	ND [2.5]
AK 102	C10 - C25 DRO	mg/Kg	250	62 [4.3]	3.3 [4.4] J	-	-	-	-
AK 103	C25 - C36 RRO	mg/Kg	10000	1400 [11]	43 [11] J	-	-	-	-

Notes:

1 18 AAC 75 Table B2 Method Two, most stringent 'Under 40 Inch Zone' Soil Cleanup Level (ADEC 2012).

– = not analyzed
[ ] = limit of detection
Bold = The result exceeds the cleanup level.
J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JS± = The result was estimated because one or more surrogate failed recovery criterion.
ND = nondetect
SDG = sample delivery group
SO = soil
CASK = ALS Environmental, Kelso, WA

Table B-1-3
2014 Black Lagoon Treatability Study PCB Soil Results

			Location ID	BSA-01	BSA-02	BSA-03	BSA-04	BSA-04	BSA-05	BSA-06	BSB-01	BSB-01
			Sample ID	14BL-PRE-BSA-01	14BL-PRE-BSA-02	14BL-PRE-BSA-03	14BL-PRE-BSA-04	14BL-PRE-BSA-04-9	14BL-PRE-BSA-05	14BL-PRE-BSA-06	14BL-PRE-BSB-01	14BL-PRE-BSB-01-9
			Lab Sample ID	K1406940-001	K1406940-002	K1406940-003	K1406940-004	K1406940-005	K1406940-006	K1406940-007	K1406940-009	K1406940-010
			Collection Date	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940
			SDG	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Primary	Primary	Duplicate	Primary	Primary	Primary	Duplicate
Method	component	Units	ADEC Cleanup Criteria[1]									
8082A	Aroclor 1016	mg/Kg	1	ND [0.045]	ND [0.05]	ND [0.054]	ND [0.043]	ND [0.043]	ND [0.043]	ND [0.044]	ND [0.046]	ND [0.047]
8082A	Aroclor 1221	mg/Kg	1	ND [0.045]	ND [0.05]	ND [0.054]	ND [0.043]	ND [0.043]	ND [0.043]	ND [0.044]	ND [0.046]	ND [0.047]
8082A	Aroclor 1232	mg/Kg	1	ND [0.045]	ND [0.05]	ND [0.054]	ND [0.043]	ND [0.043]	ND [0.043]	ND [0.044]	ND [0.046]	ND [0.047]
8082A	Aroclor 1248	mg/Kg	1	ND [0.045]	ND [0.05]	ND [0.054]	ND [0.043]	ND [0.043]	ND [0.043]	ND [0.044]	ND [0.046]	ND [0.047]
8082A	Aroclor 1254	mg/Kg	1	ND [0.045]	ND [0.05]	ND [0.054]	ND [0.043]	ND [0.043]	ND [0.043]	ND [0.044]	ND [0.046]	ND [0.047]
8082A	Aroclor 1260	mg/Kg	1	ND [0.045]	ND [0.05]	0.21 [0.054]	ND [0.043]	ND [0.043]	ND [0.043]	ND [0.044]	0.034 [0.046] J	0.052 [0.047]

Notes:

[1] 18 AAC 75 Method Two, Direct Contact Cleanup Level (ADEC 2012).

[ ] = limit of detection

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-3
2014 Black Lagoon Treatability Study PCB Soil Results

			Location ID	BSB-02	BSB-03	BSB-04	BSB-05	BSB-06	ST01-01	ST01-02	ST01-03
			Sample ID	14BL-PRE-BSB-02	14BL-PRE-BSB-03	14BL-PRE-BSB-04	14BL-PRE-BSB-05	14BL-PRE-BSB-06	14BL-ST01-01	14BL-ST01-02	14BL-ST01-03
			Lab Sample ID	K1406940-011	K1406940-012	K1406940-013	K1406940-014	K1406940-008	K1406940-015	K1406940-016	K1406940-017
			Collection Date	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940	K1406940
			SDG	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014	7/2/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Method	component	Units	ADEC Cleanup Criteria[1]								
8082A	Aroclor 1016	mg/Kg	1	ND [0.044]	ND [0.047]	ND [0.044]	ND [0.049]	ND [0.048]	ND [0.053]	ND [0.053]	ND [0.05]
8082A	Aroclor 1221	mg/Kg	1	ND [0.044]	ND [0.047]	ND [0.044]	ND [0.049]	ND [0.048]	ND [0.053]	ND [0.053]	ND [0.05]
8082A	Aroclor 1232	mg/Kg	1	ND [0.044]	ND [0.047]	ND [0.044]	ND [0.049]	ND [0.048]	ND [0.053]	ND [0.053]	ND [0.05]
8082A	Aroclor 1248	mg/Kg	1	ND [0.044]	ND [0.047]	ND [0.044]	ND [0.049]	ND [0.048]	ND [0.053]	ND [0.053]	ND [0.05]
8082A	Aroclor 1254	mg/Kg	1	ND [0.044]	ND [0.047]	ND [0.044]	ND [0.049]	ND [0.048]	ND [0.053]	ND [0.053]	ND [0.05]
8082A	Aroclor 1260	mg/Kg	1	ND [0.044]	ND [0.047]	ND [0.044]	0.019 [0.049] J	0.017 [0.048] J	0.032 [0.053] J	0.023 [0.053] J	0.11 [0.05]

Notes:

[1] 18 AAC 75 Method Two, Direct Contact Cleanup Level (ADEC 2012).

[ ] = limit of detection

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

				Location ID	BSA-01	BSA-01	BSA-02	BSA-02	BSA-03	BSA-03	BSA-04	BSA-04
				Sample ID	14BL-PRE-BSA-01	14BL-PRE-BSA-01A	14BL-PRE-BSA-02	14BL-PRE-BSA-02A	14BL-PRE-BSA-03	14BL-PRE-BSA-03A	14BL-PRE-BSA-04	14BL-PRE-BSA-04-9
				Lab Sample ID	K1406940-001	K1406938-009	K1406940-002	K1406938-008	K1406940-003	K1406938-010	K1406940-004	K1406940-005
				Collection Date	K1406940	K1406938	K1406940	K1406938	K1406940	K1406938	K1406940	K1406940
				SDG	7/2/2014	7/3/2014	7/2/2014	7/3/2014	7/2/2014	7/3/2014	7/2/2014	7/2/2014
				Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
				QA/QC	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate
				Mid/Low Level Analysis	Mid	Low	Mid	Low	Mid	Low	Mid	Mid
Method	Analyte	Units	ADEC Cleanup Criteria[1]									
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24	ND [0.022]	ND [0.00051]	ND [0.044]	ND [0.0006]	ND [0.047]	ND [0.0007]	ND [0.021]	ND [0.022]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024	ND [0.022]	ND [0.00064]	*ND [0.044] E*	ND [0.00075]	*ND [0.047] E*	ND [0.00087]	ND [0.021]	ND [0.022]
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37	ND [0.022]	ND [0.00051]	ND [0.044]	ND [0.0006]	ND [0.047]	ND [0.0007]	ND [0.021]	ND [0.022]
8260C	Trichloroethene (TCE)	mg/Kg	0.02	ND [0.011]	ND [0.00064]	*ND [0.022] E*	ND [0.00075]	*ND [0.024] E*	ND [0.00087]	ND [0.011]	ND [0.011]
8260C	Vinyl Chloride	mg/Kg	0.0085	*ND [0.011] E*	ND [0.00064]	*ND [0.022] E*	ND [0.00075]	*ND [0.024] E*	ND [0.00087]	*ND [0.011] E*	*ND [0.011] E*

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Itallics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

			Location ID	BSA-04	BSA-05	BSA-05	BSA-05	BSA-06	BSA-06	BSB-01	BSB-01
			Sample ID	14BL-PRE-BSA-04A	14BL-PRE-BSA-05	14BL-PRE-BSA-05A	14BL-PRE-BSA-05A-9	14BL-PRE-BSA-06	14BL-PRE-BSA-06A	14BL-PRE-BSB-01	14BL-PRE-BSB-01-9
			Lab Sample ID	K1406938-013	K1406940-006	K1406938-011	K1406938-012	K1406940-007	K1406938-014	K1406940-009	K1406940-010
			Collection Date	K1406938	K1406940	K1406938	K1406938	K1406940	K1406938	K1406940	K1406940
			SDG	7/3/2014	7/2/2014	7/3/2014	7/3/2014	7/2/2014	7/3/2014	7/2/2014	7/2/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Primary	Duplicate	Primary	Primary	Primary	Duplicate
			Mid/Low Level Analysis	Low	Mid	Low	Low	Mid	Low	Mid	Mid
Method	Analyte	Units	ADEC Cleanup Criteria[1]								
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24	ND [0.0005]	ND [0.021]	ND [0.00047]	ND [0.00048]	ND [0.025]	ND [0.00044]	ND [0.035]	ND [0.036]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024	ND [0.00062]	ND [0.021]	ND [0.00059]	ND [0.0006]	*ND [0.025] E*	ND [0.00055]	*ND [0.035] E*	*ND [0.036] E*
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37	ND [0.0005]	ND [0.021]	ND [0.00047]	ND [0.00048]	ND [0.025]	ND [0.00044]	ND [0.035]	ND [0.036]
8260C	Trichloroethene (TCE)	mg/Kg	0.02	ND [0.00062]	ND [0.011]	ND [0.00059]	ND [0.0006]	ND [0.013]	ND [0.00055]	ND [0.018]	ND [0.018]
8260C	Vinyl Chloride	mg/Kg	0.0085	ND [0.00062]	*ND [0.011] E*	ND [0.00059]	ND [0.0006]	*ND [0.013] E*	ND [0.00055]	*ND [0.018] E*	*ND [0.018] E*

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Itallics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

				Location ID	BSB-01	BSB-02	BSB-02	BSB-03	BSB-03	BSB-04	BSB-04	BSB-04
				Sample ID	14BL-PRE-BSB-01A	14BL-PRE-BSB-02	14BL-PRE-BSB-02A	14BL-PRE-BSB-03	14BL-PRE-BSB-03A	14BL-PRE-BSB-04	14BL-PRE-BSB-04A	14BL-PRE-BSB-04A-9
				Lab Sample ID	K1406938-001	K1406940-011	K1406938-002	K1406940-012	K1406938-003	K1406940-013	K1406938-004	K1406938-005
				Collection Date	K1406938	K1406940	K1406938	K1406940	K1406938	K1406940	K1406938	K1406938
				SDG	7/3/2014	7/2/2014	7/3/2014	7/2/2014	7/3/2014	7/2/2014	7/3/2014	7/3/2014
				Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
				QA/QC	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate
				Mid/Low Level Analysis	Low	Mid	Low	Mid	Low	Mid	Low	Low
Method	Analyte	Units	ADEC Cleanup Criteria[1]									
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24	ND [0.00049]	ND [0.022]	ND [0.00049]	ND [0.022]	ND [0.0004]	ND [0.022]	ND [0.0004]	ND [0.0004]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024	ND [0.00061]	ND [0.022]	ND [0.00061]	ND [0.022]	ND [0.0005]	ND [0.022]	ND [0.0005]	ND [0.0005]
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37	ND [0.00049]	ND [0.022]	ND [0.00049]	ND [0.022]	ND [0.0004]	ND [0.022]	ND [0.0004]	ND [0.0004]
8260C	Trichloroethene (TCE)	mg/Kg	0.02	ND [0.00061]	ND [0.011]	ND [0.00061]	ND [0.011]	ND [0.0005]	ND [0.011]	ND [0.0005]	ND [0.0005]
8260C	Vinyl Chloride	mg/Kg	0.0085	ND [0.00061]	*ND [0.011] E*	ND [0.00061]	*ND [0.011] E*	ND [0.0005]	*ND [0.011] E*	ND [0.0005]	ND [0.0005]

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Itallics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

				Location ID	BSB-05	BSB-05	BSB-06	BSB-06	BSA-01	BSA-02	BSA-03	BSA-04	BSA-04	BSA-05
				Sample ID	14BL-PRE-BSB-05	14BL-PRE-BSB-05A	14BL-PRE-BSB-06	14BL-PRE-BSB-06A	14BL-BSA-01	14BL-BSA-02	14BL-BSA-03	14BL-BSA-04	14BL-BSA-04-9	14BL-BSA-05
				Lab Sample ID	K1406940-014	K1406938-006	K1406940-008	K1406938-007	K1407612-001	K1407612-002	K1407612-003	K1407612-004	K1407612-005	K1407612-006
				Collection Date	K1406940	K1406938	K1406940	K1406938	K1407612	K1407612	K1407612	K1407612	K1407612	K1407612
				SDG	7/2/2014	7/3/2014	7/2/2014	7/3/2014	7/17/2014	7/17/2014	7/17/2014	7/18/2014	7/18/2014	7/18/2014
				Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
				QA/QC	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Primary
				Mid/Low Level Analysis	Mid	Low	Mid	Low	Mid	Mid	Mid	Mid	Mid	Mid
Method	Analyte	Units	ADEC Cleanup Criteria[1]											
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24	ND [0.026]	ND [0.00045]	ND [0.034]	ND [0.00052]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.022]	ND [0.02]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024	*ND [0.026] E*	ND [0.00056]	*ND [0.034] E*	ND [0.00065]	**0.086 [0.02]**	**0.19 [0.02]**	**0.11 [0.02]**	**0.036 [0.02] J**	**0.025 [0.022] J**	**0.065 [0.02]**
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37	ND [0.026]	ND [0.00045]	ND [0.034]	ND [0.00052]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.022]	ND [0.02]
8260C	Trichloroethene (TCE)	mg/Kg	0.02	ND [0.013]	ND [0.00056]	ND [0.017]	ND [0.00065]	ND [0.01]	ND [0.01]	ND [0.01]	ND [0.01]	ND [0.011]	ND [0.01]
8260C	Vinyl Chloride	mg/Kg	0.0085	*ND [0.013] E*	ND [0.00056]	*ND [0.017] E*	ND [0.00065]	*ND [0.01] E*	*ND [0.01] E*	*ND [0.01] E*	*ND [0.01] E*	*ND [0.011] E*	*ND [0.01] E*

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Itallics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

				Location ID	BSA-06	BSA-07	BSB-01	BSB-02	BSB-03	BSB-03	BSB-04	BSB-04	BSB-04
				Sample ID	14BL-BSA-06	14BL-BSA-07	14BL-BSB-01	14BL-BSB-02	14BL-BSB-03	14BL-BSB-03	14BL-BSB-04	14BL-BSB-04	14BL-BSB-04-9
				Lab Sample ID	K1407612-007	K1407612-008	K1407398-001	K1407398-002	K1407398-003	K1407398-003	K1407398-004	K1407398-004	K1407398-005
				Collection Date	K1407612	K1407612	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398
				SDG	7/18/2014	7/18/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014
				Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
				QA/QC	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate
				Mid/Low Level Analysis	Mid	Mid	Mid	Mid	Mid	Low	Mid	Low	Mid
Method	Analyte	Units	ADEC Cleanup Criteria[1]										
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24		0.009 [0.02] J, JM+	ND [0.02]	ND [0.024]	ND [0.023]	ND [0.03]	0.0012 [0.00045] J	ND [0.024]	ND [0.00045]	ND [0.02]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024		**0.32 [0.02]**	**0.12 [0.02]**	**0.087 [0.024]**	**0.2 [0.023]**	**0.23 [0.03]**	**0.19 [0.00056]**	**0.68 [0.024]**	0.0097 [0.00056] JD	**0.48 [0.02]**
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37		ND [0.02]	ND [0.02]	ND [0.024]	ND [0.023]	ND [0.03]	ND [0.00045]	ND [0.024]	ND [0.00045]	ND [0.02]
8260C	Trichloroethene (TCE)	mg/Kg	0.02		ND [0.01]	ND [0.01]	ND [0.012]	**0.028 [0.012] J**	**0.02 [0.015] J**	0.015 [0.00056]	**0.031 [0.012] J**	0.0012 [0.00056] J, JD	**0.025 [0.01] J**
8260C	Vinyl Chloride	mg/Kg	0.0085		*ND [0.01] E*	*ND [0.01] E*	*ND [0.012] E*	*ND [0.012] E*	*ND [0.015] E*	ND [0.00056]	*ND [0.012] E*	ND [0.00056]	*ND [0.01] E*

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Italics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

				Location ID	BSB-04	BSB-05	BSB-05	BSB-06	BSB-07	BSB-07	BSB-08	BSB-08	PST-BSA-06	PST-BSA-06
				Sample ID	14BL-BSB-04-9	14BL-BSB-05	14BL-BSB-05	14BL-BSB-06	14BL-BSB-07	14BL-BSB-07	14BL-BSB-08	14BL-BSB-08	14BL-PST-BSA-06	14BL-PST-BSA-06
				Lab Sample ID	K1407398-005	K1407398-006	K1407398-006	K1407398-007	K1407398-008	K1407398-008	K1407398-009	K1407398-009	K141023702	K141023702
				Collection Date	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398	K1407398	K1410237	K1410237
				SDG	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	7/12/2014	9/20/2014	9/20/2014
				Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
				QA/QC	Duplicate	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
				Mid/Low Level Analysis	Low	Mid	Low	Mid	Mid	Low	Mid	Low	Mid	Low
Method	Analyte	Units	ADEC Cleanup Criteria[1]											
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24	ND [0.00042]	ND [0.023]	0.0013 [0.0004] J	ND [0.024]	ND [0.022]	ND [0.00048]	ND [0.026]	ND [0.00064]	ND [0.024]	ND [0.00055]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024	**0.11 [0.00052] JD**	**0.22 [0.023]**	**0.13 [0.0005]**	**0.24 [0.024]**	**0.059 [0.022]**	0.012 [0.0006]	**0.072 [0.026]**	0.014 [0.0008]	ND [0.024]	ND [0.00068]
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37	ND [0.00042]	ND [0.023]	ND [0.0004]	ND [0.024]	ND [0.022]	ND [0.00048]	ND [0.026]	ND [0.00064]	ND [0.024]	ND [0.00055]
8260C	Trichloroethene (TCE)	mg/Kg	0.02	0.0036 [0.00052] J, JD	ND [0.012]	0.0091 [0.0005]	**0.024 [0.012] J**	0.013 [0.011] J	0.0008 [0.0006] J	ND [0.013]	0.0036 [0.0008] J	ND [0.012]	ND [0.00068]
8260C	Vinyl Chloride	mg/Kg	0.0085	ND [0.00052]	*ND [0.012] E*	ND [0.0005]	*ND [0.012] E*	*ND [0.011] E*	ND [0.0006]	*ND [0.013] E*	ND [0.0008]	*ND [0.012] E*	ND [0.00068]

