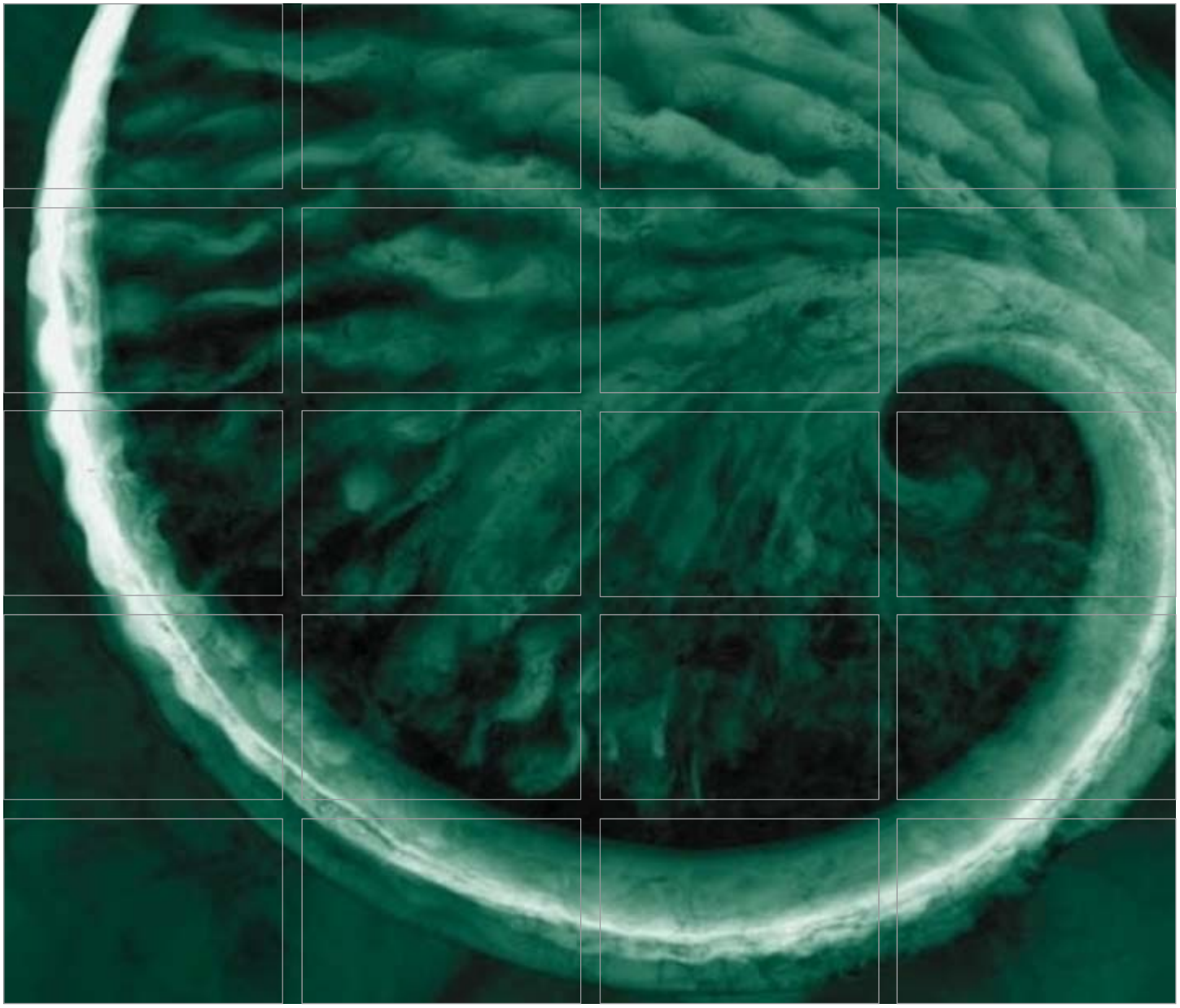

Prepared for:

Matson

2015 Long-Term Monitoring Report

Port of Anchorage Terminal Facility

DRAFT
December 2015

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ERM

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2015 Long-Term Monitoring Report
Port of Anchorage Terminal Facility

December 16, 2015

ERM Project # 0220880

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TABLE OF CONTENTS

Acronyms and Abbreviations ..... **v**

1. Introduction **1**
- 1.1. Background 1
- 1.2. Purpose and Scope 2
- 1.3. Project Organization 3
- 1.4. Regulatory Framework 3

2. Field Activities **5**
- 2.1. Monitoring Well Repair 5
- 2.2. Groundwater Sampling 5
- 2.3. Bioventing System Monitoring 6

3. Results and Discussion **9**
- 3.1. Groundwater Elevation and Flow Direction 9
- 3.2. Water Quality Results 9
- 3.3. Bioventing System Monitoring 10

4. Quality Assurance Review **11**
- 4.1. Precision and Accuracy 11
- 4.2. Representativeness 11
- 4.3. Completeness 11
- 4.4. Comparability 12
- 4.5. Data Summary 12

5. Conceptual Site Model **13**

6. Conclusions and Recommendations **15**

7. References **17**

TABLES
- 1: Groundwater Cleanup Levels (in report text)
- 2: 2013 Sample Plan (in report text)
- 3: Groundwater Elevation Measurements
- 4: Groundwater Analytical Results for Petroleum Hydrocarbons
- 5: Groundwater Analytical Results for PAHs
- 6: Cumulative Groundwater Analytical Results
- 7: Bioventing System Measurements

FIGURES
- 1: Site Location Map
- 2: Site Plan
- 3: Groundwater Results
- 4: Analytical Results
- 5: HC-1 Concentrations and Groundwater Elevation

6: HC-3 Concentrations and Groundwater Elevation
7: HC-6 Concentrations and Groundwater Elevation
8: MW-8 Concentrations and Groundwater Elevation

APPENDICES

A: Field Notes and Groundwater Sample Data Sheets
B: Laboratory Analytical Reports
C: Quality Assurance Checklist
D: ADEC CSM Forms

ACRONYMS AND ABBREVIATIONS

AAC..... Alaska Administrative Code
ADEC ..... Alaska Department of Environmental Conservation
BTEX..... Benzene, toluene, ethylbenzene, and total xylenes
COPC..... Contaminants of potential concern
COC ..... Chain of custody
CSM ..... Conceptual site model
DO..... Dissolved oxygen
DRO ..... Diesel-range organics
EPA ..... U.S. Environmental Protection Agency
ERM ..... ERM Alaska, Inc.
GCL..... Groundwater cleanup level
GRO ..... Gasoline-range organics
LCS..... Laboratory control sample
LCSD ..... Laboratory control sample duplicate
LNAPL ..... Light non-aqueous phase liquid
LOQ ..... Limit of Quantitation
mg/L ..... Milligrams per liter
mL..... Milliliter
MRL ..... Method Reporting Limit
MS ..... Matrix spike
MSD ..... Matrix Spike Duplicate
ND..... Non detect
ORP..... Oxygen-reduction potential
PAH ..... Polycyclic aromatic hydrocarbons
QA..... Quality assurance
QC ..... Quality control
RL..... Reporting Limit
RPD..... Relative percent difference
TVH ..... Total volatile hydrocarbons
UST ..... Underground storage tank
VOC ..... Volatile organic compounds

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1. INTRODUCTION

ERM Alaska, Inc. (ERM), under contract to Matson (formerly Horizon Lines of Alaska, LLC) as a third-party environmental assessor, has been tasked with performing long-term monitoring at Matson's Port of Anchorage Terminal Facility. This report constitutes the second of three biennial reports as outlined by the work plan for long-term monitoring at the site (ERM 2013). The objective of this report is to summarize the field activities conducted by ERM personnel at the site in 2015, and present results. Figures 1 and 2 depict the site location.