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Italics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

Table B-1-4
2014 Black Lagoon Treatability Study VOC Soil Results

			Location ID	PST-BSB-06	PST-BSB-06	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
			Sample ID	14BL-PST-BSB-06	14BL-PST-BSB-06	14BL-TB01	14BL-TB01	14BL-TB01	14BL-TB02	14BL-TB02	14BL-TB02	14PH-TB01	14BL-TB10
			Lab Sample ID	K141023703	K141023703	K1406938-015	K1407398-010	K1407398-010	K1406938-016	K1407398-011	K1407612-009	K1406940-021	K141023704
			Collection Date	K1410237	K1410237	K1406938	K1407398	K1407398	K1406938	K1407398	K1407612	K1406940	K1410237
			SDG	9/20/2014	9/20/2014	7/7/2014	7/12/2014	7/12/2014	7/7/2014	7/12/2014	7/18/2014	7/7/2014	9/20/2014
			Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Laboratory	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K	CAS_K
			QA/QC	Primary	Primary	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
			Mid/Low Level Analysis	Mid	Low	Low	Mid	Low	Low	Low	Mid	Mid	Mid
Method	Analyte	Units	ADEC Cleanup Criteria[1]										
8260C	cis-1,2-Dichloroethene	mg/Kg	0.24	ND [0.026]	ND [0.00056]	ND [0.0004]	ND [0.02]	ND [0.0004]	ND [0.0004]	ND [0.0004]	ND [0.02]	ND [0.02]	ND [0.024]
8260C	Tetrachloroethene (PCE)	mg/Kg	0.024	*ND [0.026] E*	ND [0.00069]	ND [0.0005]	ND [0.02]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.02]	ND [0.02]	ND [0.024]
8260C	trans-1,2-Dichloroethene	mg/Kg	0.37	ND [0.026]	ND [0.00056]	ND [0.0004]	ND [0.02]	ND [0.0004]	ND [0.0004]	ND [0.0004]	ND [0.02]	ND [0.02]	ND [0.024]
8260C	Trichloroethene (TCE)	mg/Kg	0.02	ND [0.013]	ND [0.00069] JC	ND [0.0005]	ND [0.01]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.01]	ND [0.01]	ND [0.012]
8260C	Vinyl Chloride	mg/Kg	0.0085	*ND [0.013] E*	ND [0.00069]	ND [0.0005]	*ND [0.01] E*	ND [0.0005]	ND [0.0005]	ND [0.0005]	*ND [0.01] E*	*ND [0.01] E*	*ND [0.012] E*

Notes:

[1] 18 AAC 75 Method Two, Migration to Groundwater Cleanup Level

[ ] = limit of detection

Bold = The result exceeds the cleanup level.

E and *Itallics* = The result was nondetect and the limit of detection exeeded the project action limit.

J = The analyte was positively identified, but the associated result was less than the LOQ but greater than or equal to the DL.

JC = The result was estimated because the analyte failed the minimum response factor criteria in the countinuing calibration verification (CCV).

JD = The result was estimated because the relative percent difference of the sample and field duplicate result was greater than the QC.

JM+ = The result was estimated because the analyte failed recovery criterion in the MS and/or the MSD (high).

ND = nondetect

SDG = sample delivery group

SO = soil

CASK = ALS Environmental, Kelso, WA

ATTACHMENT B-2

Qualified Sample Results

Table B-2-1
Results Qualified E Due to Limits of Detection Greater Than the Project Action Limit

SDG	Sample ID	Lab Sample ID	Method	Analyte	Project Action Limit	Result	LOD	LOQ	Units	Dilution Factor	Qualifier
K1407398	14BL-BSB-01	K1407398-001	8260C	Vinyl Chloride	0.0085	ND	0.012	0.059	mg/Kg	1	E
K1407398	14BL-BSB-02	K1407398-002	8260C	Vinyl Chloride	0.0085	ND	0.012	0.057	mg/Kg	1	E
K1407398	14BL-BSB-06	K1407398-007	8260C	Vinyl Chloride	0.0085	ND	0.012	0.06	mg/Kg	1	E
K1407612	14BL-BSA-01	K1407612-001	8260C	Vinyl Chloride	0.0085	ND	0.01	0.036	mg/Kg	1	E
K1407612	14BL-BSA-02	K1407612-002	8260C	Vinyl Chloride	0.0085	ND	0.01	0.045	mg/Kg	1	E
K1407612	14BL-BSA-03	K1407612-003	8260C	Vinyl Chloride	0.0085	ND	0.01	0.045	mg/Kg	1	E
K1407612	14BL-BSA-04	K1407612-004	8260C	Vinyl Chloride	0.0085	ND	0.01	0.043	mg/Kg	1	E
K1407612	14BL-BSA-04-9	K1407612-005	8260C	Vinyl Chloride	0.0085	ND	0.011	0.055	mg/Kg	1	E
K1407612	14BL-BSA-05	K1407612-006	8260C	Vinyl Chloride	0.0085	ND	0.01	0.035	mg/Kg	1	E
K1407612	14BL-BSA-06	K1407612-007	8260C	Vinyl Chloride	0.0085	ND	0.01	0.045	mg/Kg	1	E
K1407612	14BL-BSA-07	K1407612-008	8260C	Vinyl Chloride	0.0085	ND	0.01	0.044	mg/Kg	1	E

Notes:

LOD = limit of detection

LOQ = limit of quantitation

mg/kg = milligrams per kilogram

ND = nondetect

SDG = sample delivery group

See the Data Quality Assessment for data qualifier definitions.

Table B-2-2
Results Qualified JS+ Due to Surrogate Spike Recovery Outliers

SDG	Sample ID	Lab Sample ID	Method	Analyte	Result	LOD	LOQ	Recovery (%)	LCL (%)	UCL (%)	Units	Lab Lot Number	Dilution Factor	Qualifier
K1407612	14BL-BSA-01	K1407612-001	AK101	4-Bromofluorobenzene	271	1	1	271	50	150	Percent	KWG1410183	1	-
K1407612	14BL-BSA-01	K1407612-001	AK101	C6 - C10 GRO	78	2.5	15	-	-	-	mg/Kg	KWG1410183	1	JS+
K1407612	14BL-BSA-02	K1407612-002	AK101	4-Bromofluorobenzene	391	1	1	391	50	150	Percent	KWG1410183	1	-
K1407612	14BL-BSA-02	K1407612-002	AK101	C6 - C10 GRO	120	2.5	18	-	-	-	mg/Kg	KWG1410183	1	JS+
K1407612	14BL-BSA-03	K1407612-003	AK101	4-Bromofluorobenzene	203	1	1	203	50	150	Percent	KWG1410183	1	-
K1407612	14BL-BSA-03	K1407612-003	AK101	C6 - C10 GRO	35	2.5	18	-	-	-	mg/Kg	KWG1410183	1	JS+
K1407612	14BL-BSA-04-9	K1407612-005	AK101	4-Bromofluorobenzene	178	1.1	1.1	178	50	150	Percent	KWG1410183	1	-
K1407612	14BL-BSA-04-9	K1407612-005	AK101	C6 - C10 GRO	22	2.8	22	-	-	-	mg/Kg	KWG1410183	1	JS+, JD
K1407612	14BL-BSA-06	K1407612-007	AK101	4-Bromofluorobenzene	290	1	1	290	50	150	Percent	KWG1410183	1	-
K1407612	14BL-BSA-06	K1407612-007	AK101	C6 - C10 GRO	77	2.5	18	-	-	-	mg/Kg	KWG1410183	1	JS+
K1407612	14BL-BSA-07	K1407612-008	AK101	4-Bromofluorobenzene	225	1	1	225	50	150	Percent	KWG1410183	1	-
K1407612	14BL-BSA-07	K1407612-008	AK101	C6 - C10 GRO	36	2.5	18	-	-	-	mg/Kg	KWG1410183	1	JS+
K1407398	14BL-BSB-01	K1407398-001	AK101	4-Bromofluorobenzene	215	1.2	1.2	215	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-01	K1407398-001	AK101	C6 - C10 GRO	37	3	24	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-02	K1407398-002	AK101	4-Bromofluorobenzene	245	1.2	1.2	245	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-02	K1407398-002	AK101	C6 - C10 GRO	63	2.9	23	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-03	K1407398-003	AK101	4-Bromofluorobenzene	204	1.5	1.5	204	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-03	K1407398-003	AK101	C6 - C10 GRO	84	3.7	30	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-04	K1407398-004	AK101	4-Bromofluorobenzene	244	1.2	1.2	244	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-04	K1407398-004	AK101	C6 - C10 GRO	82	3	24	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-04-9	K1407398-005	AK101	4-Bromofluorobenzene	241	1	1	241	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-04-9	K1407398-005	AK101	C6 - C10 GRO	59	2.5	18	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-05	K1407398-006	AK101	4-Bromofluorobenzene	261	1.2	1.2	261	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-05	K1407398-006	AK101	C6 - C10 GRO	87	2.8	23	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-06	K1407398-007	AK101	4-Bromofluorobenzene	430	1.2	1.2	430	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-06	K1407398-007	AK101	C6 - C10 GRO	150	3	24	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-07	K1407398-008	AK101	4-Bromofluorobenzene	188	1.1	1.1	188	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-07	K1407398-008	AK101	C6 - C10 GRO	57	2.7	22	-	-	-	mg/Kg	KWG1409557	1	JS+
K1407398	14BL-BSB-08	K1407398-009	AK101	4-Bromofluorobenzene	198	1.3	1.3	198	50	150	Percent	KWG1409557	1	-
K1407398	14BL-BSB-08	K1407398-009	AK101	C6 - C10 GRO	51	3.3	26	-	-	-	mg/Kg	KWG1409557	1	JS+

Notes:

LCL = lower control limit
LOD = limit of detection
LOQ = limit of quantitation
mg/kg = milligrams per kilogram
ND = nondetect
SDG = sample delivery group
UCL = upper control limit
See the Data Quality Assessment for data qualifier definitions.

Table B-2-3
Results Qualified JM or JD Due to Matrix Spike Outliers

SDG	Sample ID	Lab Sample ID	Method	Analyte	Result	LOD	LOQ	Recovery	LCL	UCL	Lab Lot Number	Lab Parent Sample	Spike Amount	Expected Result	RPD (%)	Units	Qualifier
K1407612	14BL-BSA-06	K1407612-007	8260C	cis-1,2-Dichloroethene	0.009	0.02	0.045	-	-	-	KWG1410175	-	-	-	-	mg/Kg	J, JM+
K1407612	MS	KWG1410175-4	8260C	cis-1,2-Dichloroethene	1.14	0.02	0.045	127	65	125	KWG1410175	14BL-BSA-06	0.895	0.904	21	mg/Kg	-
K1407612	MSD	KWG1410175-5	8260C	cis-1,2-Dichloroethene	0.926	0.02	0.045	102	65	125	KWG1410175	14BL-BSA-06	0.895	0.904	21	mg/Kg	-
K1410237	14BL-PST-BSA-06	K141023702	AK103	Residual Range Organics (C25-C36)	1400	11	130	-	-	-	KWG1413301	-	-	-	-	mg/Kg	JD
K1410237	MS	KWG14133011	AK103	Residual Range Organics (C25-C36)	1470	11	130	41	60	120	KWG1413301	K141023702	171	1571	21	mg/Kg	-
K1410237	NMSD	KWG14133012	AK103	Residual Range Organics (C25-C36)	1170	11	130	-135	60	120	KWG1413301	K141023702	171	1571	21	mg/Kg	-

Notes:
LCL = lower control limit
LOD = limit of detection
LOQ = limit of quantitation
mg/kg = milligrams per kilogram
MS/MSD = matrix spike/matrix spike duplicate
ND = nondetect
RPD = relative percent difference
SDG = sample delivery group
UCL = upper control limit
See the Data Quality Assessment for data qualifier definitions.

Table B-2-4
Results Qualified Due to Field Duplicate Precision

Sample ID	Lab Sample ID	Duplicate Sample ID	Duplicate Lab Sample ID	Method	Analyte	Result	Duplicate Result	Units	RPD (%)
14BL-PRE-BSB-01	K1406940-009	14BL-PRE-BSB-01-9	K1406940-010	AK 102/103	C25 - C36 RRO	72	170	mg/Kg	81.0
14BL-PRE-BSB-01	K1406940-009	14BL-PRE-BSB-01-9	K1406940-010	AK 102/103	C10 - C25 DRO	4.3	9	mg/Kg	70.7
14BL-BSB-04	K1407398-004	14BL-BSB-04-9	K1407398-005	8260C LL	Tetrachloroethene (PCE)	0.0097	0.11	mg/kg	167.6
14BL-BSB-04	K1407398-004	14BL-BSB-04-9	K1407398-005	8260C LL	Trichloroethene (TCE)	0.0012	0.0036	mg/kg	100.0
14BL-BSB-04	K1407398-004	14BL-BSB-04-9	K1407398-005	AK 102/103	C10 - C25 DRO	980	1800	mg/Kg	59.0
14BL-BSB-04-9	K1407398-005	14BL-BSB-04	K1407398-004	AK 102/103	C10 - C25 DRO	1800	980	mg/Kg	59.0
14BL-BSB-04-9	K1407398-005	14BL-BSB-04	K1407398-004	8260C LL	Tetrachloroethene (PCE)	0.11	0.0097	mg/kg	167.6
14BL-BSB-04-9	K1407398-005	14BL-BSB-04	K1407398-004	8260C LL	Trichloroethene (TCE)	0.0036	0.0012	mg/kg	100.0
14BL-BSA-04	K1407612-004	14BL-BSA-04-9	K1407612-005	AK101	C6 - C10 GRO	13	22	mg/Kg	51.4
14BL-BSA-04-9	K1407612-005	14BL-BSA-04	K1407612-004	AK101	C6 - C10 GRO	22	13	mg/Kg	51.4

Notes:

mg/kg = milligrams per kilogram

RPD = relative percent difference

See the Data Quality Assessment for data qualifier definitions.

Table B-2-5
Results Qualified JC Due to Continuing Calibration Verification Response Factor Outliers

SDG	Sample ID	Lab Sample ID	Method	Analyte	Result	LOD	LOQ	Qualifier	Lab Lot Number	Units	Analysis Date	RF	RF Limit
K1410237	14BL-PST-BSB-06	K141023703	SW8260L	Trichloroethene (TCE)	ND	0.00069	0.0069	JC	KWG1413148	mg/kg	9/26/2014	0.192	0.2

Notes:

LOD = limit of detection
LOQ = limit of quantitation
mg/kg = milligrams per kilogram
ND = nondetect
RF = response factor
SDG = sample delivery group
See the Data Quality Assessment for data qualifier definitions.

ATTACHMENT B-3

ADEC Laboratory Data Review Checklists

Laboratory Data Review Checklist

Completed by:	Candace Ede		
Title:	Project Chemist	**Date:**	09-10-2014
CS Report Name:	2014 Port Heiden RRS TS Report	**Report Date:**	May 2015
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS	**Laboratory Report Number:**	K1406465
ADEC File Number:	2637.38.002.08	**ADEC Hazard ID:**	186

1. Laboratory

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

All samples were analyzed by ALS of Kelso, WA.

2. Chain of Custody (CoC)

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Correct Analyses requested?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

The sample/cooler temperatures were:

Cooler Valor Morgulis: 4.6°/5.6° C

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

There were no discrepancies identified on the Cooler Receipt Form.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality was not affected.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

There were no discrepancies identified by the laboratory.

c. Were all corrective actions documented?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

Comments:

The data quality was not affected.

5. Samples Results

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

All method blank results were less than the LOD.

iii. If above PQL, what samples are affected?

Comments:

NA

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

A MS/MSD was included in the batch.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

No metals/inorganics were reported.

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 ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

Comments:

No samples were affected.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

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

Comments:

The data quality and usability were not affected.

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 ☑ NA (Please explain.) Comments:

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 ☑ NA (Please explain.) Comments:

iii. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

NA

e. Field Duplicate

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Submitted blind to lab?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

Comments:

The data quality and usability were not affected.

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

A decontamination/equipment blank was not submitted with this SDG.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. <u>Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)</u>

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers applied are defined in the Data Quality Assessment appendix of the report.

Laboratory Data Review Checklist

Completed by:	Candace Ede		
Title:	Project Chemist	**Date:**	09-10-2014
CS Report Name:	2014 Port Heiden RRS TS Report	**Report Date:**	May 2015
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS	**Laboratory Report Number:**	K1406938
ADEC File Number:	2637.38.002.08	**ADEC Hazard ID:**	186

1. Laboratory

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

All samples were analyzed by ALS of Kelso, WA.

2. Chain of Custody (CoC)

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Correct Analyses requested?

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

The CoC requested method SW8082LL, however via phone call the correct method, SW8260LL, was requested and performed.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

A temperature blank was not present in the cooler.

The sample/cooler temperatures were:

Cooler The Hound: NP/1.6° C

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Cooler receipt temperature was above acceptable criteria, >0ºC; however there was no indication of thawed samples.

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

There were twice as many vials received than noted on the CoC, however that is the number of vials that is needed for the method. The label on the trip blanks read “Trip Blank” instead of “14BL-TB01” and “14BL-TB02”.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality was not affected.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

There were no discrepancies identified by the laboratory.

c. Were all corrective actions documented?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

Comments:

The data quality was not affected.

5. Samples Results

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

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

The CoC requested method SW8082LL, however via phone call the correct method, SW8260LL, was requested and performed.

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. <u>QC Samples</u>

a. Method Blank

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

All method blank results were less than the LOD.

iii. If above PQL, what samples are affected?

Comments:

NA

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

A MS/MSD was included in the batch.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

No metals/inorganics were reported.

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 ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

Comments:

No samples were affected.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

There were 2 trip blanks included.

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 ☐ NA (Please explain.) Comments:

iii. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

e. Field Duplicate

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Submitted blind to lab?

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

Comments:

The data quality and usability were not affected.

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☐ NA (Please explain.) Comments:

A decontamination/equipment blank was not submitted with this SDG.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. <u>Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)</u>

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers applied are defined in the Data Quality Assessment appendix of the report.

Laboratory Data Review Checklist

Completed by:	Candace Ede		
Title:	Project Chemist	**Date:**	09-10-2014
CS Report Name:	2014 Port Heiden RRS TS Report	**Report Date:**	May 2015
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS	**Laboratory Report Number:**	K1406940
ADEC File Number:	2637.38.002.08	**ADEC Hazard ID:**	186

1. Laboratory

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

All samples were analyzed by ALS of Kelso, WA.

2. Chain of Custody (CoC)

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Correct Analyses requested?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

The sample/cooler temperatures were:

Cooler The Wall: 5.0° C /4.0° C

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

Three methanol preserved samples IDs were not labelled correctly on the bottles. Samples were correctly identified by the time and sample count according to the CoC. The affected samples were: 14BL-PRE-BSB-05, 14BL-PRE-BSA-01 and 14BL-PRE-BSA-04-9.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality was not affected.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

There were no discrepancies identified by the laboratory.

c. Were all corrective actions documented?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

Comments:

The data quality was not affected.

5. Samples Results

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

SW8260 - The medium level methanol preserved analysis LODs do not meet the project action limit for one or more samples for the following analytes: vinyl chloride, tetrachloroethene (PCE) and trichloroethene (TCE). The nondetect medium level results with LODs greater than the project action limit were qualified "E". The low level analysis was performed, in laboratory report number K1406938, for the samples with corresponding sample IDs. The low level analysis LOD meets the project action limits for all samples analyzed.

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. <u>QC Samples</u>

a. Method Blank

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

All method blank results were less than the LOD.

iii. If above PQL, what samples are affected?

Comments:

NA

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

A MS/MSD was included in each batch.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

No metals/inorganics were reported.

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 ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

Comments:

No samples were affected.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

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 ☐ NA (Please explain.) Comments:

iii. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

e. Field Duplicate

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Submitted blind to lab?

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

AK102/103 - The RPD for sample/duplicate 14BL-PRE-BSB-01/ 14BL-PRE-BSB-01-9 was greater than 50% for DRO and RRO, at 71% and 81%.

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

Comments:

The data quality and usability has been minimally affected. The DRO and RRO results for sample/duplicate 14BL-PRE-BSB-01/ 14BL-PRE-BSB-01-9 were qualified JD due to field duplicate precision exceedance. The higher result will be used for reporting purposes.

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

A decontamination/equipment blank was not submitted with this SDG.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. <u>Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)</u>

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers applied are defined in the Data Quality Assessment appendix of the report.

Laboratory Data Review Checklist

Completed by:	Candace Ede		
Title:	Project Chemist	**Date:**	09-11-2014
CS Report Name:	2014 Port Heiden RRS TS Report	**Report Date:**	May 2015
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS	**Laboratory Report Number:**	K1407398
ADEC File Number:	2637.38.002.08	**ADEC Hazard ID:**	186

1. Laboratory

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

All samples were analyzed by ALS of Kelso, WA.

2. Chain of Custody (CoC)

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Correct Analyses requested?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

The sample/cooler temperatures were:

Cooler Fleabottom: 5.5° C /5.6° C
Cooler Hodor: 2.6° C /0.4° C

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

The cooler temperature, Cooler Hodor, was outside of acceptable range was noted on the cooler receipt form.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected. The samples were received in good condition and there was no note of thawed 8260LL samples.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

The methanol preserved sample jars did not have a recorded tare weight. ALS environmental emptied, dried and weighed the jars for an estimated tare weight. Other QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

Comments:

The data quality and usability were not affected.

5. Samples Results

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

SW8260 - The medium level methanol preserved analysis LODs do not meet the project action limit for vinyl chloride in one or more samples. The nondetect medium level results with LODs greater than the project action limit were qualified "E". The low level analysis was performed excluding samples 14BL-BSB-01, 14BL-BSB-02 and 14BL-BSB-06. The low level analysis LOD meets the project action limits for all samples analyzed.

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. <u>QC Samples</u>

a. Method Blank

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

All method blank results were less than the LOD.

iii. If above PQL, what samples are affected?

Comments:

NA

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

A MS/MSD was included in each batch.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

No metals/inorganics were reported.

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 ☐ NA (Please explain.) Comments:

AK102/103 - The 14BL-BSB-06 MS/MSD recovery for DRO and RRO in batch KWG1409601 was outside of QC criteria (biased high).

AK101 - The 14BL-BSB-06 MS recovery for GRO in batch KWG1409557 was outside of QC criteria (biased high).

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 ☐ NA (Please explain.) Comments:

AK 102/103: The 14BL-BSB-06 MS/MSD RPD for RRO in batch KWG1409601 was outside of QC criteria at 24%.

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

Comments:

AK 102/103, AK101: 14BL-BSB-06

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

AK 102/103: A data flag for MS/MSD recovery was not required for sample 14BL-BSB-06. The parent sample concentration was greater than the spike amount. A data flag "JD" was applied to sample 14BL-BSB-06 for RPD criteria.

AK 101: A data flag for MS/MSD recovery was not required for sample 14BL-BSB-06. The parent sample concentration was greater than the spike amount.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

AK101: The 4-BFB surrogate recovery was outside of QC criteria (biased high) for the following samples: 14BL-BSB-01, 14BL-BSB-02, 14BL-BSB-03, 14BL-BSB-04, 14BL-BSB-04-9, 14BL-BSB-05, 14BL-BSB-06, 14BL-BSB-07, and 14BL-BSB-08.

8260CLL: The 4-BFB surrogate recovery was outside of QC criteria (biased low) for the following samples: 14BL-BSB-04.

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

AK101: The results for samples 14BL-BSB-01, 14BL-BSB-02, 14BL-BSB-03, 14BL-BSB-04, 14BL-BSB-04-9, 14BL-BSB-05, 14BL-BSB-06, 14BL-BSB-07, and 14BL-BSB-08 were qualified JS+ due to high 4-BFB surrogate recoveries.

8260CLL: A data flag for sample 14BL-BSB-04 was not applied since only one surrogate failed criteria. For the SW8260 analysis qualifiers are only applied when 2 or more surrogates fail criteria.

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

Comments:

AK101: The data quality is minimally affected. The sample results qualified JS+ are considered estimated and biased high. The impact is minimal since all sample results flagged JS+ were less than the project action limit (300 mg/Kg).

8260CLL: The data quality and usability were not affected.

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

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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 ☐ NA (Please explain.) Comments:

iii. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

e. Field Duplicate

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Submitted blind to lab?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

AK102/103 – The RPD for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 was greater than 50% for DRO at 59%.

8260LL - The RPD for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 was greater than 50% for tetrachloroethene (PCE) and trichloroethene (TCE) at 167% and 100%.

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

Comments:

AK 102/103: The data quality and usability has been minimally affected. The DRO results for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 were qualified JD due to field duplicate precision exceedance. The results for the sample/duplicate were both reported above the Cleanup Level for DRO (250 mg/Kg), and the higher value will be used for reporting purposes.

8260LL: The data quality has been minimally affected. The tetrachloroethene and trichloroethene results for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 were qualified JD due to field duplicate precision exceedance. The higher result will be used for reporting purposes.

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

A decontamination/equipment blank was not submitted with this SDG.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. <u>Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)</u>

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers applied are defined in the Data Quality Assessment appendix of the report.

Laboratory Data Review Checklist

Completed by:	Candace Ede		
Title:	Project Chemist	**Date:**	09-12-2014
CS Report Name:	2014 Port Heiden RRS TS Report	**Report Date:**	May 2015
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS	**Laboratory Report Number:**	K1407612
ADEC File Number:	2637.38.002.08	**ADEC Hazard ID:**	186

1. Laboratory

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

All samples were analyzed by ALS of Kelso, WA.

2. Chain of Custody (CoC)

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Correct Analyses requested?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

The sample/cooler temperatures were:

Cooler Shadow: 5.7° C /5.5° C
Cooler John Snow: 5.2° C /-0.4° C

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Trip blanks for 8260LL analysis were received broken (frozen with bottoms broke out).

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 ☐ NA (Please explain.) Comments:

The cooler temperature, Cooler John Snow, was outside of acceptable range was noted on the cooler receipt form.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability was not affected. The broken trip blanks for the 8260LL analysis were not used because the analysis was cancelled for all the samples.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

The methanol preserved sample jars did not have a recorded tare weight. ALS environmental emptied, dried and weighed the jars for an estimated tare weight. Other QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

Comments:

The data quality and usability were not affected.

5. Samples Results

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

SW8260 - The medium level methanol preserved analysis LODs do not meet the project action limit for vinyl chloride in one or more samples. The nondetect medium level results with LODs greater than the project action limit were qualified "E". The low level analysis was not performed for these samples due to high concentrations of target analytes.

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. <u>QC Samples</u>

a. Method Blank

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

All method blank results were less than the LOD.

iii. If above PQL, what samples are affected?

Comments:

NA

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

A MS/MSD was included in each batch.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

No metals/inorganics were reported.

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 ☐ NA (Please explain.) Comments:

AK102/103 - The 14BL-BSA-06 MS/MSD recovery for DRO and RRO in batch KWG1410490 was outside of QC criteria (biased high).

8260C: The 14BL-BSA-06 MS recovery for vinyl chloride, cis-1,2-Dichloroethene and trichloroethene (TCE) in batch KWG1410175 was outside of QC criteria (biased high).

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 ☐ NA (Please explain.) Comments:

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

Comments:

AK 102/103, 8260C: 14BL-BSA-06

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

AK 102/103: A data flag for MS/MSD recovery was not required for sample 14BL-BSB-06. The parent sample concentration was greater than the spike amount.

8260C: A data flag for MS recovery was not required for vinyl chloride and trichloroethene because the results were nondetect. The cis-1,2-Dichloroethene results for 14BL-BSA-06 were qualified JM+ due to MS recoveries above the QC limit.

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

Comments:

The data quality was minimally affected. The 14BL-BSA-06 cis-1,2-Dichloroethene sample results qualified JM+ are considered estimated and biased high. The impact is minimal since the LCS/LCSD recoveries and precision were acceptable and the sample results for cis-1,2-Dichloroethene is below the action limit.

c. Surrogates – Organics Only

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

AK101: The 4-BFB surrogate recovery was outside of QC criteria (biased high) for the following samples: 14BL-BSA-01, 14BL-BSA-02, 14BL-BSA-03, 14BL-BSA-04-9, 14BL-BSA-06, and 14BL-BSA-07.

8260C: The 4-BFB surrogate recovery was outside of QC criteria (biased high) for the following samples: 14BL-BSA-01, 14BL-BSA-06, and 14BL-BSA-07.

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

AK101: The results for samples 14BL-BSB-01, 14BL-BSB-02, 14BL-BSB-03, 14BL-BSB-04, 14BL-BSB-04-9, 14BL-BSB-05, 14BL-BSB-06, 14BL-BSB-07, and 14BL-BSB-08 were qualified JS+ due to high 4-BFB surrogate recoveries.

8260C: A data flag for samples 14BL-BSA-01, 14BL-BSA-06, and 14BL-BSA-07 was not applied since only one surrogate failed criteria. For the SW8260 analysis qualifiers are only applied when 2 or more surrogates fail criteria.

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

Comments:

AK101: The data quality is minimally affected. The sample results qualified JS+ are considered estimated and biased high. The impact is minimal since all sample results flagged JS+ were less than the project action limit (300 mg/Kg).

8260C: The data quality and usability were not affected.

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

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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 ☐ NA (Please explain.) Comments:

iii. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

e. Field Duplicate

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Submitted blind to lab?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

AK102/103 – The RPD for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 was greater than 50% for DRO at 59%.

8260LL - The RPD for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 was greater than 50% for tetrachloroethene (PCE) and trichloroethene (TCE) at 167% and 100%.

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

Comments:

AK 102/103: The data quality and usability has been minimally affected. The DRO results for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 were qualified JD due to field duplicate precision exceedance. The results for the sample/duplicate were both reported above the Cleanup Level for DRO (250 mg/Kg), and the higher value will be used for reporting purposes.

8260LL: The data quality has been minimally affected. The tetrachloroethene and trichloroethene results for sample/duplicate 14BL-BSB-04/ 14BL-BSB-04-9 were qualified JD due to field duplicate precision exceedance. The higher result will be used for reporting purposes.

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

A decontamination/equipment blank was not submitted with this SDG.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. <u>Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)</u>

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers applied are defined in the Data Quality Assessment appendix of the report.

Laboratory Data Review Checklist

Completed by:	Candace Ede		
Title:	Project Chemist	**Date:**	11-06-2014
CS Report Name:	2014 Port Heiden RRS TS Report	**Report Date:**	May 2015
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS	**Laboratory Report Number:**	K1410237
ADEC File Number:	2637.38.002.08	**ADEC Hazard ID:**	186

1. Laboratory

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☑ NA (Please explain.) Comments:

All samples were analyzed by ALS of Kelso, WA.

2. Chain of Custody (CoC)

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Correct Analyses requested?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☑ Yes ☑ No ☐ NA (Please explain.) Comments:

The sample/cooler temperatures were:

Cooler Canada: 1.9° C /-0.4° C
Cooler Pile of Bio: 0.3° C /0.0° C

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

The cooler temperature, Cooler Canada, was outside of acceptable range was noted on the cooler receipt form.

e. Data quality or usability affected? (Please explain.)

Comments:

For Cooler Canada, there was no indication of frozen samples and the data quality and usability was not affected.

4. <u>Case Narrative</u>

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

8260 Low Level: The minimum relative response factor for trichloroethene was not met in the CCV. A data flag "JC" was applied to sample 14BL-PST-BSB-06.

Other QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

A method reporting limit (MRL) check standard containing the analytes of concern were analyzed each day of analysis.

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

Comments:

The MRL check standard shown that sensitivity was adequate to detect the compounds in question, and the results for trichloroethene are minimally affected.

5. Samples Results

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

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

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

SW8260 - The medium level methanol preserved analysis LODs do not meet the project action limit for vinyl chloride in one or more samples. The nondetect medium level results with LODs greater than the project action limit were qualified "E". The low level analysis LOD meets the project action limits for all samples analyzed.

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

All method blank results were less than the LOD.

iii. If above PQL, what samples are affected?

Comments:

NA

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

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 ☐ NA (Please explain.) Comments:

A MS/MSD was included in each batch. For the 8260 low level batch KWG1413148, a non-client sample was used for QC.

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

No metals/inorganics were reported.

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 ☐ NA (Please explain.) Comments:

AK102/103 - The 14BL-PST-BSA-06 MS/MSD recovery for RRO in batch KWG1413301 was outside of QC criteria (biased low). The 14 14PH-215-MW-10 MS recovery for DRO in batch KWG1413367 was outside of QC criteria (biased low).

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 ☐ NA (Please explain.) Comments:

AK 102/103: The 14BL-PST-BSA-06 MS/MSD RPD for RRO in batch KWG1413301 was outside of QC criteria at 23%. The 14PH-215-MW-10 MS/MSD RPD for DRO in batch KWG1413367 was outside of QC criteria at 27%

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

Comments:

AK 102/103: 14BL-PST-BSA-06, 14PH-215-MW-10

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

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

AK 102/103: A data flag for MS/MSD recovery was not required for sample 14BL-BSB-06. The parent sample concentration was greater than the spike amount. The DRO results for 14PH-215-MW-10 was qualified JM- due to MS recovery below the QC limit. A data flag “JD” was applied to samples 14BL-PST-BSA-06 and 14PH-215-MW-10 for RPD criteria.

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

Comments:

The data quality was minimally affected. The 14PH-215-MW-10 DRO sample result qualified JM- are considered estimated and biased low. The impact is minimal since the LCS/LCSD recoveries and precision were acceptable and the sample result for DRO is below the action limit.

c. Surrogates – Organics Only

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

☑ Yes ☐ No ☐ NA (Please explain.) 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 ☐ NA (Please explain.) Comments:

8260: The 4-BFB surrogate recovery was outside of QC criteria (biased high) for the following samples: 14BL-PST-BSB-06 and 14BL-TB10.

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

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

8260: A data flag for samples 14BL-PST-BSB-06 and 14BL-TB10 was not applied since only one surrogate failed criteria. For the SW8260 analysis qualifiers are only applied when 2 or more surrogates fail criteria.

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

Comments:

8260C: The data quality and usability were not affected.

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

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

☑ Yes ☑ No ☐ NA (Please explain.) Comments:

A trip blank was not included for the 8260 low level analysis.

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 ☐ NA (Please explain.) Comments:

iii. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected, since both samples for 8260 low level were non-detect for the target analytes.

e. Field Duplicate

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

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

A field duplicate was not submitted with this SDG.

ii. Submitted blind to lab?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

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

Comments:

NA

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

A decontamination/equipment blank was not submitted with this SDG.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers applied are defined in the Data Quality Assessment appendix of the report.