1.1. Background

According to Hart Crower, Inc.'s (Hart Crowser's) Groundwater Monitoring Plan, dated October 2004 (Hart Crowser 2004), three underground storage tanks (USTs) located on the south side of the Maintenance Shop were upgraded in 1997 to meet current regulatory standards. During the upgrades, a 10,000-gallon UST was damaged, and an estimated 5,600 gallons of fuel were released. Response activities reportedly recovered all of the fuel and removed 50 cubic yards of impacted soil. Some impacted soil may remain in conjunction with two of the three tanks that were left in place. As part of the remedial solution, a passive bioventing system consisting of six underground, horizontal, slotted PVC lines were installed. The objective of the bioventing system is to promote in situ remediation through the passive removal of volatile hydrocarbons and the addition of oxygen, which supports aerobic degradation of hydrocarbons in the vadose (unsaturated) zone.

Hart Crowser conducted a release investigation in 2000 to assess the impact of documented releases from USTs located on the southern side of the Maintenance Shop. Four monitoring wells (HC-1, HC-2B, HC-3, and HC-4) were installed. Review of analytical results from the monitoring wells indicated that groundwater concentrations of benzene, gasoline-range organics (GRO), and diesel-range organics (DRO) exceeded the ADEC groundwater cleanup levels (GCLs). All wells contained petroleum hydrocarbon concentrations above GCLs with the exception of HC-4, located at the western side of the former fuel canopy.

In 2002, Hart Crowser installed two new monitoring wells (HC-5 and HC-6) along the Cherry Hill Storm Drain line to determine whether the storm sewer line was acting as a preferential pathway for contaminant migration from the USTs. All existing wells were sampled, with wells HC-1, HC-2B, HC-3, and HC-4 having similar results as in 2000. No compounds were detected above GCLs in HC-5 and HC-6. Hart Crowser conducted two more rounds of groundwater monitoring in November 2004 and March 2005.

In September 2005, OASIS Environmental, Inc. (OASIS) oversaw the removal of the three USTs and associated piping and dispensers. Based on a plan discussed with the ADEC, OASIS left visible petroleum contamination in place during the removal and placed contaminated soil back into the excavation above the water table (OASIS 2005). As part

of the removal, two monitoring wells (MW-8 and MW-9) were installed at the down-gradient edges of the UST excavation.

ERM (as OASIS) has completed six monitoring events since the removal of the three USTs September 2005. Monitoring was performed on a semiannual basis from 2005 to 2008 and then reduced to an annual basis from 2009 to 2011, per the approval of the ADEC project manager. A complete summary of monitoring activities completed from 2005 to 2011 is provided in the document *2011 Long Term Monitoring Report, Port of Anchorage Terminal Facility* (OASIS 2011).

Review of groundwater monitoring results for the years 2005 through 2011 indicate that the contaminant plume continues to attenuate and is not migrating offsite. Groundwater hydrocarbon concentrations continue to exceed GCLs, especially in wells located in the vicinity of the former UST excavation. The monitoring data, which is available as far back as October 2000, show that groundwater contaminant concentrations continue to exhibit statistically significant decreasing trends. Stable or not increasing hydrocarbon concentrations at perimeter wells suggests that the plume is not migrating and that attenuation is occurring at the edges of the plume.

An analysis of the 2011 natural attenuation parameter results suggests that the site conditions are transitionally aerobic and reducing. Comparison of Fe (III), nitrate and sulfate concentrations in the background well to the plume wells provides no strong indications of a dominant attenuation process; however, decreasing concentrations in the source area indicate that attenuation is likely occurring.

In 2011, monitoring of the bioventing system continued to show that conditions support the aerobic biodegradation of volatile hydrocarbon in the vicinity of the passive bioventing system lines. Carbon dioxide was detected in the vadose zone at concentrations above 0.3 percent, which indicates that microbial activity is occurring. Because oxygen levels were not entirely depleted, there appears to be sufficient oxygen for additional microbial activity.

1.2. Purpose and Scope

The scope of work for long-term monitoring during 2015 is based on recommendations made in the document *2011 Long Term Monitoring Report, Port of Anchorage Terminal Facility* (OASIS 2011) and the *2013 Long Term Monitoring Report* (ERM 2014). The purpose of the 2015 biennial long-term monitoring event is to:

- Evaluate groundwater flow direction;
- Assess the current state and distribution of hydrocarbon constituents in groundwater monitoring wells;
- Monitor the bioventing system to determine if in situ remediation is occurring;
- Refine the Terminal's conceptual site model based on input of additional data gathered from the execution of this LTM Plan; and

- Demonstrate over time that the combination of bioventing and monitored natural attenuation is cleaning the site toward applicable Method 2 and Table C (18 Alaska Administrative Code [AAC] 75) cleanup levels for soil and groundwater, respectively.

1.3. Project Organization

- Owner/Operator: Matson, 1717 Tidewater Road, Anchorage, Alaska, 99501
- Third-Party Environmental Assessor: ERM, 825 W. 8th Avenue, Anchorage, Alaska, 99501.
- ADEC Certified Laboratory: TestAmerica, 2000 W. International Airport Road, Suite A-10, Anchorage, Alaska, 99502

1.4. Regulatory Framework

This work plan has been developed in accordance with regulatory policy and standard practices as outlined in:

- 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2015);
- *Underground Storage Tanks Procedure Manual* (ADEC 2002);
- *Policy Guidance on Developing Conceptual Site Models* (ADEC 2010a); and
- *Draft Field Sampling Guidance* (ADEC 2010b).

The contaminants of potential concern (COPCs) associated with this project include benzene, toluene, ethylbenzene, and total xylenes (BTEX), GRO, DRO, and polycyclic aromatic hydrocarbons (PAHs). Analytical results for groundwater samples are evaluated using ADEC's GCLs as presented in Table C of 18 AAC 75.345. Table 1 presents the applicable GCLs.

TABLE 1. GROUNDWATER CLEANUP LEVELS FOR CONTAMINANTS OF CONCERN

Analyte	GCL[1] [mg/L]
benzene	0.005
toluene	1.0
ethylbenzene	0.7
xylenes	10
GRO	2.2
DRO	1.5
naphthalene	0.73
1-methylnaphthalene	0.15
2-methylnaphthalene	0.15
benzo(a)pyrene	0.0002
dibenzo(a,h)anthracene	0.00012

[1]GCLs per 18AAC75.345 (June 2015)

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2. FIELD ACTIVITIES

During October of 2015, ERM performed the following activities at the terminal facility:

- Groundwater elevations were measured using an oil-water interface probe.
- Water quality parameters were evaluated.
- Groundwater samples were collected using low-flow sampling techniques.
- Groundwater samples were submitted to a commercial laboratory for analysis.
- Bioventing system monitoring was conducted.

The work was performed in accordance with the work plan (ERM 2013), unless otherwise noted. Field notes and data sheets are included in Appendix A. All samples were collected by ERM personnel who meet the definition of qualified persons per 18 AAC 75.333(c).

2.1. Monitoring Well Repair

ERM personnel conducted the biennial groundwater monitoring effort 28 September 2015. Repairs were completed to HC-1, which had been damaged by frost-jacking. The PVC casing was cut down by 0.08 ft.

Prior to monitoring well repair, a depth-to-groundwater measurement and a total-well-depth measurement were recorded using a water level meter. Total well depths were measured to calculate the water column thickness.

2.2. Groundwater Sampling

ERM sampled the wells using low-flow sampling techniques. This process included purging groundwater at less than 1 liter per minute using a peristaltic pump, passing groundwater through a flow-through cell, monitoring for water quality parameters using a YSI 556 water quality meter, and sampling after water quality parameters had stabilized.

The wells that were sampled during this field event include HC-1, HC-3, HC-6 and MW-8. Previous sampling event results have indicated that monitoring wells HC-2B, HC-4, HC-5 and MW-11 are not impacted by petroleum hydrocarbons. Sampling at MW-9 was discontinued in 2013 because the concentrations in the wells exhibited statistically significant decreasing trends, and MW-9 is in the direct vicinity of two other wells (MW-8 and HC-1) which have historically exhibited higher concentrations of contaminants of concern than MW-9.