ATTACHMENT B-4

Laboratory Deliverables

(Provided separately on CD)

APPENDIX C

Survey Data

Survey Data Summary Table

PointID	Easting	Northing	Orthometric_ Height	Code	Date_TimeTaken	FeatureType	PointDescription	GeoidSeperation	CoordinateClass	Position_ Quality	Height_Q uality	Position_Height_ Quality
RTCM-Ref 0000	520985.802	6314674.714	32.4759	SCP	6/10/2014 9:45	RTK Reference Point	Base Station at PHTBM006	13.228	REF			
PHTBM007 CS	520895.998	6314567.97	30.9007	SCP	6/10/2014 9:45	Check Shot	Initial Check Shot at PHTMB007	13.228	MEAS	0.0053	0.007	0.0087
BLBIOPILE001	520730.336	6314882.394	24.5826	XMZ	6/10/2014 15:02	Land Management Zone	Proposed Biopile Location	13.219	MEAS	0.0082	0.0135	0.0158
BLBIOPILE002	520706.373	6314890.276	25.4966	XMZ	6/10/2014 15:03	Land Management Zone	Proposed Biopile Location	13.218	MEAS	0.0092	0.0154	0.0179
BLBIOPILE003	520706.781	6314860.565	25.4344	XMZ	6/10/2014 15:03	Land Management Zone	Proposed Biopile Location	13.219	MEAS	0.0076	0.0127	0.0148
BLBIOPILE004	520706.973	6314821.89	25.966	XMZ	6/10/2014 15:04	Land Management Zone	Proposed Biopile Location	13.219	MEAS	0.0064	0.0094	0.0114
BLBIOPILE005	520724.394	6314820.839	26.1772	XMZ	6/10/2014 15:04	Land Management Zone	Proposed Biopile Location	13.22	MEAS	0.008	0.0139	0.016
BLBIOPILE006	520743.427	6314816.851	25.7709	XMZ	6/10/2014 15:05	Land Management Zone	Proposed Biopile Location	13.22	MEAS	0.0111	0.0193	0.0222
BLBIOPILE007	520739.72	6314833.678	27.077	XMZ	6/10/2014 15:05	Land Management Zone	Proposed Biopile Location	13.22	MEAS	0.0169	0.0208	0.0268
BLBIOPILE008	520736.132	6314852.749	25.6459	XMZ	6/10/2014 15:05	Land Management Zone	Proposed Biopile Location	13.219	MEAS	0.0079	0.0092	0.0121
BLBIOPILE009	520730.327	6314882.425	24.5795	XMZ	6/10/2014 15:06	Land Management Zone	Proposed Biopile Location	13.219	MEAS	0.0081	0.0094	0.0124
PHTBM007 CS2	520896.001	6314567.96	30.8912	SCP	6/10/2014 18:36	Check Shot	Final Check Shot at PTHBM007	13.228	MEAS	0.0058	0.0085	0.0102
PHTBM006 CS	520985.793	6314674.708	32.5052	SCP	7/2/2014 10:18	Check Shot	Initial Check Shot at PHTMB006	13.228	MEAS	0.0074	0.0095	0.012
ST01	520738.348	6314916.049	24.4947	OSL	7/2/2014 16:29	Stockpile Sample Location	14BL-ST01-01	13.218	MEAS	0.0189	0.0354	0.0401
ST02	520732.88	6314916.867	24.2543	OSL	7/2/2014 16:30	Stockpile Sample Location	14BL-ST01-02	13.218	MEAS	0.0067	0.0128	0.0145
ST03	520728.203	6314907.674	24.1409	OSL	7/2/2014 16:30	Stockpile Sample Location	14BL-ST01-03	13.218	MEAS	0.008	0.0145	0.0166
PRE BSA 01	520732.501	6314823.66	25.8318	OSL	7/2/2014 10:06	Biopile Pre-Construction Sample Location	PRE BSA 01	13.22	MEAS	0.0062	0.0083	0.0103
PRE BSA 02	520718.321	6314822.651	25.4995	OSL	7/2/2014 10:06	Biopile Pre-Construction Sample Location	PRE BSA 02	13.22	MEAS	0.007	0.0094	0.0118
PRE BSA 03	520711.918	6314838.335	25.3863	OSL	7/2/2014 10:07	Biopile Pre-Construction Sample Location	PRE BSA 03	13.219	MEAS	0.0075	0.0103	0.0127
PRE BSA 04	520729.534	6314840.992	25.6771	OSL	7/2/2014 10:07	Biopile Pre-Construction Sample Location	PRE BSA 04	13.219	MEAS	0.0069	0.0092	0.0115
PRE BSA 05	520724.512	6314832.409	25.5232	OSL	7/2/2014 10:07	Biopile Pre-Construction Sample Location	PRE BSA 05	13.22	MEAS	0.0059	0.0079	0.0099
PRE BSA 06	520749.897	6314835.658	26.1042	OSL	7/2/2014 10:08	Biopile Pre-Construction Sample Location	PRE BSA 06	13.22	MEAS	0.0067	0.0091	0.0114
PRE BSB 01	520714.021	6314855.364	25.2007	OSL	7/2/2014 14:23	Biopile Pre-Construction Sample Location	PRE BSB 01	13.219	MEAS	0.0057	0.0093	0.0109
PRE BSB 02	520697.933	6314852.678	25.263	OSL	7/2/2014 14:23	Biopile Pre-Construction Sample Location	PRE BSB 02	13.219	MEAS	0.0059	0.0098	0.0114
PRE BSB 03	520698.728	6314870.553	25.2113	OSL	7/2/2014 14:24	Biopile Pre-Construction Sample Location	PRE BSB 03	13.218	MEAS	0.0058	0.0095	0.0112
PRE BSB 04	520713.279	6314874.4	25.1493	OSL	7/2/2014 14:24	Biopile Pre-Construction Sample Location	PRE BSB 04	13.218	MEAS	0.0055	0.0089	0.0104
PRE BSB 05	520706.833	6314864.46	25.111	OSL	7/2/2014 14:25	Biopile Pre-Construction Sample Location	PRE BSB 05	13.219	MEAS	0.0052	0.0085	0.0099
PRE BSB 06	520733.705	6314878.388	25.2038	OSL	7/2/2014 14:26	Biopile Pre-Construction Sample Location	PRE BSB 06	13.219	MEAS	0.0063	0.0105	0.0123
RTCM-Ref 0000	522136.88	6312873.97	24.3059	SCP	7/2/2014 10:05	RTK Reference Point	Base Station at PHTBM003	13.289	REF	0	0	0
PHTBM001 CS2	522259.721	6312916.285	31.6946	SCP	7/2/2014 17:05	Check Shot	Final Check Shot at PTHBM001	13.29	MEAS	0.0059	0.0085	0.0103
PHTBM006-CS	520985.793	6314674.687	32.5084	SCP	7/9/2014 10:06	Check Shot	Initial Checkshot at PHTBM006	13.228	MEAS	0.0068	0.009	0.0113
BSA01	520734.748	6314847.356	25.8525	XMZ	7/9/2014 10:29	Land Management Zone	BSA Location 01	13.219	MEAS	0.0057	0.0089	0.0106
BSA02	520705.46	6314842.645	25.6266	XMZ	7/9/2014 10:30	Land Management Zone	BSA Location 02	13.219	MEAS	0.0058	0.0093	0.0109
BSA03	520710.522	6314814.405	25.5968	XMZ	7/9/2014 10:30	Land Management Zone	BSA Location 03	13.22	MEAS	0.0059	0.0094	0.0111
BSA04	520740.007	6314819.271	26.2855	XMZ	7/9/2014 10:31	Land Management Zone	BSA Location 04	13.22	MEAS	0.0063	0.0101	0.0119
BSB01	520718.088	6314879.801	25.1473	XMZ	7/9/2014 10:26	Land Management Zone	BSB Location 01	13.218	MEAS	0.0064	0.0097	0.0116
BSB02	520690.113	6314875.354	25.5937	XMZ	7/9/2014 10:26	Land Management Zone	BSB Location 02	13.218	MEAS	0.0062	0.0093	0.0112
BSB03	520694.669	6314845.874	25.4474	XMZ	7/9/2014 10:27	Land Management Zone	BSB Location 03	13.219	MEAS	0.0067	0.0102	0.0122
BSB04	520721.938	6314851.639	25.4822	XMZ	7/9/2014 10:28	Land Management Zone	BSB Location 04	13.219	MEAS	0.0061	0.0095	0.0113
BLO-RD01	520791.83	6314870.472	27.2613	XMZ	7/9/2014 10:38	Land Management Zone	BLO-RD01	13.22	MEAS	0.0054	0.0093	0.0107
BLO-RD02	520784.521	6314878.693	26.9898	XMZ	7/9/2014 10:38	Land Management Zone	BLO-RD02	13.22	MEAS	0.0051	0.0087	0.0101
BLO-RD03	520776.522	6314887.573	26.8097	XMZ	7/9/2014 10:39	Land Management Zone	BLO-RD03	13.219	MEAS	0.0052	0.0089	0.0103
BLO-RD04	520769.349	6314895.448	26.4332	XMZ	7/9/2014 10:39	Land Management Zone	BLO-RD04	13.219	MEAS	0.0058	0.0101	0.0116
BLO-RD05	520761.546	6314904.188	26.0801	XMZ	7/9/2014 10:39	Land Management Zone	BLO-RD05	13.219	MEAS	0.0054	0.0094	0.0109
BLO-RD06	520754.428	6314912.339	25.8532	XMZ	7/9/2014 10:40	Land Management Zone	BLO-RD06	13.218	MEAS	0.0057	0.0099	0.0114
BLO-RD07	520747.218	6314920.119	25.5655	XMZ	7/9/2014 10:40	Land Management Zone	BLO-RD07	13.218	MEAS	0.0061	0.0106	0.0122
BSA-RD01	520737.779	6314834.364	25.9582	XMZ	7/9/2014 10:33	Land Management Zone	BSA-RD01	13.22	MEAS	0.006	0.0099	0.0116
BSA-RD02	520748.612	6314836.856	25.88	XMZ	7/9/2014 10:33	Land Management Zone	BSA-RD02	13.22	MEAS	0.0059	0.0096	0.0113
BSA-RD03	520757.455	6314842.084	26.0133	XMZ	7/9/2014 10:34	Land Management Zone	BSA-RD03	13.22	MEAS	0.0062	0.0103	0.012
BSA-RD04	520764.134	6314849.385	26.2503	XMZ	7/9/2014 10:34	Land Management Zone	BSA-RD04	13.22	MEAS	0.0058	0.0096	0.0113
BSA-RD05	520768.194	6314858.795	25.8303	XMZ	7/9/2014 10:34	Land Management Zone	BSA-RD05	13.22	MEAS	0.0059	0.0097	0.0113
BSA-RD06	520774.866	6314866.407	25.8144	XMZ	7/9/2014 10:35	Land Management Zone	BSA-RD06	13.22	MEAS	0.0055	0.0092	0.0107
BSA-RD07	520783.263	6314874.123	26.9119	XMZ	7/9/2014 10:35	Land Management Zone	BSA-RD07	13.22	MEAS	0.0057	0.0095	0.0111
BSB-RD01	520757.34	6314907.5	25.9643	XMZ	7/9/2014 10:18	Land Management Zone	BSB-RD01	13.219	MEAS	0.0066	0.0095	0.0116
BSB-RD02	520751.97	6314904.349	25.7144	XMZ	7/9/2014 10:18	Land Management Zone	BSB-RD02	13.219	MEAS	0.0068	0.0097	0.0118

Survey Data Summary Table

PointID	EllipsoidHeight	HorzAccuracy	VerticalAccuracy	SurveyMethod	SurveyEquip	Projection	Geographic_Datum	PositionUOM	OrthometricUOM	DescriptionUOM	QualityUOM	RawDataFile
RTCM-Ref 0000	45.7039	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
PHTBM007 CS	44.1287	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE001	37.8016	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE002	38.7146	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE003	38.6534	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE004	39.185	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE005	39.3972	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE006	38.9909	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE007	40.297	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE008	38.8649	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
BLBIOPILE009	37.7985	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
PHTBM007 CS2	44.1192	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH6.10.14_7908_0610_130619
PHTBM006 CS	45.7332	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH 070214_7908_0702_111811
ST01	37.7127	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
ST02	37.4723	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
ST03	37.3589	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSA 01	39.0518	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSA 02	38.7195	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSA 03	38.6053	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSA 04	38.8961	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSA 05	38.7432	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSA 06	39.3242	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSB 01	38.4197	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSB 02	38.482	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSB 03	38.4293	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSB 04	38.3673	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSB 05	38.33	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
PRE BSB 06	38.4228	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	BLO PRECON_7908_0702_110534
RTCM-Ref 0000	37.5949	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH 070214_7908_0702_111811
PHTBM001 CS2	44.9846	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PH 070214_7908_0702_111811
PHTBM006-CS	45.7364	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PTH07.09.14_7908_0709_110452
BSA01	39.0715	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1986	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSA02	38.8456	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1987	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSA03	38.8168	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1988	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSA04	39.5055	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1989	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSB01	38.3653	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1990	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSB02	38.8117	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1991	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSB03	38.6664	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1992	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BSB04	38.7012	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1993	Meters	Meters	N/A	Meters	BIOPILE-LOC_7908_0709_112533
BLO-RD01	40.4813	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1994	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BLO-RD02	40.2098	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1995	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BLO-RD03	40.0287	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1996	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BLO-RD04	39.6522	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1997	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BLO-RD05	39.2991	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1998	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BLO-RD06	39.0712	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1999	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BLO-RD07	38.7835	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2000	Meters	Meters	N/A	Meters	BLO-RD01_7908_0709_113730
BSA-RD01	39.1782	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2001	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSA-RD02	39.1	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2002	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSA-RD03	39.2333	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2003	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSA-RD04	39.4703	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2004	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSA-RD05	39.0503	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2005	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSA-RD06	39.0344	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2006	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSA-RD07	40.1319	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2007	Meters	Meters	N/A	Meters	BSA-ACCESS-RD_7908_0709_113233
BSB-RD01	39.1833	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2008	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
BSB-RD02	38.9334	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2009	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659

Survey Data Summary Table

PointID	Easting	Northing	Orthometric_ Height	Code	Date_TimeTaken	FeatureType	PointDescription	GeoidSeperation	CoordinateClass	Position_ Quality	Height_Q uality	Position_Height_ Quality
BSB-RD03	520745.063	6314897.656	24.9824	XMZ	7/9/2014 10:19	Land Management Zone	BSB-RD03	13.219	MEAS	0.0065	0.0094	0.0114
BSB-RD04	520740.435	6314889.571	24.7846	XMZ	7/9/2014 10:19	Land Management Zone	BSB-RD04	13.219	MEAS	0.0059	0.0085	0.0103
BSB-RD05	520735.15	6314881.819	25.0837	XMZ	7/9/2014 10:20	Land Management Zone	BSB-RD05	13.219	MEAS	0.0065	0.0093	0.0114
BSB-RD06	520731.874	6314875.319	25.3833	XMZ	7/9/2014 10:23	Land Management Zone	BSB-RD06	13.219	MEAS	0.0068	0.0099	0.012
BSB-RD07	520725.871	6314866.629	25.505	XMZ	7/9/2014 10:23	Land Management Zone	BSB-RD07	13.219	MEAS	0.0056	0.0082	0.0099
BSB-RD08	520720.426	6314866.224	25.4854	XMZ	7/9/2014 10:23	Land Management Zone	BSB-RD08	13.219	MEAS	0.0065	0.0095	0.0115
RTCM-Ref 0000	522136.88	6312873.97	24.306	SCP	7/9/2014 10:04	RTK Reference Point	Base Station at PHTBM003	13.289	REF			
PHTBM006 CS2	520985.772	6314674.756	32.3973	SCP	7/9/2014 17:12	Check Shot	Final Checkshot at PHTBM006	13.228	MEAS	0.0178	0.0245	0.0303
PHTBM006	520985.807	6314674.724	32.5027	SCP	7/12/2014 7:40	Check Shot	Initial Checkshot at PHTBM006	13.228	MEAS	0.006	0.0082	0.0102
BSB01	520716.022	6314855.98	25.8011	OSL	7/12/2014 8:46	Biopile Baseline Sample	BSB-01	13.219	MEAS	0.006	0.0095	0.0112
BSB02	520712.172	6314856.039	27.4785	OSL	7/12/2014 8:46	Biopile Baseline Sample	BSB-02	13.219	MEAS	0.0061	0.0096	0.0114
BSB03	520707.479	6314856.297	27.023	OSL	7/12/2014 8:46	Biopile Baseline Sample	BSB-03	13.219	MEAS	0.0056	0.0089	0.0105
BSB04	520700.051	6314868.826	27.5295	OSL	7/12/2014 8:47	Biopile Baseline Sample	BSB-04	13.218	MEAS	0.0056	0.0088	0.0104
BSB05	520707.396	6314865.423	26.9096	OSL	7/12/2014 8:47	Biopile Baseline Sample	BSB-05	13.219	MEAS	0.0058	0.009	0.0107
BSB06	520713.733	6314873.043	26.3826	OSL	7/12/2014 8:48	Biopile Baseline Sample	BSB-06	13.219	MEAS	0.0051	0.008	0.0095
BSB07	520706.134	6314851.344	25.8155	OSL	7/12/2014 8:48	Biopile Baseline Sample	BSB-07	13.219	MEAS	0.0057	0.0089	0.0106
BSB08	520704.526	6314875.378	26.1271	OSL	7/12/2014 8:50	Biopile Baseline Sample	BSB-08	13.218	MEAS	0.0064	0.0099	0.0118
RTCM-Ref 0000	522136.88	6312873.97	24.3061	SCP	7/12/2014 7:39	RTK Reference Point	Base Station at PHTBM003	13.289	REF			
PHTBM006 CS2	520985.807	6314674.715	32.5136	SCP	7/12/2014 9:19	Check Shot	Final Checkshot at PHTBM006	13.228	MEAS	0.0086	0.0119	0.0147
BSA001	520733.947	6314825.26	28.0001	OSL	7/18/2014 9:17	Biopile Baseline Sample	BSA-01	13.22	MEAS	0.0075	0.0097	0.0122
BSA002	520724.222	6314830.308	27.8692	OSL	7/18/2014 9:17	Biopile Baseline Sample	BSA-02	13.22	MEAS	0.0074	0.0095	0.012
BSA003	520713.178	6314834.616	27.6518	OSL	7/18/2014 9:18	Biopile Baseline Sample	BSA-03	13.219	MEAS	0.0076	0.0098	0.0124
RTCM-Ref 0000	522136.88	6312873.97	24.306	SCP	7/18/2014 8:50	RTK Reference Point	Base Station at PHTBM006	13.289	REF	0	0	0
TBMCS	520896.019	6314567.957	30.8945	SCP	7/19/2014 8:05	Check Shot	Initial Checkshot at PHTBM007	13.228	MEAS	0.0046	0.0075	0.0088
BSA004	520712.179	6314842.112	25.9839	OSL	7/19/2014 8:16	Biopile Baseline Sample	BSA-04	13.219	MEAS	0.005	0.0079	0.0094
BSA005	520725.19	6314843.765	26.2766	OSL	7/19/2014 8:18	Biopile Baseline Sample	BSA-05	13.219	MEAS	0.0051	0.0081	0.0096
BSA006	520728.414	6314819.045	26.6409	OSL	7/19/2014 8:19	Biopile Baseline Sample	BSA-06	13.22	MEAS	0.0061	0.0096	0.0114
BSA007	520718.827	6314816.76	26.4897	OSL	7/19/2014 8:20	Biopile Baseline Sample	BSA-07	13.22	MEAS	0.0084	0.0112	0.014
RTCM-Ref 0000	520985.802	6314674.714	32.476	SCP	7/19/2014 8:04	RTK Reference Point	Base Station at PHTBM006	13.228	REF	0	0	0
TBMCS10	520896.019	6314567.965	30.892	SCP	7/19/2014 13:49	Check Shot	Final Checkshot at PHTBM007	13.228	MEAS	0.0073	0.0111	0.0133
PHTBM006 CS	520985.785	6314674.699	32.527	SCP	10/2/2014 10:56	Check Shot	Initial Checkshot at PHTBM006	13.228	MEAS	0.0101	0.0125	0.016
BSA01	520733.333	6314844.383	26.4031	OSL	10/2/2014 16:29	Land Management Zone	BSA Post-Construction Location 01	13.219	MEAS	0.008	0.0114	0.014
BSA02	520737.869	6314820.202	26.1709	OSL	10/2/2014 16:29	Land Management Zone	BSA Post-Construction Location 02	13.22	MEAS	0.0072	0.0105	0.0127
BSA03	520712.552	6314815.734	25.9832	OSL	10/2/2014 16:30	Land Management Zone	BSA Post-Construction Location 03	13.22	MEAS	0.0069	0.0097	0.0119
BSA04	520707.305	6314841.359	26.0281	OSL	10/2/2014 16:31	Land Management Zone	BSA Post-Construction Location 04	13.219	MEAS	0.0087	0.0123	0.015
BSA05	520710.532	6314839.22	27.658	OSL	10/2/2014 16:31	Land Management Zone	BSA Post-Construction Location 05	13.219	MEAS	0.0076	0.0107	0.0132
BSA06	520714.492	6314818.792	27.9489	OSL	10/2/2014 16:32	Land Management Zone	BSA Post-Construction Location 06	13.22	MEAS	0.0066	0.0092	0.0113
BSA07	520735.03	6314822.203	27.9875	OSL	10/2/2014 16:32	Land Management Zone	BSA Post-Construction Location 07	13.22	MEAS	0.01	0.0157	0.0186
BSA08	520731.733	6314842.125	27.9624	OSL	10/2/2014 16:33	Land Management Zone	BSA Post-Construction Location 08	13.22	MEAS	0.0088	0.0127	0.0154
BSB01	520720.43	6314853.367	26.1247	OSL	10/2/2014 16:33	Land Management Zone	BSB Post-Construction Location 01	13.219	MEAS	0.0059	0.0085	0.0103
BSB02	520695.861	6314848.805	25.9625	OSL	10/2/2014 16:34	Land Management Zone	BSB Post-Construction Location 02	13.219	MEAS	0.0077	0.0106	0.0131
BSB03	520692.075	6314872.518	26.2409	OSL	10/2/2014 16:34	Land Management Zone	BSB Post-Construction Location 03	13.218	MEAS	0.0093	0.0133	0.0162
BSB04	520717.271	6314878.531	25.7699	OSL	10/2/2014 16:35	Land Management Zone	BSB Post-Construction Location 04	13.218	MEAS	0.0103	0.0161	0.0191
BSB05	520716.336	6314876.076	27.3392	OSL	10/2/2014 16:35	Land Management Zone	BSB Post-Construction Location 05	13.219	MEAS	0.0076	0.011	0.0134
BSB06	520694.963	6314871.264	27.7977	OSL	10/2/2014 16:36	Land Management Zone	BSB Post-Construction Location 06	13.218	MEAS	0.0095	0.0148	0.0176
BSB07	520698.193	6314851.823	27.4666	OSL	10/2/2014 16:36	Land Management Zone	BSB Post-Construction Location 07	13.219	MEAS	0.0092	0.0134	0.0163
BSB08	520718.578	6314855.152	27.5461	OSL	10/2/2014 16:37	Land Management Zone	BSB Post-Construction Location 08	13.219	MEAS	0.0165	0.0245	0.0295
RTCM-Ref 0000	522136.88	6312873.97	24.3059	SCP	10/2/2014 10:55	RTK Reference Point	Base Station at PHTBM003	13.289	REF	0	0	0
PHTBM001 CS2	522259.722	6312916.289	31.7244	SCP	10/2/2014 17:24	Check Shot	Final Checkshot at PHTBM001	13.29	MEAS	0.0059	0.0121	0.0135

Survey Data Summary Table

PointID	EllipsoidHeight	HorzAccuracy	VerticalAccuracy	SurveyMethod	SurveyEquip	Projection	Geographic_Datum	PositionUOM	OrthometricUOM	DescriptionUOM	QualityUOM	RawDataFile
BSB-RD03	38.2014	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2010	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
BSB-RD04	38.0036	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2011	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
BSB-RD05	38.3027	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2012	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
BSB-RD06	38.6023	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2013	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
BSB-RD07	38.724	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2014	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
BSB-RD08	38.7044	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 2015	Meters	Meters	N/A	Meters	BSB-ACCESS-RD_7908_0709_111659
RTCM-Ref 0000	37.595	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PTH07.09.14_7908_0709_110452
PHTBM006 CS2	45.6253	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1984	Meters	Meters	N/A	Meters	PTH07.09.14_7908_0709_110452
PHTBM006	45.7307	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH07.12.14_7908_0712_083947
BSB01	39.0201	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB02	40.6975	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB03	40.242	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB04	40.7475	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB05	40.1286	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB06	39.6016	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB07	39.0345	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
BSB08	39.3451	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH14-BSB_7908_0712_094506
RTCM-Ref 0000	37.5951	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH07.12.14_7908_0712_083947
PHTBM006 CS2	45.7416	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH07.12.14_7908_0712_083947
BSA001	41.2201	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BSA01_7908_0718_095024
BSA002	41.0892	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BSA01_7908_0718_095024
BSA003	40.8708	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BSA01_7908_0718_095024
RTCM-Ref 0000	37.595	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BSA01_7908_0718_095024
TBMCS	44.1225	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
BSA004	39.2029	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
BSA005	39.4956	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
BSA006	39.8609	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
BSA007	39.7097	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
RTCM-Ref 0000	45.704	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
TBMCS10	44.12	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	PH071914_7908_0719_090434
PHTBM006 CS	45.755	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA01	39.6221	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA02	39.3909	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA03	39.2032	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA04	39.2471	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA05	40.877	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA06	41.1689	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA07	41.2075	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSA08	41.1824	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB01	39.3437	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB02	39.1815	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB03	39.4589	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB04	38.9879	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB05	40.5582	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB06	41.0157	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB07	40.6856	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
BSB08	40.7651	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
RTCM-Ref 0000	37.5949	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854
PHTBM001 CS2	45.0144	0.1162	0.1316	RTK-GPS	Leica Viva	UTM Zone 4 North	WGS 1985	Meters	Meters	N/A	Meters	BIOPILECNRS10.02_1659_1002_182854

APPENDIX D

Photograph Log

PHOTOGRAPH LOG
TABLE OF CONTENTS

Photo Number **Page**

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Photo No. 1 – 30 June 2014
Clearing the pads for the biopiles. Facing west.

Photo No. 2 – 01 July 2014
Biopile footprint. Facing west.

Photo No. 3 – 3 July 2014
Collecting pre-construction samples from Biopile Cell BSA. Facing east.

Photo No. 4 – 07 July 2014
Building Biopile BSB. Facing east.

Photo No. 5 – 07 July 2014
Excavating the PCE-contaminated soil for the biopiles. Facing west.

Photo No. 6 – 08 July 2014
Installing the second tier of ventilation piping in biopile. Facing north.

Photo No. 7 – 08 July 2014
Covering the second tier of ventilation piping in biopile. Facing north.

Photo No. 8 – 08 July 2014
Prepping biopile for third tier of piping. Facing north.

Photo No. 9 – 09 July 2014
Inlet pipes on Biopile BSB. Facing East.

Photo No. 10 – 12 July 2014
PCE-contaminated soil excavation. Facing west.

Photo No. 11 – 15 July 2014
Filling Biopile BSA. Facing east.

Photo No. 12 – 17 July 2014
Covering Biopile BSB with liner and netting with sandbags. Facing northeast.

Photo No. 13 – 19 July 2014
Inlet piping on Biopiles BSA (left) and BSB (right). Facing west.

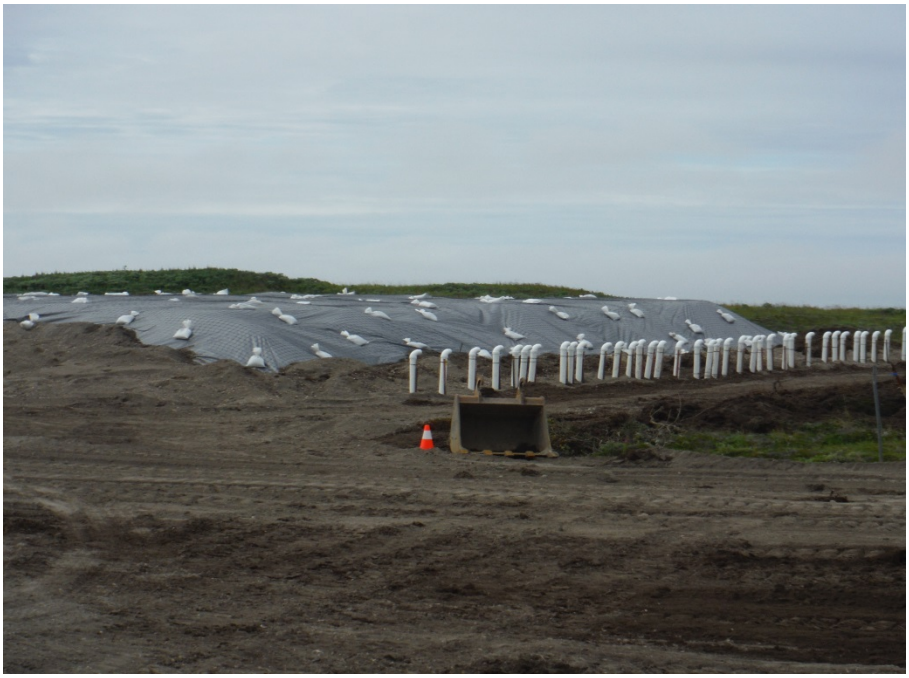

Photo No. 14 – 26 July 2014
Finished Biopile BSB. Facing southeast.

APPENDIX E

Field Notes

No. 550 Environmental—Poly
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Toob Biopile 2014

Port Heiden
Toob Biopile
2014

Rite in the Rain®
ALL-WEATHER
ENVIRONMENTAL
FIELD BOOK
№ 550

Michal Pelka MP
Julia Cohen JC
ERIN HARDY EH
PENNY BULLOCK
JON McVAY

HTRW-307-05F45101-1104-0006

Daily Logbook Checklist

Did you remember ... ???

- ☐ Project name / Site ID / Client
- ☐ Date
- ☐ Weather, site conditions, and other salient observations
- ☐ Level of PPE used
- ☐ Full names of onsite personnel and affiliations (including all visitors)
- ☐ Daily objectives
- ☐ Field measurements and calibrations
- ☐ Time and location of activity
- ☐ Field observations and comments
- ☐ Deviations from the Work Plan
- ☐ Site photographs
- ☐ Site sketches (with reference i.e. "N" arrow)
- ☐ Survey and location i.e. samples or debris (GPS coordinates when possible)
- ☐ For each sample record:
  - Date, time, sampler(s)
  - Sample ID
  - Media, container(s), preservatives
  - QC (dup/MS/MSD)
  - Analysis
  - MeOH lot #
  - Tare weight
- ☐ Sample shipments (when, what, destination)
- ☐ Waste tracking (when, how much, destination)
- ☐ Daily summary of activities (i.e. # of samples collected)

Port Helden Medical Clinic Community Health Aide - Billie Schraffenberger Community Health Aide - Tisha Lind	907-837-2208 907-837-2900 907-837-2240
Kanakanak Hospital: Bristol Bay Area Health Corporation located in Dillingham Toll Free	907-842-5201 800-478-5201
Providence Kodiak Island Medical Center	907-486.3281
Providence Alaska Medical Center (ER)	907-212-3111
Providence LifeMed Air Ambulance (MEDEVAC Service)	800-478- 5433
Alaska Regional (ER)	907-264-1222
U.S. Coast Guard Search & Rescue	800-478-5555
Poison Control Center	800-222-1222
Transport and Evacuation	
Pen Air Cargo Desk, King Salmon	907-246-3372
U.S. Coast Guard Search & Rescue	800-478-5555
Alaska State Troopers, King Salmon Alaska State Troopers, Anchorage Alaska State Troopers, Dillingham	907-246-3307 907-269-5511 907-842-5641
Spills and Toxins	
National Response Center (Oil and Toxic Chemical Spills)	800-424-8802
Poison Control Center	800-222-1222
Volunteer Fire Chief - Andrew Lind Sr.	907-837-2240
Customer/Client	
Pat Roth	907-552-7893
David Jadhon	907-753-2595

"Rite in the Rain®"
ALL-WEATHER WRITING PAPER

ALL-WEATHER

ENVIRONMENTAL FIELD BOOK

Name Jacobs Engineering

Address 4300 B Street Suite 600
Anchorage AK 99503

Phone 907-563-3322

Project Port Heiden T006
Biopile

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

Page Pattern		Cover Options	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
Columnar	1/4" Grid	Item No. 550	Item No. 550F

CONTENTS

PAGE	REFERENCE	DATE

Reference Page Index

Location _____ Date _____

Project / Client _____

Location Port Heiden Date 6-10-14

Project / Client T006 USACE

0700 Tailgate with Anikchak, Jacobs & QAR

Personell:
Michal Pelka

PPE: Modified Level D

Objectives: Stake out black Lagoon excavation

1030 Setup base station at PHTBM006

1045 Check shot at PHTBM007
ID PHTBM007 CS

X=520895.998 ΔX=0
Y=6314567.970 ΔY=0.028
Z=44.129 ΔZ=0.003

1500 Arrived at Black Lagoon, to Stake out excavation

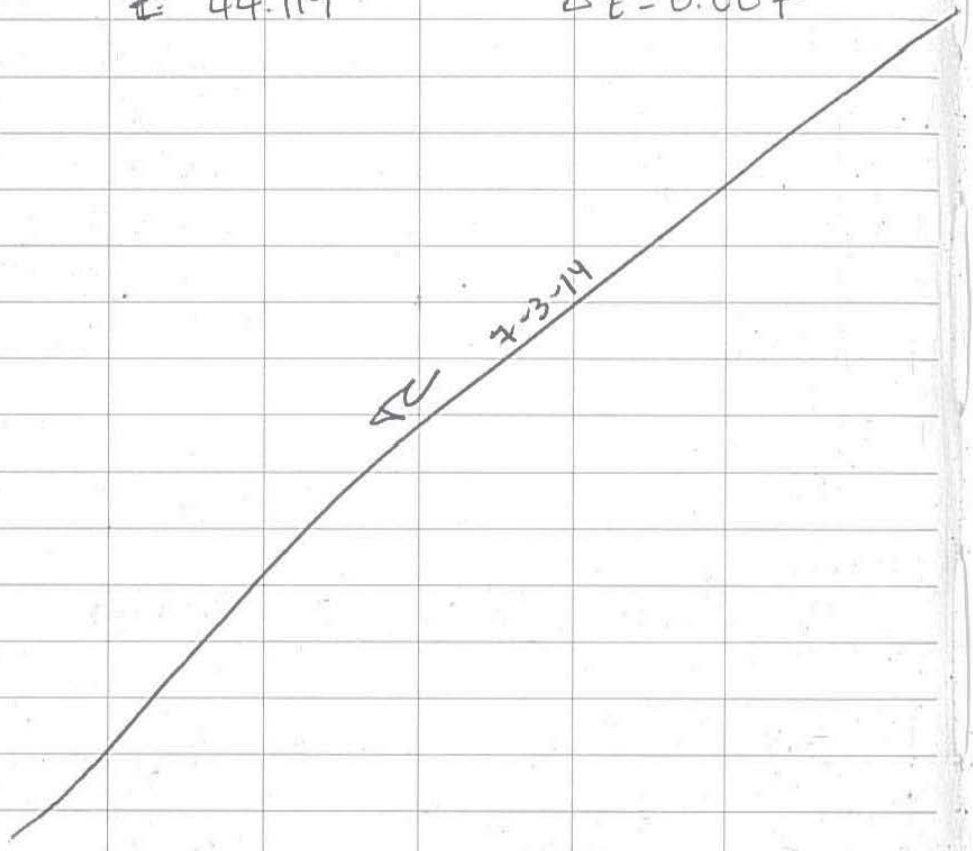
Location Port Heiden Date 6-10-14

Project / Client USACE TO06

1600 Surveyed Future Biopile footprint (rough)

1930 Check shot at PHTBM007
ID PHTBM007 CS2

X=	520896.001	ΔX =	0.003
Y=	6814567.960	ΔY =	0.018
Z=	44.119	ΔZ =	0.007



Location PORT HEIDEN Date 6-23-14

Project / Client ~~KEMRON~~ TO06 USACE

partly ~~sunny~~, ~45° F, light wind <5 mph @ 1700

PERSONEL: JULIA COHEN
ERIN HARDY

PPE: MOD LEVEL D

OBJECTIVE: CONFIRMATION SAMPLE CELLS ABOVE CLEAN-UP LEVELS FOR PCBS AT BLACK LAGOON OUTFALL (BLO)

1640 BEGIN SAMPLING
1730 END SAMPLING (8 primary, 1 dup, 1 MS/MSD)

SAMPLE LIST

SAMPLE ID	TIME	QAQC
H036V023-12	1650	
14PH-~~H36V23~~8	~~1655~~8	
14PH-H039V026-6	~~1700~~ 1655	
14PH-H041V032-6	~~1705~~ 1700	
14PH-H043V033-6	~~1708~~ 1705	DUP
14PH-H039V038-12	~~1710~~ 1708	
14PH-H037V037-12	~~1715~~ 1710	MS/MSD
14PH-H036V037-18	1715	
14PH-H037V032-6	1720	

END OF DAY

Location PORT HEIDEN Date 6-23-14

Project / Client TO06 BLO PCB CONFIRMATION SAMPLES

MAP OF BLO WITH MARKED SAMPLED GRIDS (RESULTS FROM 2013) ON MAP

Location PORT HEIDEN Date 6-24-14

Project / Client TO06 USACE

partly cloudy, ~58°F, light wind @ 1200

PERSONEL: JULIA COHEN

PPE: MOD LEVEL D

OBJECTIVE: SURVEY SAMPLE LOCATIONS FOR CONFIRMATION SAMPLING AT BLACK LAGOON OUTFALL

1130 SURVEYED IN GRID CENTEROIDS AS COMPOSITE SAMPLE LOCATIONS

SURVEY CHECKSHOT DATA IN KEMRON SURVEY NOTEBOOK

END OF SURVEY / DAY

6-24-14

Location PORT HEIDEN Date 06-30-14

Project / Client TODD USACE

partly cloudy, ~ 45°F, 10-15 mph winds @ 0900

PERSONEL: DREW McCLURE PPE: MOD LEVEL D
GREG RUTKOWSKI
2 (TWO)