MW-10 was not sampled because the well had been paved over. The location of the well was verified with a metal detector. Analytical results at MW-10 had not exceeded GCLs since 2006, with the exception of one exceedance of benzene with a concentration of 0.00503 mg/L in October of 2013 (GCL is 0.005 mg/L). For this reason, MW-10 is not

included in the 2015 study results and ERM does not recommend installing a replacement well. A summary of wells that were sampled is provided in Table 2, below.

TABLE 2. WELLS SAMPLED 09/28/15

Well	GRO/BTEX	DRO	PAHs
HC-1	X	X	-
HC-2B	-	-	-
HC-3	X	X	-
HC-4	-	-	-
HC-5	-	-	-
HC-6	X	X	-
MW-8	X	X	X
MW-9	-	-	-
MW-10	Note 1	Note 1	-
MW-11	-	-	-

Note 1: GRO/BTEX and DRO sampling was planned at MW-10; however, the well had been paved over so the well was not accessed in 2015.

The groundwater monitoring event sampling took place in accordance with sampling procedures outlined in ADEC's *Underground Storage Tanks Procedure Manual* (ADEC 2002). Monitoring wells were purged until at least three casing volumes of water had been removed from the well, or until a minimum of three (minimum of four, if using temperature as an indicator) of the parameters listed on the *Low-Flow Groundwater Sampling Worksheets* had stabilized. *Low-Flow Groundwater Sampling Worksheets* from the sampling effort are provided in Appendix A. The water quality parameters including dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, temperature, and conductivity were measured using a YSI-556 water quality meter.

Water samples collected for laboratory analysis were immediately placed in a cooler along with frozen gel ice. Samples were delivered directly to TestAmerica in Anchorage, an ADEC-approved laboratory, and analyzed for BTEX, GRO and DRO, and selected samples for PAHs.

2.3. Bioventing System Monitoring

The bioventing system is composed of six slotted PVC lines, which are buried horizontally in the footprints of the former USTs and filling stations. The lines daylight at the maintenance facility wall and extend up the exterior of the building to the outlet through fans on the roof.

During the 2015 monitoring event, ERM personnel inspected and tested the bioventing system. Total volatile hydrocarbons, oxygen, and carbon dioxide levels were monitored.

A sampling pump was connected to the sample port on each of the six lines via single-use polyethylene tubing. Approximately 0.25 cubic feet per minute (cfm) of soil gas was extracted from each line for approximately four minutes to allow thorough evacuation of any static vapors in the line. After sufficient evacuation, an RKI Eagle multi-gas meter

(with LEL calibrated to oxygen, carbon dioxide, and hexane standards) was connected to the pump effluent to monitor the soil gas oxygen, carbon dioxide, and total volatile hydrocarbon (TVH) content.

Four of six of the roof-top passive bioventing system fans were observed spinning during the 2015 monitoring event. The in-line fans on lines 4 and 5 were not spinning at the time of the monitoring event. Wind speed at the time of the event was negligible, which is the likely reason for no movement of the two fans.

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3. RESULTS AND DISCUSSION

This section presents the findings from work performed as part of the long-term monitoring plan. Appendix B contains the analytical data reports.

3.1. Groundwater Elevation and Flow Direction

ERM recorded the total well depth and depth-to-water measurements prior to sampling. No light non-aqueous phase liquid (LNAPL) was observed in any of the site wells. The groundwater measurements were used with the results of the 2015 monitoring well survey to calculate relative groundwater elevation data compared against an assumed benchmark elevation of 100 feet at a reference point previously established by professional surveyors, Bell and Associates. The groundwater elevation data is presented in Table 3 and Figure 3. The inferred groundwater flow direction is to the south at a gradient of 0.08 ft/ft, which is consistent with previous monitoring events.

3.2. Water Quality Results

Water quality parameter results are consistent with the results of recent monitoring events. Parameters collected from MW-10 are not included in these results. Temperature readings ranged from 9.66 to 12.65 degrees Celsius (49.30 to 54.8 degrees Fahrenheit). The DO readings from most wells ranged between 0.03 mg/L and 0.71 mg/L. In recent years wells have generally reported DO concentrations at or below 1.0 mg/L. Conductivity ranged from 2,498 to 4,220 microsiemens per centimeter. The groundwater pH levels were slightly acidic, ranging from 6.22 to 6.85, and ORP results ranged from -93.7 to -33.2 millivolts.

The 2015 analytical sample results for the BTEX, GRO and DRO are summarized in Table 4. Figure 4 displays the 2015 groundwater sampling results at each location. Review of results of the laboratory analysis indicate that:

- Benzene concentrations exceeded the GCL in source area wells (1.9 mg/L at MW-8 and 1.1 mg/L at HC-1);
- Ethylbenzene and xylene exceeded their respective GCL concentrations in source area well MW-8 (1.6 mg/L and 12 mg/L, respectively);
- DRO concentrations exceeded the GCL at each sampled well: DRO concentrations ranged from 2.5 to 23 mg/L;
- GRO concentrations exceeded the GCL in source area wells MW-8 and HC-1 with concentrations at 48 mg/L and 3.8 mg/L, respectively.

In general, sample concentrations are consistent with data from previous years. Table 6 presents historical groundwater sample analytical results from 2000 to 2015 for BTEX, GRO, and DRO. Concentrations of benzene, GRO, and DRO at each well over time, as

well as relative groundwater elevation trends, are illustrated on Figures 5 through 8. The wells positioned in the vicinity of the former USTs (HC-1, MW-8 and MW-9) exhibited concentrations above GCLs. The down-gradient and up-gradient wells exhibited concentrations below GCLs, with the exception of DRO, which was slightly above the GCL at both wells.

DRO results for every sample collected from MW-8 since the well was installed in 2005 have exceeded the diesel solubility limit of 3.9 mg/L (API 2000). This observation suggests that groundwater in the source area is in contact with LNAPL. However, LNAPL has never been observed in this well and no product or sheen was observed during the UST removal.

The results for the PAH sample collected from MW-8 are shown in Table 5. All analyte concentrations were either below the method reporting limit (MRL) or detected below the respective GCL. Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene, were detected in excess of the screening level (one-tenth of the applicable cleanup level) at MW-8.

3.3. Bioventing System Monitoring

Table 7 presents the cumulative monitoring results of the bioventing system including the results from the September 28, 2015 monitoring event. The level of carbon dioxide, which is produced as a by-product of the aerobic biodegradation of hydrocarbons, remains well above the atmospheric background of 0.038%, which suggests that respiration from microbial activity is occurring in the vadose zone. The carbon dioxide concentrations were slightly lower than average in 2015, indicating that respiration from microbial activity is occurring but perhaps at a slower rate than past years. Oxygen levels ranged from 16.5 to 18.5 percent indicating that microbial activity may be depleting some oxygen supply but oxygen levels remain sufficient for aerobic biodegradation. Oxygen levels were slightly higher than historic average oxygen levels since 2006 in 4 of the 6 lines, suggesting less aerobic biodegradation is taking place in recent years. TVH measurements at lines 1 and 5 indicate that contaminant vapors remain present in the vadose zone soil.

4. QUALITY ASSURANCE REVIEW

An ADEC Laboratory Data Review Checklist was completed to evaluate the quality of laboratory reports of analytical data for the samples collected during the 2015 monitoring activities. The ADEC Laboratory Data Review Checklist (ADEC 2010c) is provided in Appendix C. Per ADEC's *Technical Memorandum on Environmental Laboratory Data and Quality Assurance Requirements*, the quality assurance summary (below) describes quality assurance parameters and the impact that any discrepancies have on the quality and usability of the data.

Groundwater samples were analyzed for the following parameters:

- DRO by AK102
- GRO by AK101
- BTEX by EPA8021B
- PAHs by 8270SIM

4.1. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing LCS/LCSDs, MS/MSDs and field duplicate pairs for this project, with exceptions noted in above sections. Field duplicate samples were collected in accordance with sampling plan specifications. Field duplicate RPDs met applicable control limits, with exceptions noted in above sections. Recoveries and RPDs for all LCS/LSCD and MS/MSD samples were within required limits, with exceptions noted in above sections.

4.2. Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental condition. The number and selection of samples were specified in the sampling plan and verified in the field to account accurately for site variations and sample matrices. The DQO for representativeness was met.

4.3. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

$$\%\ \text{completeness} = \frac{\text{number of valid (i.e., non-R flagged) results}}{\text{number of possible results}}$$

All requested analyses were performed in accordance with Work Plan specifications. No sample results were rejected, noting that sample results for sample 15-HLA-MW8MSD-1011 should not be used due to the laboratory reporting results for submitted MS/MSD sample. All primary samples that were submitted were analyzed; therefore, completeness for this project is 100%.

4.4. Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this project followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

4.5. Data Summary

The data quality was determined as acceptable or estimated. Acceptable data are associated with QC data that meet all QC criteria or with QC samples that did not meet QC criteria but data quality objectives were not affected. Estimated, "J", results are considered inaccurate due to a bias created by matrix interference or QC acceptance criteria which were not met. The EPA National Functional Guidelines (EPA 2008) were used to evaluate the acceptability of the data.

Data quality meets established DQO established for this project. Data are suitable for their intended use.

5. CONCEPTUAL SITE MODEL

The data from the 2015 monitoring event was evaluated in order to update the conceptual site model (CSM) for the site. The CSM was completed in accordance with the ADEC Policy Guidance on Developing Conceptual Site Models, updated in October 2010. No new receptors or exposure pathways were identified in 2015, so the CSM graphical and scoping forms completed in 2011 are applicable and are presented in Appendix D.

The CSM scoping form in Appendix D outlines the current and future receptors for the property. Access to the site is restricted to Matson personnel and approved visitors. The current and future receptors of all completed pathways at the site consist of commercial or industrial workers, site visitors or trespassers, and construction workers.

The source area includes the petroleum contaminated soil and groundwater in the vicinity of the three USTs that historically supplied fuel to the fueling canopy. The complete exposure pathways are:

- Incidental soil ingestion,
- Dermal absorption of contaminants from soil,
- Dermal absorption of contaminants from groundwater,
- Ingestion of groundwater, and
- Inhalation of indoor and outdoor air.

The site is paved with asphalt, which prevents current contact with the subsurface soil, groundwater and soil gas. The incidental ingestion, dermal absorption and inhalation of outdoor air pathways could potentially affect future receptors in the case that the asphalt were removed.

Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene, constituents found in diesel fuel are included in the chemicals noted for potential dermal absorption exposure (Appendix B of the Policy Guidance on Developing Conceptual Site Models, ADEC 2010). These three chemicals were detected in excess of the screening level (one-tenth of the applicable cleanup level) at MW-8. Therefore, the dermal exposure pathway is considered complete at the site.

The nearest surface water body, the Cook Inlet, is not recognized as a current or potential future drinking water source, so the ingestion of surface water pathway is considered incomplete. The ingestion of wild foods pathway does not exist because the site is industrial and secured, which prevents the harvest and ingestion of wild foods.

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6. CONCLUSIONS AND RECOMMENDATIONS

Although groundwater hydrocarbon concentrations continue to exceed GCLs, especially in wells located in the vicinity of the former UST excavation, evaluation of the results of the 2015 groundwater monitoring event do not indicate offsite migration of the contaminant plume is occurring. Across the site (including both upgradient and downgradient wells), DRO concentrations were higher in 2015 than they have been in recent years, while benzene concentrations remained consistent with recent years.

Monitoring of the bioventing system continues to show that in the vicinity of the passive bioventing system lines, conditions support the aerobic biodegradation of volatile hydrocarbons. The carbon dioxide concentrations remain above background levels and oxygen concentrations remain sufficient to support aerobic biodegradation in the vadose zone.

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TABLES

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TABLE 3: GROUNDWATER ELEVATION MEASUREMENTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Monitoring Well	Relative TOC[1,2] Elevation (Feet)	Depth to Groundwater (Feet)	Relative Groundwater Elevation (Feet)
HC-1	97.6	7.12	90.48
HC-3	99.12	7.21	91.91
HC-6	97.83	8.65	89.18
MW-8	98.18	6.49	91.69

Notes:

1. Relative TOC established by ERM on 10/25/2013.
2. TOC = top of casing
3. HC-1 was cut by 1.0 inch on 9/20/2015, after the depth to groundwater measurement was taken. The new relative TOC elevation is reflected in this table.
4. MW-10 has been paved over and is not included in the 2015 study results.

TABLE 4: GROUNDWATER ANALYTICAL RESULTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Monitoring Well	Petroleum Hydrocarbon Concentration [mg/L]					
	AK 101					AK 102
	Benzene	Toluene	Ethylbenzene	Xylenes	GRO	DRO
ADEC Groundwater Cleanup Level[3]	0.005	1.0	0.7	10	2.2	1.5
HC-1	**1.1**	0.0011	0.140	0.310	**3.8**	**7.5**
HC-3	0.0031	ND (0.001)	ND (0.001)	ND (0.003)	ND (0.1)	**2.5**
HC-6	ND (0.0002)	ND (0.001)	ND (0.001)	ND (0.003)	ND (0.1)	**2.8**
MW-8	**1.9**	ND (0.2)	**1.6**	**12**	**48**	**23**
HC-Z (Duplicate of MW-8)	**2.3**	0.096	**2**	**13**	**61**	**22**

Notes:
1. Value in parantheses is the laboratory reporting limit.
2. Groundwater cleanup Levels from 18 AAC 75.345, Table C (2015)
3. MW-10 has been paved over and is not included in the 2015 study results.

Key:
ADEC = Alaska Department of Environmental Conservation
Bold = Concentrations above ADEC Groundwater Cleanup Levels (18 AAC 75)
DRO = Diesel range organics
GRO = Gasoline range organics
mg/L = milligrams per liter
ND = Not detected above the reporting limit shown in parentheses

TABLE 5: GROUNDWATER ANALYTICAL RESULTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Analyte	PAH Concentration[2] (mg/L)		ADEC Cleanup Level[1] (mg/L)
	MW-8	MW-Z (Duplicate of MW-8)	
Acenaphthene	0.00053	0.00043	2.2
Acenaphthylene	ND (0.0001)	ND (0.0001)	2.2
Benzo[a]anthracene	ND (0.0001)	ND (0.0001)	0.0012
Benzo[a]pyrene	ND (0.0001)	ND (0.0001)	0.0002
Benzo[b]fluoranthene	ND (0.0001)	ND (0.0001)	0.0012
Benzo[g,h,i]perylene	ND (0.0001)	ND (0.0001)	1.1
Benzo[k]fluoranthene	ND (0.0001)	ND (0.0001)	0.0012
Chrysene	ND (0.0001)	ND (0.0001)	0.12
Dibenz(a,h)anthracene	ND (0.0001)	ND (0.0001)	0.00012
Fluoranthene	ND (0.0001)	ND (0.0001)	1.5
Fluorene	0.00058	0.00047	1.5
Indeno[1,2,3-cd]pyrene	ND (0.0001)	ND (0.0001)	0.0012
Phenanthrene	0.00039	0.0003	11
Pyrene	ND (0.0001)	ND (0.0001)	1.1
Anthracene	ND (0.0001)	ND (0.0001)	11
1-Methylnaphthalene	0.048 J-D	0.033 J-D	0.15
2-Methylnaphthalene	0.066 J-D	0.046 J-D	0.15
Naphthalene	0.220 J-D	0.140 J-D	0.73

Notes:
1. Groundwater cleanup levels from 18 AAC 75.345, Table C (2015)
2. Samples were analyzed by method 8270D SIM
3. Value in parantheses is the method reporting limit (MRL)

Key:
ADEC = Alaska Department of Environmental Conservation
Bold = Concentrations above ADEC Groundwater Cleanup Levels (18 AAC 75)
mg/L = milligrams per liter
ND = Not detected above the reporting limit shown in parentheses
PAH = Polyaromatic hydrocarbon
J-D = Reported value is considered estimated due to the primary and duplicate sample results not meeting quality control criteria.