OBJECTIVE: SAMPLE GRIDS AT BLO THAT CAME BACK ≥1.0 PPM PCB IN K1406465
- GRIDS EXCAVATED IN 6" LIFT
- NO WALL SAMPLES TAKEN FOR BLO-H037036

~~SAMPLE SUMMARY~~ &

SAMPLE ARE 9 (NINE) POINT COMPOSITE SAMPLES. SAMPLES TAKEN AT NINE PTS APPROX. 5 FT APART WITH STAINLESS STEEL SPOON AND PLACED IN CLEAN/NEW PLASTIC BAG. SAMPLE HOMOGENIZED AT FIELD LAB AT PLACED IN 4 OZ AMBER JAR, SAMPLES STORED A 4°C ± 2°C. SAMPLES PACKED IN COOLERS AND SHIPPED TO ALS LABORATORIES,

* DETAILS ON EXCAVATION IN KEMRON LOGBOOK PG 76-77

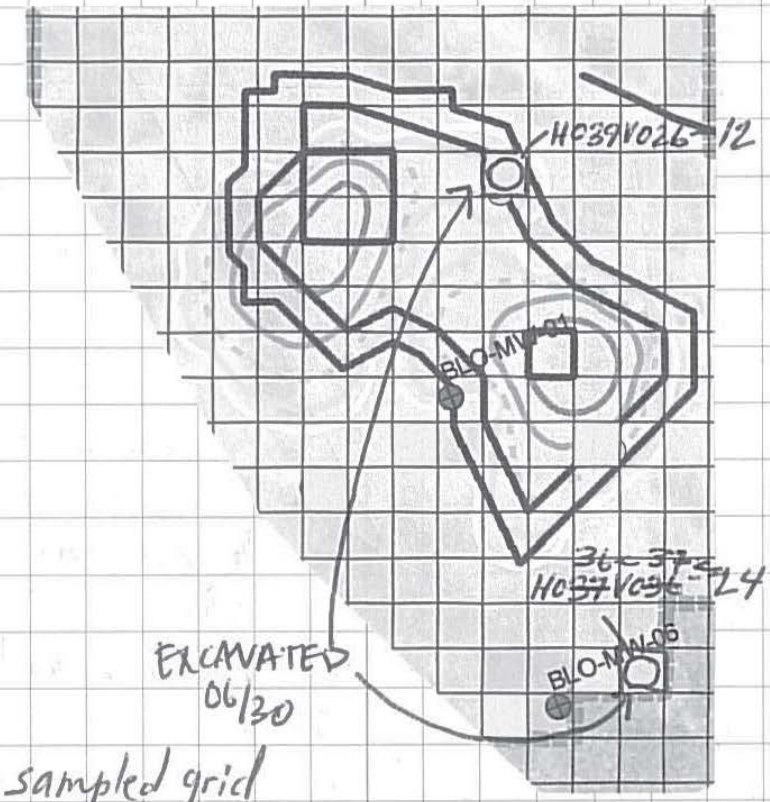
Location PORT HEIDEN Date 06-30-14

Project / Client TODD USACE

SAMPLE SUMMARY + MAP

SAMPLE ID	TIME	QA/QC	DEPTH
14PH-H037~~036~~V036~~037~~-24	0919		24"-30"~~18-24~~"
14PH-H039V026-12	0915		12"-18"~~6-12~~"

MAP OF BLO EXCAVATION AREA AND PCB GRIDS EXCAVATED + SAMPLED



O = sampled grid

Location PORT HEIDEN Date 07-01-14

Project / Client T006 USACE

partly cloudy, ~50°F, 5 mph wind @ 1600

0700 TAILGATE MEETING - SEE SIGN IN SHEET

PERSONEL: AMBER, JEFF, ANDREW - ANIAKCHAK
PAT PRICE
JULIA COHEN
DAN FLEMING
DREW MCCLURE
GREG RUTKOWSKI
] LEFT FOR ANCHORAGE @ 1230 PM ON LAKE CLARK

OBJECTIVE: CONTINUE EXCAVATING + CLEARING + LEVELING AREA FOR BIOPILES

0800 BEGAN WORK AT BLO
LEVELING AREA FOR BIOPILES AND LAYING OUT BIOPILE DIMENSIONS

DUG 6" DOWN IN BIOPILE CELL TO MAKE BERM AROUND OUTSIDE

MOVED CONNEX, AND PORTA-POTTY FROM SRA2 TO BLO FOR CREW

1800 ENDED WORK AT BLO

07-1-14

Location PORT HEIDEN Date 07-02-14

Project / Client T006 USACE

sunny, light wind 0-5 mph, 50°F @ 0900

PERSONEL: (SEE SIGN IN SHEET)
PAT PRICE
ERIN HARDY
JULIA COHEN
] JACOBS

AMBER
LARISSA
DEREK
JEFF
ANDREW
] ANIAKCHAK

REBECCA - USACE QAR

PPE: MOD LEVEL D

OBJECTIVE + FINISH LEVELING BIOPILE CELLS
+ BUILD SMALL BERMS AROUND CELLS
+ BUILD BERM ALONG ROADWAY TO RESTRICT ACCESS TO BIOPILE + EXCAVATION AREA
+ SAMPLE PRE-CONSTRUCTION FOR BIOPILE CELLS + BIOPILE ACCESS RD

0700 TAILGATE MEETING

0718 BEGAN WORK AT SITE WITH 1 BULLDOZER, 2 DUMP TRUCKS, 1 FORK LIFT/LOADER

Location PORT HEIDEN Date 07-02-14

Project / Client T006 USACE

0800 SET UP BASE STATION AT PHTBM003

0918 TOOK CHECKSHOT @ PHTBM006

x	520985.793	Δx = 0.009
y	6314674.708	Δy = 0.006
z	45.733	Δz = 0.029

ok

1010 BEGAN SAMPLING AT BLO
PRECON SAMPLES FOR BIOPILES AND BIOPILE ACCESS ROAD

SOIL SAMPLE METHOD

FIVE
SOIL SAMPLES TAKEN AT (5) POINTS WITHIN EACH BIOPILE FOOTPRINT (10 TOTAL) AND TWO (2) POINTS ON ACCESS ROUTE TO BIOPILES. SOIL SAMPLES WERE COLLECTED AT DISCRETE LOCATIONS USING A STAINLESS STEEL SPOON. SAMPLES FOR PCB, SVOC, RRO + DRO WERE PLACED DIRECTLY INTO 9 (NINE) OZ AMBER GLASS JAR. SAMPLES FOR GRO + VOC (mid-level) WERE PLACED IN 4 OZ AMBER GLASS JAR WITH SEPTA LID AND PRESERVED WITH METHANOL ON SITE.

Location PORT HEIDEN Date 07-02-14

Project / Client T006 USACE

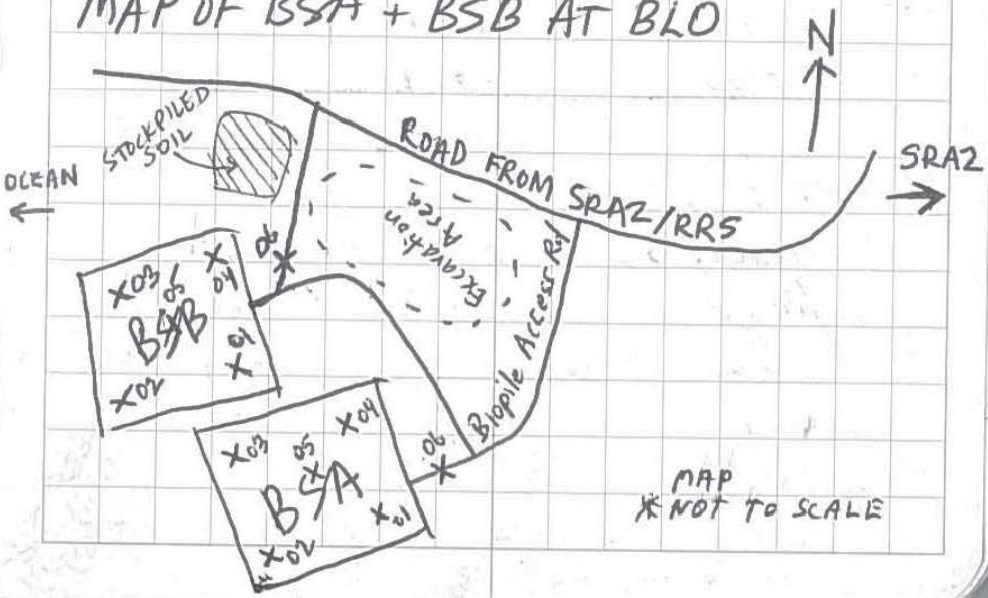
(CONT.) SAMPLES WERE KEPT COOL AND TRANSPORTED TO FIELD LAB TO BE REFRIGERATED AND STORED AT 4°C ± 2 UNTIL ANALYSIS AT ALS LABORATORY. SAMPLES WILL ~~BE ANALYZED~~ BE ANALYZED USING METHODS BELOW:

VOCs	SW8260
GRO	AK101
DRO/RRO	AK102/103
PCB	SW8082

PRECON SAMPLE LOCATIONS AT BLO WERE SURVEYED

SAMPLE SUMMARY ON FOLLOWING PAGE 16

MAP OF BSA + BSB AT BLO



MAP NOT TO SCALE

Location Port Heiden Date 0702-14

Project / Client T006 USACE

Sample Summary

Sample ID	Time	QA/QC	Notes
14BL-PRE-BSA-01	1018		4oz Amber w/ Septa lid + Meoh; 8oz Amber
" " " -02	1032		"
-03	1039		
-04	1048	DUP	
-05	1054		
-06	1100		Biopile Access Road
BSB -01	1505	DUP	
-02	1510		
-03	1513		
-04	1518		
-05	1520	MS/MSD	
-06	1455		Biopile Access Road
14PH-ST01-01 BL	1730		
-02	1731		
-03	1732		

15 PRIMARY SAMPLES
2 DUPLICATES
1 MS/MSD

JC 7-2-14

Location Port Heiden Date 07-02-14

Project / Client T006 USACE

1730 SAMPLED TEMPORARY STOCKPILE AT BL, "ST01"
ST01 ESTIMATED AT ~70 CY ∴
3 SAMPLES WERE TAKEN PER ADEC GUIDELINES

APPROX./REPRESENTATIVE SAMPLE LOCATIONS AT STOCKPILE WERE RECORDED/SURVEYED

1800 FINISHED WORK ONSITE
BIOPILE CELLS WERE LEVELED AND BERMS WERE BUILT
SPRINKLER SYSTEM AND WATER SET UP
ACCESS RD TO BIOPILES PARTIALLY CONSTRUCTED
FILL DIRT/SOIL FROM DOT PIT STOCKPILED IN BERMS ALONG ROADWAY

1805 TOOK CHECKSHOT AT PHTBM001

X	522259.721	ΔX = 0.003
Y	6312916.285	Δy = 0.011
Z	44.985	Δz = 0.026

ok

1810 TOOK DOWN BASE STATION

JC 7-2-14

Location PORT HEIDEN Date 07-03-14

Project / Client T006 USACE

Sunny, 50°F, light breeze (5-10 mph) @ 0915

PERSONEL: SEE SIGN IN SHEET FROM TAILGATE
JULIA COHEN - SURVEY + SAMPLING
ERIN HARDY

PPE: MOD LEVEL D

OBJECTIVE: CONTINUE STOCKPILING DIRT FROM DOT PIT TO BACKFILL EXCAVATION AND LINE BIOPILE CELL

SURVEY IN EXCAVATION BOUNDARY + BIOPILE LOCATIONS + ACCESS RD

COLLECT LOW-LEVEL VOC SAMPLES FOR PRE-CON AT BSA + BSB + ACCESS RD

0700 TAILGATE MEETING - SEE SIGN IN SHEET
0715 BEGAN WORK AT BLO - 3 DUMP TRUCKS, LOADER, EXCAVATOR
0920 SET UP BASE STATION AT PHTBM003

0924 TOOK CHECKSHOT AT PHTBM001

X	522259.727	ΔX = 0.008
Y	6312916.281	ΔY = 0.007
Z	44.983	ΔZ = 0.024

ok

Location PORT HEIDEN Date 07-03-14

Project / Client T006 USACE

0950 BG BEGIN PRE-CONSTRUCTION SAMPLING AT BIOPILES FOR LOW-LEVEL VOCs.* USED SAME SAMPLE LOCATIONS AS 07-02-14.

SOIL SAMPLE METHOD: SOIL SAMPLES WERE TAKEN USING "TERRACORE" AND PLACED IN 40 mL VIALS, PRE-PREPARED BY LAB WITH DI WATER. SAMPLES WERE ~~FOR~~ TRANSPORTED TO FIELD AND KEEP FROZEN IN COOLERS BY LAB AND FROZEN UNTIL ARRIVAL AT ALS.

SAMPLE SUMMARY

SAMPLE ID	TIME	QA/QC	NOTES (40 mL clear vial + DI H_2O)
14BL-PRE-BSB-01A	0956		Low-Level VOC sample
" " " 02A	0958		"
03A	1002		
04A	1008	DUP	
05A ~~04A-9~~ **	1010 ~~1008~~ **	MS/MSD	
06A	1016		
" " BSA-02A	1018		
01A	1022		
03A	1023		
04A	1030		
05A	1026	DUP	
06A	1032		

SAME SAMPLE LOCATIONS AS 07-02-14 PRECON SAMPLES

Location PORT HEDEN Date 07-03-14

Project / Client T006 USACE

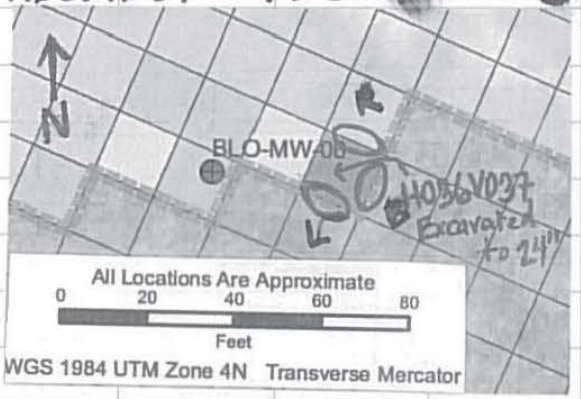
1400 SURVEYED IN EXCAVATION AREA AT BLO INCLUDING OUTER BOUNDARY, 10 FT BOUNDARY AND 20 FT BOUNDARY

1600 SAMPLED BLO GRID H036V037 WALLS @ 24" (Left, Right + Back, Front is next to a grid excavated to 12", so it is only a 12" wall)

SAMPLE SUMMARY

SAMPLE ID	TIME	QAQC	NOTES/Depth
14PH-H036V037-R-24	~~1614~~ 1611		0-24"
" " " -B-24	1612		
" " " -L-24	1614		

MAP OF H036V037 walls sampled at BLO



O = sampled wall

Location PORT HEDEN Date 7-3-2014

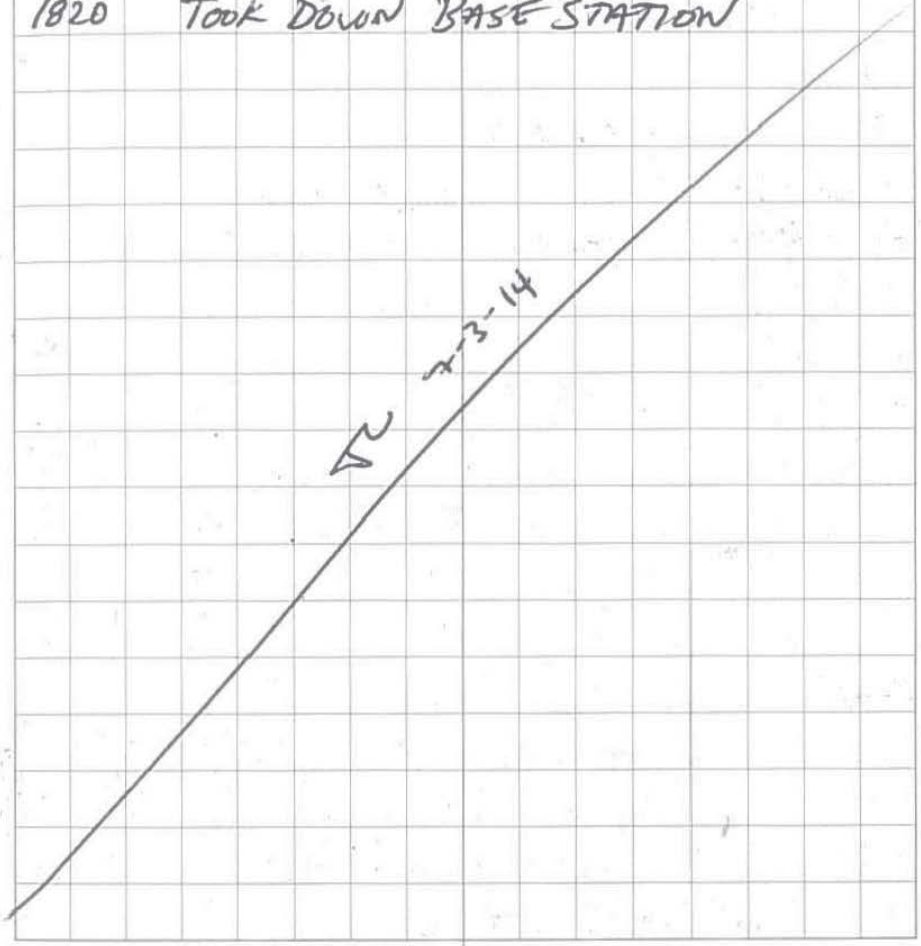
Project / Client T006 USACE

1816 TOOK CHECKSHOT AT PHTBM001

X	522259.726	ΔX = 0.007
Y	6312916.270	ΔY = 0.004
Z	44.993	ΔZ = 0.024

OK

1820 TOOK DOWN BASE STATION



Location PORT HIEDEN Date 07-07-14

Project / Client TOØ6 USACE

G~ CLOUDY, light rain, ~50°F

0700 TAILGATE MEETING SEE SIGN IN SHEET

PERSONEL - SEE SIGN IN SHEET
ERIN HARDY - NOTE TAKER

PPE - MOD LVL D

OBJECTIVE: LAY DOWN LINER + GEO FABRIC + SAND IN BIO PILE CELLS
BEGIN PCE EXCAVATION AND BIOPILE CELL CONSTRUCTION

0800 BEGIN WORK
EQ. ON SITE: 1 LOADER
2 EXCAVATORS

~~1510 TOOK PID READING~~
~~MAX 53.7 PPM~~

1740 TOOK BACKGROUND PID READING UPWIND OF SITE = 0.2 ppm

Location PORT HEDEN Date 07-07-14

Project / Client TOØ6 USACE

1745 TOOK PID READING IN BREATHING ZONE DOWNWIND OF EXCAVATION
PID READING = 0.5 PPM

1748 TOOK PID READING ON TOP OF BIOPILE - "STINKY"
PID = 1.6 PPM

1750 ~~STOPPED WORK - END OF DAY~~
~~EXCAVATED APPROX~~
2 ~~CC~~ CELLS TO 10 FT

15 FT x 30 FT x 10 FT
≅ 167 CUBIC YARDS
* IN CQC ≅ 200 CUBIC YARDS

EOD

7-7-14

Location PORT HEIDEN Date 7-8-14

Project / Client TO06 USACE

CLOUDY, 5-10 MPH WIND AT 910 AM

0700 TAILGATE MEETING

PERSONEL: SEE SIGN IN SHEET
PPE: MOD LEVEL D

OBJECTIVE BUILD BIOPILE + EXCAVATE DIRT

0730 BEGIN WORK ON SITE

0900 BEGAN EXCAVATING AREA WITH HIGHEST PCE CONTAMINATION

0930 CHECKED BREATHING AIR NEAR EXCAVATION WITH PID
PID READING = 0.2 PPM

0935 CHECKED BREATHING AIR ON TOP OF BIOPILE NEAR "STINKY" DIRT
PID READING = 0.7 PPM

1000 CALIBRATED PID USING ISOBUTYLENE CAL GAS

Location PORT HEIDEN Date 7-8-14

Project / Client TO06 USACE

CLOUDY, 10-15 MPH WIND, ~45°F

1745 ENDED WORK ON SITE
BIOPILE BSB ≅ 1/3 FINISHED

5' - 1/2 15' x 15' grid cell
10' - 6.75 " " "
20' - 2 " " " "