TABLE 6: CUMULATIVE GROUNDWATER ANALYTICAL RESULTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Monitoring Well	Date of Sample	Hydrocarbon Concentrations (mg/L)					
		Benzene	Toluene	Ethylbenzene	Xylenes	GRO	DRO
ADEC GW Cleanup Level	2013	0.005	1.0	0.7	10	2.2	1.5
G-1-96	Nov-02	ND (0.0005)	ND (0.002)	ND (0.002)	ND (0.004)	ND (0.09)	ND (0.556)
HC-1	Oct-2000	**8.06**	0.567	0.678	3.865	**27.7**	**6.27**
	Nov-2002	**7.55 J**	0.021 J	**0.916 J**	4.081 J	**24.8 J**	**6.78**
	Nov-2004	**6.42**	0.023	**0.816**	3.03	**21.6**	**10.7**
	Mar-2005	**3.76**	0.009	0.507	1.76	**14.3**	**7.64**
	Nov-2005	**2.34**	0.00581	0.307	1.08	**11.1**	**6.53**
	Apr-2006	**1.94**	0.00597 J	0.305	1.04	**8.25**	**4.94**
	Nov-2006	**2.21**	ND (0.025)	0.269	0.604	**9.35**	**6.85**
	Apr-2007	**1.7**	ND (0.005)	0.228	0.527	**6.62**	**4.88**
	Oct-2007	**1.25**	ND (0.005)	0.157	0.232	**4.39**	**6.05**
	Apr-2008	**0.653**	ND (0.005)	0.0758	0.165	1.73	1.31
	Jun-2009	**0.734**	0.00275 J	0.19	0.282	**2.73 J**	**3.86**
	Oct-2010	**1.05**	0.0037	0.600	4.76	**1.93**	**2.70**
	Aug-2011	**0.875**	0.000827	0.146	0.228	**3.650**	**2.51**
	Oct-2013	**0.737**	ND (0.005)	0.0893	0.159	**2.26**	**2.95**
	Sept-2015	**1.10**	0.0011	0.140	0.310	**3.80**	**7.50**
HC-2B	Oct-00	0.0012	ND (0.002)	0.005	0.069	0.310	**3.61**
	Nov-02	0.0006	ND (0.002)	0.004	0.049	0.310	**1.55**
	Nov-04	0.0016	ND (0.0005)	0.0049	0.079	0.280	**2.5**
	Mar-05	0.0005	ND (0.0005)	0.0021	0.014	0.110	**1.55**
	Nov-05	0.000904	ND (0.0005)	0.00399	0.0499	0.232	1.36
	Apr-06	ND (0.0005)	ND (0.0005)	0.00201	0.0233	0.138	1.11
	Nov-06	ND (0.0005)	ND (0.0005)	0.000871	0.0169	0.159	1.29
	Apr-07	ND (0.0005)	ND (0.0005)	0.0011	0.013	0.111	0.863
	Oct-2007	NS	NS	NS	NS	NS	**1.57**
	Apr-2008	NS	NS	NS	NS	NS	1.06
	Jun-2009	NS	NS	NS	NS	NS	1.14
HC-3	Oct-00	**0.0244**	ND (0.002)	ND (0.002)	0.003	0.21	**2.18**
	Nov-02	**0.0107**	ND (0.002)	ND (0.002)	ND (0.0004)	ND (0.09)	0.82
	Nov-04	0.004	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	0.726
	Mar-05	**0.0068**	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.06	ND (0.394)
	Nov-05	**0.00566**	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.0665	0.68
	Apr-06	0.00315	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.0568	1.25
	Nov-2006	**0.00855**	ND (0.0005)	ND (0.0005)	ND (0.0015)	4	1.09
	Apr-2007	0.00322	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.0654	0.640
	Oct-2007	0.00262	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.0577	1.14
	Apr-2008	0.00432	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.205	1.05
	Jun-2009	**0.0088**	ND (0.001)	ND (0.001)	0.00677	0.207	**2.20**
	Oct-2010	0.00301	ND (0.001)	ND (0.001)	ND (0.003)	ND (0.050)	0.603
	Aug-2011	**0.00604**	ND (0.0005)	ND (0.0005)	ND (0.0015)	0.0552	0.931
	Oct-2013	0.002	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	0.848
	Sept-2015	0.0031	ND (0.001)	ND (0.001)	ND (0.003)	ND (0.1)	**2.5**

TABLE 6: CUMULATIVE GROUNDWATER ANALYTICAL RESULTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Monitoring Well	Date of Sample	Hydrocarbon Concentrations (mg/L)					
		Benzene	Toluene	Ethylbenzene	Xylenes	GRO	DRO
ADEC GW Cleanup Level	2013	0.005	1.0	0.7	10	2.2	1.5
HC-4	Aug-2011	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.050)	ND (0.385)
HC-5	Nov-02	ND (0.0005)	ND (0.0002)	ND (0.0002)	ND (0.0004)	ND (0.09)	0.668
	Nov-04	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	ND (0.431)
	Mar-05	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	**2.67**
	Nov-05	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	ND (0.391)
	Apr-06	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	ND (0.391)
HC-6	Nov-02	ND (0.0005)	ND (0.0002)	ND (0.0002)	ND (0.0004)	ND (0.09)	ND (0.581)
	Nov-04	0.004	ND (0.0005)	ND (0.0005)	0.002	ND (0.05)	0.949
	Mar-05	**0.0144**	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	**1.74**
	Nov-05	0.000502	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	0.468
	Apr-06	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	ND (0.417)
	Nov-06	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	**1.78**
	Apr-07	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	0.870
	Oct-07	NS	NS	NS	NS	NS	**2.86**
	Apr-08	NS	NS	NS	NS	NS	0.715
	Jun-09	NS	NS	NS	NS	NS	0.842
	Oct-10	NS	NS	NS	NS	NS	0.586
	Aug-2011	NS	NS	NS	NS	NS	1.40
	Oct-2013	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	**1.54**
	Sept-2015	ND (0.0002)	ND (0.001)	ND (0.001)	ND (0.003)	ND (0.1)	**2.8**
MW-8	Nov-2005	**5.55**	**9.45**	**1.54**	**13.7**	**91.5**	**33.8**
	Apr-2006	**6.66**	**15.6**	**2.2**	**17.8**	**107**	**47.6**
	Nov-2006	NS	NS	NS	NS	NS	NS
	Apr-2007	**5.87**	**12.6**	**2.29**	**19**	**114**	**29.7**
	Oct-2007	**4.9**	**9.85**	**1.5**	**17.9**	**106**	**32.1**
	Apr-2008	**2.68**	**12.5**	**2.44**	**20.3**	**82.8**	**25.1**
	Jun-2009	**2.41**	**4.35**	**2.06**	**15.3**	**101**	**25.4 J-B**
	Oct-2010	**1.82**	**2**	**2.2**	**18.1**	**98.1**	**17.7**
	Aug-2011	**1.840**	0.287	**1.840**	**14.100**	**59.000**	**16.6**
	Aug-2011[1]	**1.780**	0.273	**1.770**	**13.700**	**59.600**	**20.4**
	Oct-2013	**1.38**	0.13	**1.51**	**11**	**24.1**	**17.7**
	Oct-2013[1]	**1.43**	0.138	**1.63**	**12**	**27.4**	**15.2**
	Sept-2015[1]	**1.9**	ND (0.2)	**1.6**	**12**	**48**	**23**
MW-9	Nov-05	**5.20**	**1.02**	**1.63**	**10.1**	**56.2**	**33.3**
	Apr-06	**7.94**	0.742	**2.47**	**12.9**	**66**	**35.6**
	Nov-06	**7.40**	0.369	**2.2**	9.90	**61.1**	**21.9**
	Apr-07	**7.42**	ND (0.25)	**1.99**	9.54	**56.3**	**24.2**
	Oct-07	**8.16**	0.114	**1.36**	6.20	**45.6**	**21.0**
	Apr-08	**5.69**	0.062	**0.713**	3.19	**18.0**	**11.0**
	Jun-09	**1.90**	0.0137	0.0638	0.318	**3.77**	**9.00 J-B**
	Oct-10	**1.92**	0.017	0.54	4.46	**3.95**	**6.53**
	Aug-2011	**0.104**	0.00133	0.00607	0.0283	0.447	**2.08**