5' x 15' x 7.5' = 562.5 ft³
10' x 101.25' x 15' = 15187.5 ft³
20' x 30' x 15' = 9000 ft³
24750 ft³ / 27
≅ 920 CUBIC YARDS

10' x 120' x 15' = 18000
20' x 30' x 15' = 9000
27000 ft³
≅ 1000 CUBIC YARDS

23' x 82' x 8' = 15088 ft³ / 27
≅ 558 CUBIC YARDS
+ PILE
≅ 600 YARDS³

7-8-2014

Location Port Heiden Date 7-9-2014

Project / Client T086 USACE

Cloudy, calm (no wind!), ~40°F @ 800

Personel: See tailgate sign in sheet

PPE: Mod Level D

Objective: Continue excavation and Biopile BSB construction

Survey locations of biopiles, roads + excavation

0700 Tailgate Meeting

Created new SPA for stockpiling/ biopile construction

0730 Arrive onsite

0830 Begin work onsite - 2 excavators
1 loader
4 laborers

1115 Surveyed in biopile locations and biopile access road locations + BLO road extension

See T046 survey logbook page 42 for checkshot info from 7-9-2014

1200 PID not functioning due to moisture in sensor, removed sensor and dried out overnight

Location Port Heiden Date 7-9-2014

Project / Client T086 USACE

1730 Surveyed Boundary of PCE Excavation

1745 Ended work at site

1760 Measured Biopile
Approx. 81' x 58' x 8'
= 1392 yd³

EOD

7-9-14

Location Port Heiden Date 7-10-2014

Project / Client T006 USACE

Cloudy, 10-15 mph winds, ~45°F @ 755

Personel: See tailgate sign in sheet

PPE: Mod Level D

Objective: Continue building biopile BSB and excavating PCE contaminated soil

0700 Tailgate meeting - see sign in sheet for attendance

0715 Crew arrived on site, warm up equipment and did inspections

0800 Began work on site - 2 excavators at BSB, 1 loader, 4 laborers

1430 Stopped work around BSB with loader + excavator due to very muddy conditions

Crew began filling sand bags

1500 Ended work on site due to weather conditions

EOD

7-10-2014

Location Port Heiden Date 7-11-2014

Project / Client T006 USACE

Rainy, 15-20 mph wind, ~40°F @ 800

Personel: See sign in sheet from tailgate

PPE: Mod Level D

Objective: Fill sandbags

Stockpile dirt to infill excavation

Cut + lay out pipe for biopile

Note: No work with heavy equipment at biopiles due to mud conditions and weather

0700 Tailgate Meeting - see sign in sheet for attendance

1800 End of day

Summary

- Filled 2 pallets of sandbags
- Hauled ~~many loads~~ of dirt from DOT pit to site for backfill
- Cut pipes at BSB

290 CY PB 7/23

07-11-2014

Location PORT HEDEN Date 07-12-2014

Project / Client T006 USACE

PARTLY CLOUDY, 10-15 MPH WIND, 40°F @ 815 AM

PERSONEL: SEE SIGN IN SHEET FOR TAILGATE

PPE: MOD LEVEL D

OBJECTIVE: SCRAP OFF MUD FROM WORK AREA AND REINFORCE WITH CLEAN FILL

+ CONTINUE HAULING DIRT FOR SAND BAGS AND BACKFILL
+ FILL SANDBAGS
+ CONTINVE BUILDING BIOPILE BSB
+ SAMPLE BIOPILE BSB FOR INITIAL CONDITIONS SAMPLING
  "14BL-BSB-01" to "14BL-BSB-08"

0700 TAILGATE MEETING - SEE SIGN IN SHEET

0730 SET UP BASE STATION AT PHTBM003

0840 TOOK CHECKSHOT AT PHTBM006

X	520985.807	$\Delta X = 0.005$
Y	6314674.724	$\Delta Y = 0.010$
Z	45.731	$\Delta Z = 0.027$

ok

Location PORT HEDEN Date 07-12-2014

Project / Client T006 USACE

0900 BEGAN SAMPLING BIOPILE BSB

0950 FINISHED SAMPLING
SURVEYED IN SAMPLE LOCATIONS

1019 TOOK CHECKSHOT AT PHTBM006

X	520985.807	$\Delta X = 0.005$
Y	6314674.715	$\Delta Y = 0.001$
Z	45.7342	$\Delta Z = 0.038$

ok

1030 TOOK DOWN BASE STATION

Location Port Hueden Date 7-12-2014

Project / Client T0806 USACE

Sample Summary

Sample ID	Time	QA/QC	Depth
14BL-BSB-01	0855		3' bench 18" ~~1.5 ft~~
" " 02	0902		30"-8' pile
03	0910		24"-8' pile
04	0915	DUP	30"-8'
05	0920		3'-8' pile
06	0922	MS/MSD	4'-8' pile
07	0930	side sample	~~3'-8' pile~~ 5'-8' pile
08	0935	side sample	4'-8' pile

8 PRIMARY
1 DUPLICATE
1 MS/MSD

Location Port Heiden Date 071414

Project / Client T0806 USACE

Weather - Partly cloudy, light breeze
Penny Bullock & Kelly McGovern arrival ~11am.
Continue construction of BSB, ~~and~~ completed construction of BSB, and began construction of Biopile BSA in late afternoon.
Constructed PVC pipes for biopiles.
PPE: Modified Level D
Personnel: Kelly McGovern
Penny Bullock
Pat Price
+ Aniakchak Crew(4)

EOD Summary -
Exc 500 cy
Finish construction of BSB
Begin Construction of BSA
Construct Pipes for biopiles

1800: Fuel equip + return to field office

EOD PB 7/14/14

Location Port Heiden Date 07/15/14 -PB

Project / Client T006 Port Heiden

Sunny, slight breeze, ~54°F

0700	Tailgate - See sign in sheet for personnel
0810	Begin exc at BLO and construction of BSA PPE: Modified Level D Personnel: Kelly McGovern and Pat Price + Aniakchak crew (7)
1200	Break for lunch
1300	Return from lunch
1428	P. Bullock arrive to site to take PID readings from breathing zone @ top of pile. Readings up to 70 ppm. Leave site to troubleshoot PID
1600	Bullock return to site to re-take readings after re-calibrating (0.00 ppm fresh air, 98.1 iso) Readings range from 0.9 to 2.87 ppm
1800	EOD / Fuel equip / leave site

Location Port Heiden Date 07/15/14

Project / Client T006 USACE

Overcast, slight breeze, ~48°F

0700	- Tailgate - See Sign in Sheet for personnel
0720	Begin work @ BLO - continue construction of BSA PPE - Modified Level D Personnel: Pat Price + Kelly McGovern + Aniakchak Crew (7)
0850	K. McGovern leave site and go to red bldg to gather survey equipment for exc boundary stakeout.
1040	Rover does not connect via Bluetooth. Troubleshoot setup
1230	RTK setup complete and receiving signal Break for lunch
1320	Head to RRSTBM006 For Checkshot

Location Port Heiden Date 7/16/14

Project / Client USACE TO06

Overcast, slight breeze, ~55°F

1330 Base station is setup @ PHTBM003
Check shot @ PHTBM006 GPS002
X 6314674.708 Δ X 0.006
Y 520985.830 Δ Y 0.028
Z 45.735 Δ Z 0.029
✓ OK

1400 Arrive @ BLO excavation to mark out boundaries

1430 Leave site for Redbldg

K. McGovern arrive @ BLO site to take PID readings in breathing zone. Readings btw 0.1 - 1.1 PPM

1540 Take checkshot @ PHTBM003 GPS003
X 6314674.712 ΔX 0.002
Y 520985.786 ΔY 0.016
Z 45.343 * ΔZ 0.361

Location Port Heiden Date 7/16/14

Project / Client USACE TO06

* elevation off b/c check-shot was taken without raising stick to appropriate height.

1615 Take down base station and return to redbldg (field office)

1638- EOD Summary -
1800 Construction of BSA continued throughout day. 700 CY of material excavated from BL PCE excavation

EOD P. Bullock
7/16/14

Location Port Heiden Date 7/17/14

Project / Client TO#6 USACE

Clear, slight breeze, ~50°F

0700 Tailgate meeting: P. Price, K. McGovern, P. Bullock (Jacobs) Rebecca Jordan (USACE), Aniakchak Crew (7)

0730 K. McGovern + Aniakchak crew head up to BLO site

PPE: Modified Level D

Objective: Finish construction of Bio-cell BSA and cover BSA and BSB

1200 Break for lunch

1230 P. Price and P. Bullock leave Red building to go up to BLO site to sample the top of bio-cell BSA. We have only 3 low level VOC kits so we will sample the top and cover today. When more kits arrive we will pull samples (4) from the sides.

Location Port Heiden Date 7/17/14

Project / Client TO#6 USACE

Method: Hand auger to random depths

Sample ID	Time	Sampler	Depth
14BL-BSA-01	1240	PB	2'
14BL-BSA-02	1250	PB	3'
14BL-BSA-03	1300	PB	4'

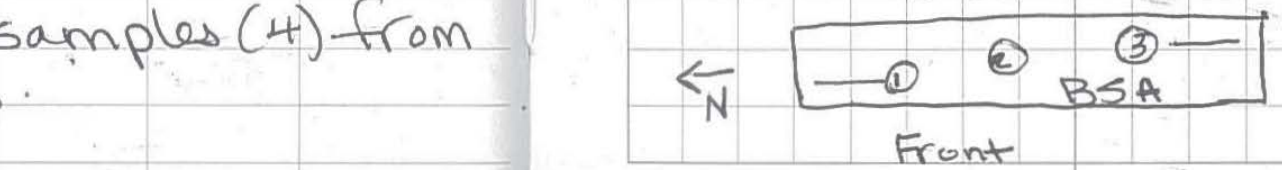
All samples analyzed for AK101, AK102, AK103, SW8260, and SW8260LL

1 9oz jar 4°C (amber)

1 4oz jar + MeOH /4°C (amber)

2 40 mL + DI H_2O ∠ 0C (clear)

Note: Sample 01 location 5' IN from front berm, 10' from ~~south~~ north PB. Sample 02 in center of pile (top). Sample 03 8' in from back berm, 20' from ~~south~~ OK Back



Location Port Heiden Date 7/17/14

Project / Client TO Ø6 USACE

Will survey sample locations on 7/18 after low level kits arrive and remaining samples are located

1300 Aniakchak crew return from lunch

1310 Depart BLO for red building and sample management

1315 Aniakchak crew continue constructing biopile BSA

1630 Begin covering biopile BSB

1800 End of day
Pat Price fuel equpment

Summary
200 cy of material exc
3 samples collected

EOD P. Bullock
7/17/14

Location Port Heiden Date 7/18/14

Project / Client TO Ø6 USACE HTRW

Overcast, ~ 50°F, breezy after lunch

0705 Tailgate. Discussed back strain related to pulling covers and sandbags. See sign in sheet.

0730 - Crew to site - PPE: Mod Level D
- McGovern setup survey base
Height above monument = 93.1cm, correct -20cm = .731 m on Heiden base. (PHTBMØØ3)

0745 Fuel truck filled black pickup.

0948 P. Bullock + K. McGovern head up to PHTBMØØ6 to take Checkshot. *GPS006-GPS008
x 6314674.711 Δx 0.003 ✓
y 520985.791 Δy 0.011 ✓
z 45.736 Δz 0.032 ✓
ok

1030 Survey sample pts
BSA01, BSA02, BSA03
Crew assembling pipe @ BSA.

Aniakchak crew working on securing

levers and installing piping on sides of bio-cells.

1100 P. Bullock leave site to go to field office

1123 Sample kits arrive via Lake Clark Air

1140 P. Bullock head back up to BLO ~~site~~ PB site to collect side samples from biocell BSA and survey in sample location points

	Sample ID	Sampler	Time	Depth
	~~14BL-BSA-04~~ PB			
+dup	14BL-BSA-04	PB/KM	1158	12"
	14BL-BSA-05	PB/KM	1208	2'
+MS/MSD	14BL-BSA-06	PB/KM	1218	5'
	14BL-BSA-07	PB/KM	1228	3'

All samples analyzed for AK102, AK101, AK103, SW8260, and SW8260LL

1	9 oz amber	4°C
1	4 oz amber	4°C + MeOH
1	40 mL clear	DI H_2O < 0°C

Sample locations all from sides of bio-cell BSA

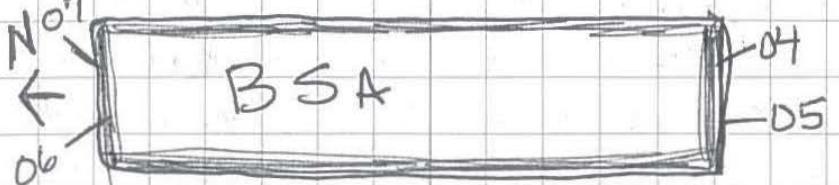


figure Not to scale

1240 GPS not working Will try to survey IN location points after lunch

1250 Return to field office.

Location Port Heiden Date 7/18/14

Project / Client TO#6 USACE

1600 P. Bullock + Kelly McGovern return to BLO to try and survey location points.

1610 GPS not working. Will go to base station and troubleshoot.

1625 Base station antenna down from wind and batteries dead.

1630 Take down base station and return to field office.

1800 Aniakchak field crew finish for day. Fuel equipment and return to field office

EOD 7/18/14 PB

4 samples + 1 dup + 1 MS/MSD

Location Port Heiden Date 7/19/14

Project / Client TO#6 USACE

Cloudy, windy, ~ 48°F

0700 Morning tailgate; P. Price, K. McGovern, P. Bullock, (Jacobs) Rebecca Jordan (USACE), Aniakchak crew (7)

0730 Aniakchak crew head up to BLO site to continue securing bio-piles BSA + BSB and attach piping to sides. PPE: Mod Level D

0800 K. McGovern + P. Bullock head up to RRS

0810 Set up base station at PHTBM006

0858 Check shot @ PHTBM007 Job PH071914 Point ID = TBMCS

X 5208896.019 ΔX 0.021 ✓

Y 6314567.957 ΔY 0.015 ✓

Z 44.122 ΔZ 0.004 ✓

0916 GPS sample locations BSA004 - BSA007 (collected 7/18/14)

Location Port Heiden Date 7/19/14

Project / Client TO06 USACE

0930 GPS not working - troubleshoot so we can locate PRE-Construction Traversed Road Sample Points for Post-Construction sampling.

1115 Locate Points BSA-06 and BSB-06 and mark w/ pin flags.

1145 Jacobs + Aniakchak crew break for lunch.

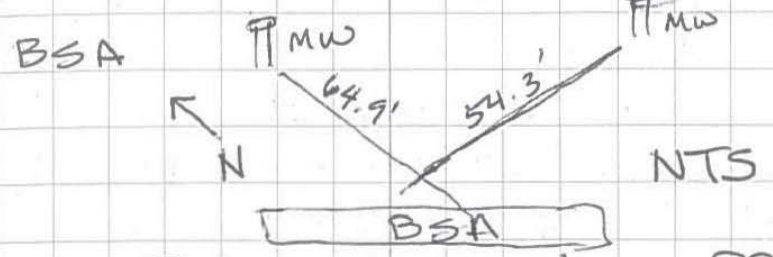
1320 K. McGovern + P. Bullock return to BLO site and mark PRE construction sample locations by swing tie so dozer can remove 6" of material in traversed area prior to POST sample collection. Samples will be collected at later date;

Location Port Heiden Date 7/19/14

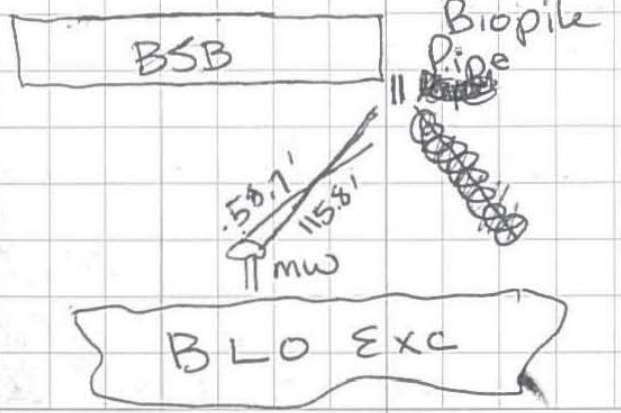
Project / Client TO06 USACE

gps equipment may go back to ANC prior to sample collection.

1330 BSA - swing tie off 2 monitoring wells



1340 BSB - Swing tie off West end of biopile 1st pipe and monitoring well



Location Port Heiden Date 7/19/14

Project / Client TO06 USACE

1400 GPS not able to complete Checkshot at PHTBM007. Will come back later after troubleshooting

1452 Able to complete CS.
PHTBM007
Point ID = TBMCS10
X 6314567.965 ΔX 0.023 ✓
Y 5208962.019 ΔY 0.021 ✓
Z 44.120 ΔZ* 0.006 X
PB ~~*elevation Δ Not okay - not within range of acceptability~~
*ΔZ ok, within range

1500 Take down base station. Return to field office.

1600 Aniakchak field crew End of day
Fuel equip + return to field office 7/19/14
EOD P. Bullock

Location Port Heiden Date ~~7/20~~ 7/21 (Tue)

Project / Client TO06

Early Clouds, calm, sunny lake ice

0700 Safety meeting
- Sand bags
- driving w/ adjacent contractors
- distractions + complacency

- Feather in fill over toe of top liner
- Sand bags about every 15'
- Goal is to finish blocks today

1015 Inspect progress
- nets on
- sand bags applied
⇒ McKay estimates 100 bags (25/side) / pile

1130 Kelly McGover Port Prize Depot

1300 JM looks @ treated is pile for use as Back fill w/ AL

Location Port Heiden Date 7/21

Project / Client TOØ6

Mostly sunny calm

Bio piles -

1530 after double checking Work Plan identified that sand bags are required ~ 5' instead of 15'. Notified AL.

1620 Other than adding ~ 25 bags per pile, piles looking complete

1745 Aniakchak crew head back to field office - EOD

EOD PB 7/21/14

Location Port Heiden Date 7/22/14

Project / Client TOØ6 USACE

Cloudy, light rain, ~50°F, breezy

0700 Tailgate meeting; Jon McVay, Penny Bullock (Jacobs), Rebecca Jordan (USACE), Aniakchak crew (7). Discuss daily objectives backfilling excavation @ BLO. Generate SPA

0750 Aniakchak crew head to BLO site. Jon McVay head to BLO to fuel equipment
PPE: Modified Level D

0820 Curtis arrive to fuel Black diesel truck

0840 J. McVay head up to site to check on start-up activities. After discussion, haul route is modified from morning discussion. Using material from CA landfarming activities across road from BLO excavation.

haul route will avoid turning into where biopiles are located and having to do a 6 point turn. This will eliminate several minutes per haul. Instead a loop will be made from landfarming soil ~~and~~ to ~~west~~ east side of excavation.

1100 P. Bullock arrive haul route to do QC check. Avg round trip 6-8 minutes

~~1210~~ PB

1115 P. Bullock return to field office

1210 P. Bullock + Jon McVay arrive to excav to check backfilling of exc and take photos while crew is at lunch and no vehicles

are in haul route.

1500 P. Bullock arrive to monitor activities

1540 leave site and return to field office

1730 J. McVay head up to site to button up activities / barricade exc and fuel equip.

1830 Finish fueling / return to field office

EOD Summary
- 1040 cyards ~~haul~~ hauled; 800 cy (approx) placed in excavation

P. Bullock 7/22/14

Location Port Heiden Date 7/23/14

Project / Client TO#6 USACE

Morning rain, cloudy, breezy, ~48°F

0700 Morning tailgate: Jon McVay, P. Bullock (Jacobs), R. Jordan (USACE), Aniakchak crew (6) Discuss daily objective of backfilling BLO excavation.

0730- Aniakchak crew head to BLO site to backfill

1145 Aniakchak crew head to lunch

1300 - ~~1545~~ 1745 Continue to haul material from CA landfarming area ~~material~~ PB to PCE exc @ BLO.

1745 Aniakchak crew depart site. Jon McVay arrive to fuel equipment

EOD Summary

1080 cy hauled to exc.

P. Bullock 7/23/14

Location Port Heiden Date 7/24/14

Project / Client TO#6 USACE

Rainy, overcast, ~57°F

0700 Tailgate: J. McVay, P. Bullock, R. Jordan, Aniakchak crew (6) Discuss finishing backfill and grading activities. Will place topsoil/vegetative cover that was removed during exc on top. Discuss grooming CA pile to good-looking condition when done. PPE - Level D

0730 J. McVay + Aniakchak crew head to site. Inspect haul route. With rainy conditions road is sloppy. Add pumice material to route is necessary to make route safe

Location Port Heiden Date 7/24/14

Project / Client TO Ø6 USACE

0900 Maxine consolidate TO Ø6 cointainer contents to other 3 containers will return this connex today eob.

1145 Aniakchak crew break for lunch

1300 Aniakchak crew return to site

1320 P. Bullock arrive Site to inspect activities hauling activities on-going

1540 P. Bullock arrive for inspection. No hauling activites - backfilling is complete: Working on spreading topsoil + grading to original state.

Notes: To be completed yet: ① Move container to SRA2 ✓ completed 1630 PB ② build sand bags for biocells, ③ pick up misc pallets, trash near portapotty,

Location Port Heiden Date 7/24/14

Project / Client TO Ø6 USACE

1554. Larissa brings 1st load of trapper creek fill for new connex pad to behind red bldg (hear over radio comm)

1555 To do list continued-

④ back blade in front of CA treated soil and along haul route; corner is sloppy - where hump + dip is located just past dump zone.

1557 P. Bullock leave site, return to field office

1745 Aniakchak crew leave site and head to field office

1800 EOD Summary 720 ~~loads~~ CY PB from CA 40 cy from Trapper hill pit for Pad

EOD 7/24/14 P. Bullock

Location Port Heiden Date 7/25/14

Project / Client TO06 USACE

Partly cloudy, ~ 50°F, slight breeze

0700 Tailgate - J. McVay, P. Bullock, and R. Jordan (USACE) + Aniakchak crew (6) and diff level PPE. Discuss day's activities - backblade area in front of CA soil, clean up their pile (fluff edges, etc), put more sandbags on biocells BSA + BSB, bring liner from CA1A to Storage Area 1, Clean last vehicle, make dump run, gas + return 2 vehicles + Dump trucks, more conNexes

0730 Aniakchak crew head up to RRS

1040 Derek builds new connex pad behind red building with material dumped yesterday from Trapper hill pit.

1130 Larissa + Jeff make dump run to landfill Celestee and amber

Location Port Heiden Date ~~7/25/14~~

Project / Client TO06 USACE

Partly sunny, breezy, ~ 55°F

continue working on bringing BLO exc to grade and fluffing up pile.

1200 Break for lunch

1300 Start moving conexes to red building pad (and items outside conexes) Amber + Larissa make 2nd dump run. Celestee start removing liner from Storage Area 1.

1400 Take red and silver trucks for fuel and return dump trucks.

1430 Begin hosing down vehicles.

1500 Results from J-1-1 come back below cleanup level. Derek runs dozer across sample area to even out.

1600 EOD P. Bullock 7/25/14

Location Port Heiden Date 7/26/14

Project / Client TO06 USACE

Cloudy, ~ 50°F, slight breeze

0630 P. Bullock arrive field office to wrap up paperwork.
Objective of day:
Remove fuel tank from rental truck and clean bunkhouse and transport items from bunkhouse to Field office

0830 Return to bunkhouse

1030 J. McVay and P. Bullock conduct inspections and take photos up at RRS

1230- Cleaning + organization-

1300 Change locks to orginal on Bunkhouse
PB
PB

2000 Return Bruce's truck to Ray's place.

2200 Bring bunkhouse keys to Angela
EOD P. Bullock 7/26/14

Location Port Heiden Date 7/27/14

Project / Client TO06 USACE

Cloudy, breezy ~ 54°F

0800 J. McVay + P. Bullock
-1200 finish site de-Mob: Clean bunkhouse and transfer all Jacobs items to Red Building (field office)

1230 J. McVay + P. Bullock leave Port Heiden via Lake Clark Air to ANC

EOD P. Bullock 7/27/14

Location Port Heiden Black Lagoon Date 9/20/14

Project / Client TO #6 USACE GR/MH/LD

Partly Cloudy, 52°, 13 mph winds

0800 Tailgate meeting conducted at field office (See sign in sheet).

Objectives - Locate sample points on Bio-pile Road and collect samples.

See "2014 Kenroy Survey" logbook for survey information.

1030 Prepared sampling equipment and bottle kit for Bio-pile road sampling

1048 Arrive at Bio-Pile site unload equipment and begin to locate sample points with survey equipment.

1058 Collect 14BL-PST-BSB-06 for AK101/8260B and DRO/RRO

1110 Collect 14BL-PST-BSA-06 for AK101/8260B and DRO/RRO

1112 Load equipment and depart site. Make Date 9/20/14

Location Date

Project / Client

APPENDIX F

Response to Comments

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

555 Cordova St
Anchorage, AK 99501
Main: 907-269-7552
Fax: 907-269-7687
www.dec.alaska.gov

File No: 2637.38.002.08

January 29, 2014

Keith Barnack
AFCEC/OLAR
10471 20th St Ste 341
JBER, AK 99506-2201

Re: Draft Black Lagoon Biopile Treatability Study, Port Heiden, Alaska dated January 2015

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) has received the above document on January 16, 2015 for review and comment. ADEC concurs with the recommendation to collect a second round of samples to evaluate the system efficiency of the biopile. The document may be finalized.

Sincerely,

Louis Howard
Environmental Program Specialist

REVIEW COMMENTS **PROJECT: 2014 Draft Black Lagoon Biopile Treatability Study Report**
DOCUMENT: Draft 2014 report Location: Port Heiden RRS, Alaska

U.S. ARMY CORPS OF ENGINEERS	**DATE: 29-Jan-15** **REVIEWER: Meseret Ghebresllassie** **PHONE: 907-854-3843**	**Action taken on comment by:** Jacobs Engineering Group Responses Submitted: 18-Mar-15

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1.	Executive Summary	1st para. 1st sentence - Black Lagoon is at the Former Radio Relay Station property line. May be trying to say near the Former Composite Building.	A	Agree. The text will be clarified to state "located just west of the former Composite Building and in the vicinity of the Former Radio Relay Station…"	A
2.	Executive Summary	Page 1, bullets – access road sampling is out of scope under this contract action. Please refrain from using the word "access road" on this report unless otherwise discussing the specified sample are collected from the access road site.	A	Agree. Wording throughout the document will be changed to avoid any confusion using "access road" when referring to the temporary roads used to reach the biopile area. The use of "access roads" will be replaced with "temporary roads used to reach the biopiles".	A
3.	Sec 2.1	1st para. 1st sentence - Change the "2013 draft Black Lagoon … to "2013 Final Blank Lagoon….	A	Agree. Name of report will be updated to final.	A
4.	Sec 2.1	Please specify the depth of the excavation with in 2 ft margin of error. 15 to 20 feet is huge margin.	A	Agree. The text will be clarified to state: "In most places, the excavation depth was 10 feet below ground surface (bgs), but two locations were excavated 20 feet bgs (the maximum reach of the excavator) to remove higher levels of PCE-contaminated soil."	A
5.	Sec 2.1	What do you mean a clean landfill soil used as backfill material? Landfill soil??	A	Agree. This sentence is inaccurate, landfarmed soil, not landfill soil was used to backfill excavations. The use of the landfarmed soil was approved by ADEC prior to use. Appendix F will be added to the document to include the Landfarm Soil Approval Documentation. The text in Section 2.1 will be changed to "The excavation was backfilled with local clean material from the Alaska Department of	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 29-Jan-15** **REVIEWER: Meseret Ghebresllassie** **PHONE: 907-854-3843**	**Action taken on comment by:** Jacobs Engineering Group Responses Submitted: 18-Mar-15

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
				Transportation (DOT) pit, remediated landfarmed soil, and overburden soil removed during the leveling of the biopile pads."	
6.	Sec 2.1	What do you mean soil removed from a hill during the leveling of the biopile pads? Is this organic top layer soil /overburden soil removed during the initial construction of the biopile base pad?	A	Agree. The sentence in Section 2.1 will be revised as described in comment #5. Sections 2.1 and 2.2 will be reorganized to better describe events in chronological order.	A
7.	Section 2.2	1st parg, 2nd sentence from last "…the effectiveness of biopiles in remediating PCE-contaminated soil in Port Heiden instead of remediating the site." This sentence doesn't make sense.	A	Agree. The sentence will be changed to: "The purpose of the Treatability Study is to assess the effectiveness of biopiles in remediating PCE-contaminated soil in Port Heiden, instead of excavating, containerizing, and shipping the contaminated soil to an offsite disposal facility."	A
8.	Section 2.2	Please describe/explain the biopile construction process in a chronological order. Start with the biopile pad location selection, pre-construction sample collection, site preparation and describe in detail the biopile construction technology including air distribution system layout and how the PCE soil laid without damaging the air venting system. May be use a 3D figure to describe the air ventilation design better than Figure A-3	A	Agree. Section 2.2 will be restructured to include to provide a chronological accounting of the biopile construction activities; including pad location selection, pre-construction sample collection, and site preparation. This section will also provide details on how the contaminated soil was placed into the biopiles and the air distributions system layout. Section 2.3 will be added to the report to discuss the biopile operation. Figure A-5 will be added to present a more	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 29-Jan-15** **REVIEWER: Meseret Ghebresllassie** **PHONE: 907-854-3843**	**Action taken on comment by:** Jacobs Engineering Group Responses Submitted: 18-Mar-15

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
				detailed schematic of the air distribution system.	
9.		Please describe the remedial technology of the passive air ventilation biopile. How does PCE and daughter products are expected to be remediated by this technology? Please describe the technology in relation to contamination removal model. This is a treatability study report, description of technology and process of implementation should be described for the reader to understand the process.	A	Agree. Operational details of the biopiles will be described in a new section (Section 2.3 *Biopile Operation*). The text, too lengthy to include here, will discuss the mechanisms of contaminant remediation (evaporation for PCE and daughter products and VOCs, biodegradation for petroleum constituents), the mechanics of air movement through the piles, potential difficulties that could limit biopile effectiveness, and the inability to accurately model biopile performance.	A
10.	Section 3.1, 1st para.	This section describes four soil samples collected from access road; however figure A-2 shows only two samples. At what depth were the samples collected?	A	Agree. This was in error; only two samples were collected from the temporary roads used to access the biopiles. Road samples were collected at a depth of 6 inches bgs and the baseline biopile samples were collected from various (random) depths, ranging from 1 to 8 feet. The sample depths will be discussed in the text in Section 3.1. Table 3-1 will be updated with depths baseline biopile sample depths. Soil sample depths will be added to the Sample Summary Table (Table B-1-1, Appendix B).	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 29-Jan-15** **REVIEWER: Meseret Ghebresllassie** **PHONE: 907-854-3843**	**Action taken on comment by:** Jacobs Engineering Group Responses Submitted: 18-Mar-15

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
11.	Section 3.1, 2nd para.	Even though, the baseline soil samples were collected from random locations that specified random sample should have depth and horizontal directional description ID. That way we can identify performance efficiency compromise as a result of damaged venting system within a biopile.	A	Agree. Although random, these points were surveyed and depths were recorded for future sampling efforts and/or performance comparisons. Table 3-1 will be updated to include the sample depths and all soil sample depths will be listed in the Sample Summary Table (Table B-1-1, Appendix B).	A
12.	3.4	So sample location and depth is surveyed. Please provide sample ID and depth in section 3.1.		Agree. A general description or range will be added to Section 3.1 and the sample depths will be added to Table 3-1 in Section 3.2.	A
13.	Section 4	Move this discussion to section 2 and elaborate the remediation technique discussion.		Agree. The remediation technique will be discussed in further detail at the end of Section 2. Please refer to the response to Comment #9 for details. A summary of the technique will be retained here. The existing text will be subdivided into multiple paragraphs, and the first paragraph will read as follows: In the summer of 2014, two passively ventilated biopiles were constructed to assess the effectiveness of biopiles as a remediation technique for PCE-contaminated soil in Port Heiden. The biopiles were constructed with interfingered ventilation pipes designed to passively move air through the soil and thereby promote the evaporation and	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 29-Jan-15** **REVIEWER: Meseret Ghebresllassie** **PHONE: 907-854-3843**	**Action taken on comment by:** Jacobs Engineering Group Responses Submitted: 18-Mar-15

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
				removal of PCE, TCE, and any other volatile contaminants. Concurrently, this will maintain aerobic conditions within the soil and promote the biodegradation of petroleum-derived contaminants. Fertilizer added during construction will also facilitate biodegradation.	
14.	Figure A-2	Please include sample ID.	A	Sample Location IDs will be added to this figure.	A
15.	App B	Analytical Results and Data Quality Assessment – will be provided by USACE chemist.	A	We will await comments from USACE chemist.	A
		----- End of Comments ----			

APPENDIX G

Use of Landfarm Soil Approval Letter

THE STATE of ALASKA
GOVERNOR SEAN PARNELL

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION & RESPONSE
Contaminated Sites Program

555 Cordova Street
Anchorage, Alaska 99501
Phone: 907.269.7503
Fax: 907.269.7649
dec.alaska.gov

File No: 2637.38.002.05

July 9, 2014

Mr. Keith Barnack
AFCEC/OLAR
10471 20th St Rm 341
JBER, AK 99506-2201

Re: NVPH Landfarming Memorandum July 2014, Port Heiden Alaska

Dear Mr. Barnack;

The Alaska Department of Environmental Conservation's Contaminated Sites Program staff (ADEC) received the document on July 9, 2014 for review and comment. ADEC has reviewed the information provided by the Native Village of Port Heiden Cooperative Agreement, working on behalf of the Air Force, to close the landspreading areas LSA1, LSA2, LSA3 and LSA4 at Port Heiden RRS in 2011. ADEC has determined, in accordance with 18 AAC 75.380(d) that cleanup is complete at the landspreading areas, subject to a future department determination that the cleanup is not protective of human health, safety, or welfare, or of the environment. ADEC is basing this determination on the most current and complete information available to ADEC.

If you have any questions regarding this letter, please call me at (907) 269-7552.

Sincerely,

Louis Howard
Environmental Program Specialist