TABLE 6: CUMULATIVE GROUNDWATER ANALYTICAL RESULTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Monitoring Well	Date of Sample	Hydrocarbon Concentrations (mg/L)					
		Benzene	Toluene	Ethylbenzene	Xylenes	GRO	DRO
ADEC GW Cleanup Level	2013	0.005	1.0	0.7	10	2.2	1.5
MW-10	Nov-06	0.00427	0.0017	0.0054	0.0322	0.133	0.761
	Apr-07	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	**2.03**
	Oct-07	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	ND (0.394)
	Apr-08	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	ND (0.427)
	Oct-2013	**0.00503**	0.00115	0.00857	0.0707	0.137	NS
MW-11	Nov-06	**0.00629**	0.00136	0.00433	0.027	0.126	1.00
	Apr-07	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	1.06
	Oct-07	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0015)	ND (0.05)	0.779
	Apr-08	NS	NS	NS	NS	NS	NS
	Jun-09	NS	NS	NS	NS	NS	ND (0.397) J-B

Notes:
1. Duplicate Sample
2. Value in parantheses is the laboratory reporting limit.

Key:
ADEC = Alaska Department of Environmental Conservation
Bold = Concentrations above ADEC Groundwater Cleanup Levels (18 AAC 75)
DRO = Diesel range organics
GRO = Gasoline range organics
mg/L = milligrams per liter
ND = Not detected above the reporting limit shown in parentheses

TABLE 7: CUMULATIVE BIOVENTING SYSTEM MEASUREMENTS
2015 LONG-TERM GROUNDWATER MONITORING REPORT
PORT OF ANCHORAGE TERMINAL FACILITY

Line	Nov-06	Apr-07	Oct-07	Aug-09	Oct-10	Aug-11	Oct-13	Sep-15	Average
Oxygen [%]									
1	20.1	17.6	16	19.1	19	20.3	20.6	16.6	18.7
2	18.3	15.1	12.8	15.3	15.2	17.3	19.4	16.5	16.2
3	16.4	16.4	14.5	17.4	16.6	18.7	20.9	18.5	17.4
4	20.9	20.9	13.6	16.6	16.5	18.1	20.9	17.6	18.1
5	20.9	14.5	12.5	15.3	16.2	16.2	19.5	16.6	16.5
6	13.5	18.1	17.9	16.5	18.2	17.8	20.1	18.5	17.6
Carbon Dioxide [%]									
1	0.3	1.8	3.4	1.3	1.3	1.5	1.2	2.2	1.6
2	2	3	5.5	4	4.1	3.7	1.7	2.46	3.3
3	3.2	2.2	4.3	2.4	3.2	2.5	0.4	1.02	2.4
4	0.3	0	4.6	2.9	3.6	3	1.24	0.74	2.0
5	0.9	3	5.7	4	3.8	4.7	1.6	2.6	3.3
6	4.5	1.6	1.9	3.4	2.1	3.3	1.4	1.86	2.5
Total Volatile Hydrocarbons [ppm]									
1	10	160	160	0	0	55	25	5	51.9
2	25	780	110	0	0	20	0	0	116.9
3	0	420	120	0	0	35	15	0	73.8
4	15	0	110	0	0	25	0	0	18.8
5	20	320	90	0	0	0	0	25	56.9
6	50	110	100	0	0	15	0	0	34.4

Key:
ppm = parts per million
NA = Not Available

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FIGURES

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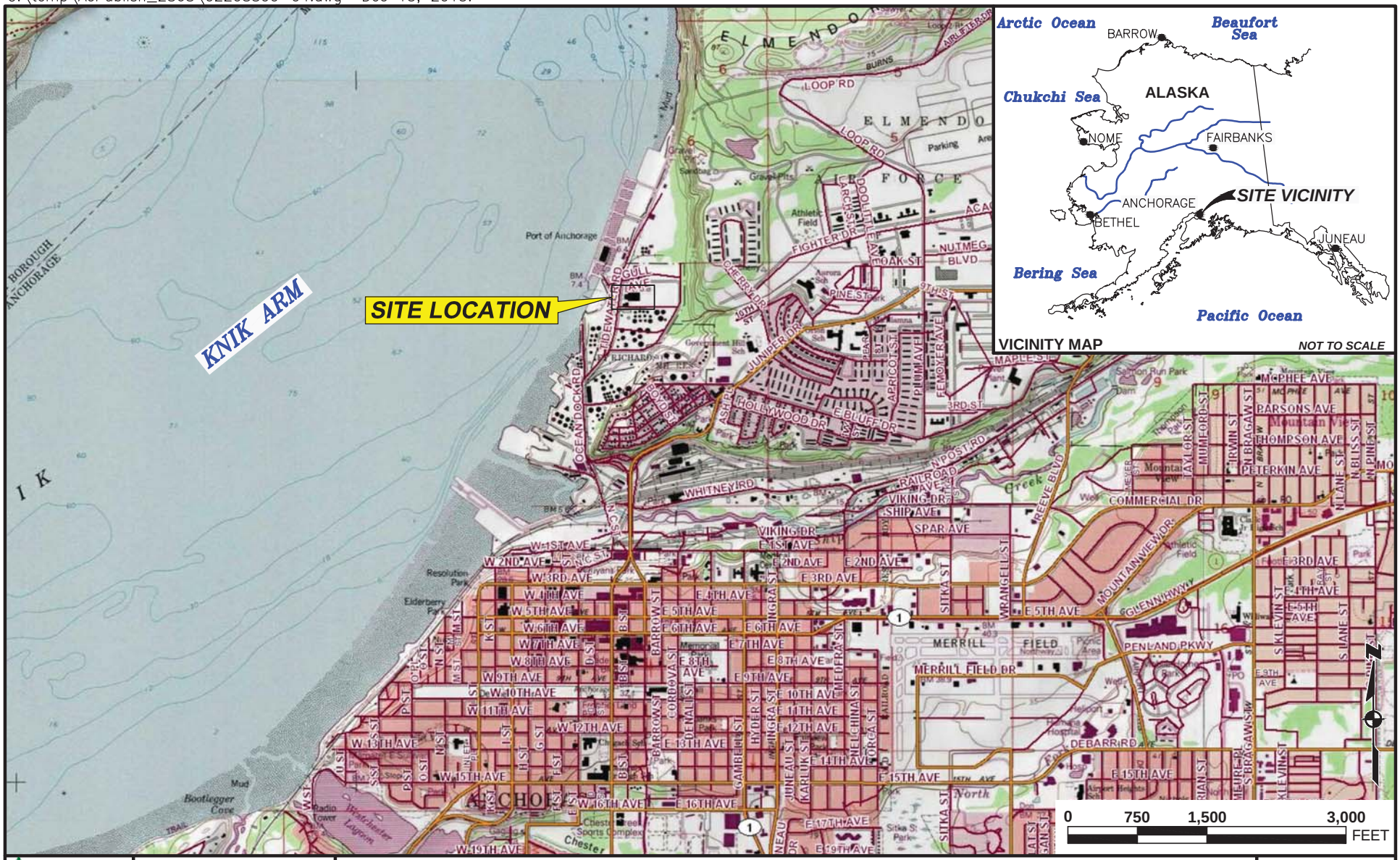

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DATE: DEC. 2015
CHKD: K.J.
DRAWN: J.S.E.
PROJ. No.: 0220880

825 W. 8th Ave., Anchorage, AK 99501, (907) 258-4880

SITE LOCATION MAP

LONG-TERM MONITORING REPORT
Matson
Anchorage, Alaska

FIGURE
1

SOURCE: TOPO IMAGE FROM NATIONAL GEOGRAPHIC SOFTWARE 2006.

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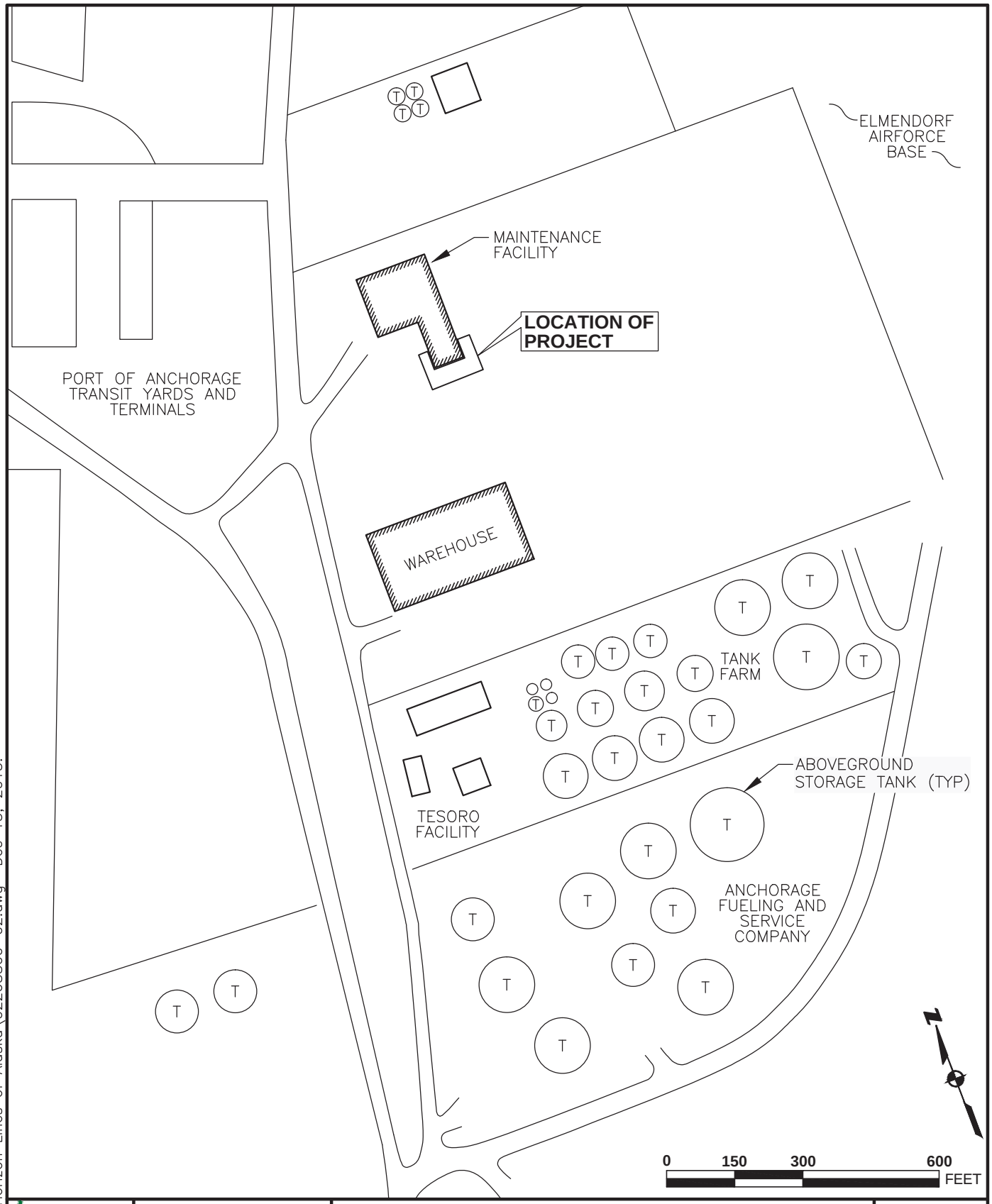

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DATE: DEC. 2015
CHKD: K.J.
DRAWN: J.S.E.
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SITE PLAN

LONG-TERM MONITORING WORK PLAN
Matson
Anchorage, Alaska

FIGURE

2

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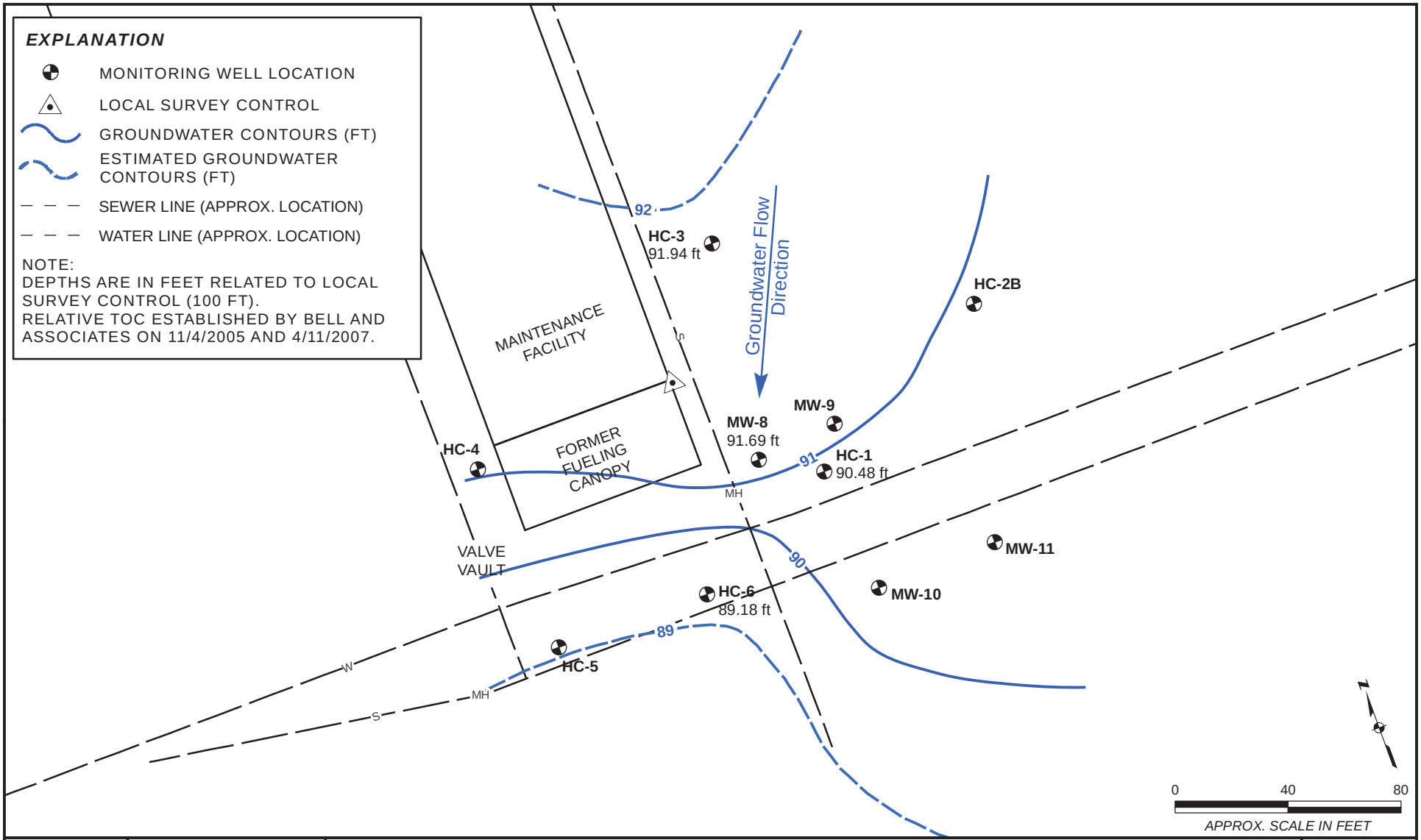

ERM

DATE: DEC. 2015
CHKD: K.M.J.
DRWN: J.S.V.
PROJ. No.: 0220880

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PIEZOMETRIC SURFACE MAP (09/28/2015)

LONG-TERM-MONITORING REPORT
MATSON
Anchorage, Alaska

FIGURE
3

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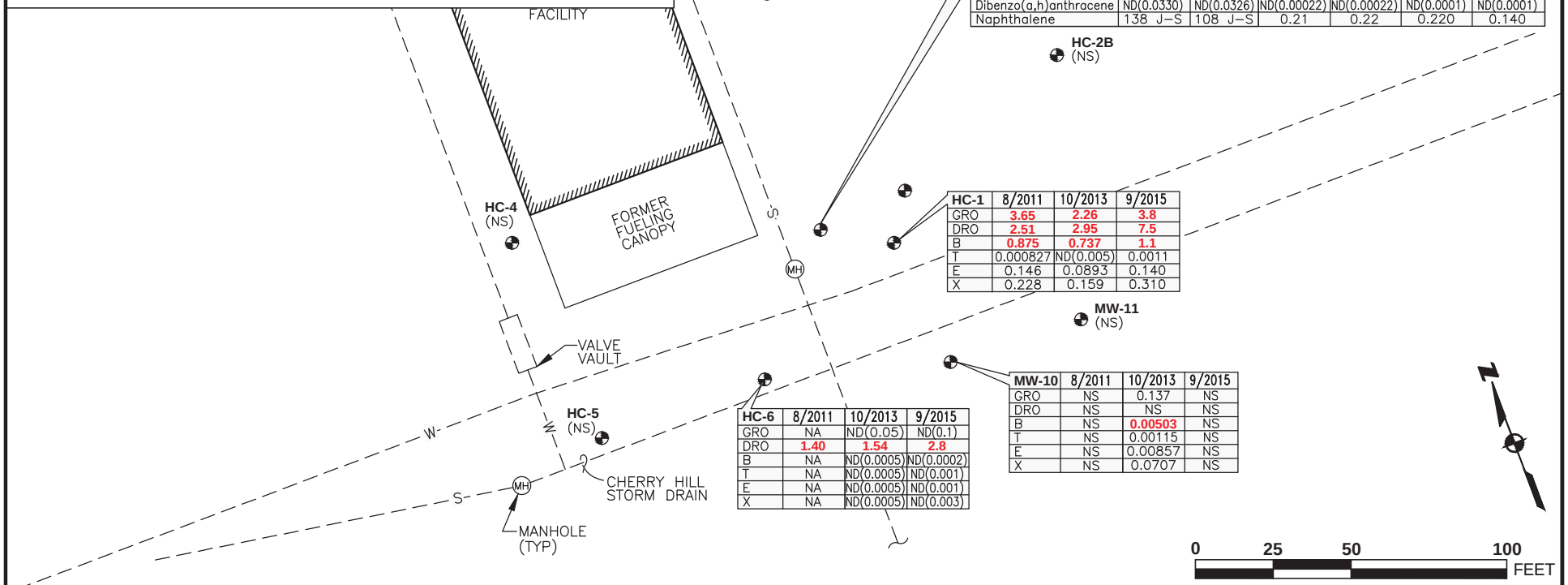
LEGEND

HC-1	MONITORING WELL LOCATION
GRO	GASOLINE-RANGE ORGANICS (mg/L)
DRO	DIESEL-RANGE ORGANICS (mg/L)
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES (mg/L)
ND	NOT DETECTED
NA	NOT ANALYZED
(NS)	NOT SAMPLED
J-S	ESTIMATED DUE TO SURROGATE RECOVERY FAILURE
--S--	SEWER LINE (APPROX. LOCATION)
--W--	WATER LINE (APPROX. LOCATION)

NOTE:
BOLD/RED TEXT INDICATES AN EXCEEDANCE OF ADEC GROUNDWATER CLEANUP LEVELS.

HC-3	8/2011	10/2013	9/2015
GRO	0.0552	ND(0.05)	ND(0.1)
DRO	0.931	0.848	**2.5**
B	0.00604	0.002	0.0031
T	ND	ND(0.0005)	ND(0.001)
E	ND	ND(0.0005)	ND(0.001)
X	ND	ND(0.0015)	ND(0.003)

MW-8	8/2011	(DUP.)	10/2013	(DUP.)	9/2015	(DUP.)
GRO	**59**	**59.6**	**24.1**	**27.4**	**48**	**61**
DRO	**16.6**	**20.4**	**17.7**	**15.2**	**23**	**22**
BENZENE	**1.84**	**1.78**	**1.38**	**1.43**	**1.9**	**2.3**
TOLUENE	0.287	0.273	0.130	0.138	ND(0.2)	0.096
ETHYLBENZENE	**1.84**	**1.77**	**1.51**	**1.63**	**1.6**	**2**
XYLENES	**14**	**13.7**	**11**	**12**	**12**	**13**
1-Methylnaphthalene	28 J-S	23.2 J-S	0.047	0.050	0.048	0.033
2-Methylnaphthalene	38.3 J-S	32.6 J-S	0.075	0.079	0.066	0.046
Benzo(a)pyrene	ND(0.0330)	ND(0.0326)	ND(0.00011)	ND(0.00011)	ND(0.0001)	ND(0.0001)
Dibenzo(a,h)anthracene	ND(0.0330)	ND(0.0326)	ND(0.00022)	ND(0.00022)	ND(0.0001)	ND(0.0001)
Naphthalene	138 J-S	108 J-S	0.21	0.22	0.220	0.140



HC-1	8/2011	10/2013	9/2015
GRO	**3.65**	**2.26**	**3.8**
DRO	**2.51**	**2.95**	**7.5**
B	**0.875**	**0.737**	**1.1**
T	0.000827	ND(0.005)	0.0011
E	0.146	0.0893	0.140
X	0.228	0.159	0.310

MW-10	8/2011	10/2013	9/2015
GRO	NS	0.137	NS
DRO	NS	NS	NS
B	NS	**0.00503**	NS
T	NS	0.00115	NS
E	NS	0.00857	NS
X	NS	0.0707	NS

HC-6	8/2011	10/2013	9/2015
GRO	NA	ND(0.05)	ND(0.1)
DRO	**1.40**	**1.54**	**2.8**
B	NA	ND(0.0005)	ND(0.0002)
T	NA	ND(0.0005)	ND(0.001)
E	NA	ND(0.0005)	ND(0.001)
X	NA	ND(0.0005)	ND(0.003)

ERM

DATE: DEC. 2015
CHKD: K.J.
DRAWN: J.S.E.
PROJ. No.: 0220880

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ANALYTICAL RESULTS

LONG-TERM MONITORING REPORT
Matson
Anchorage, Alaska

FIGURE
4

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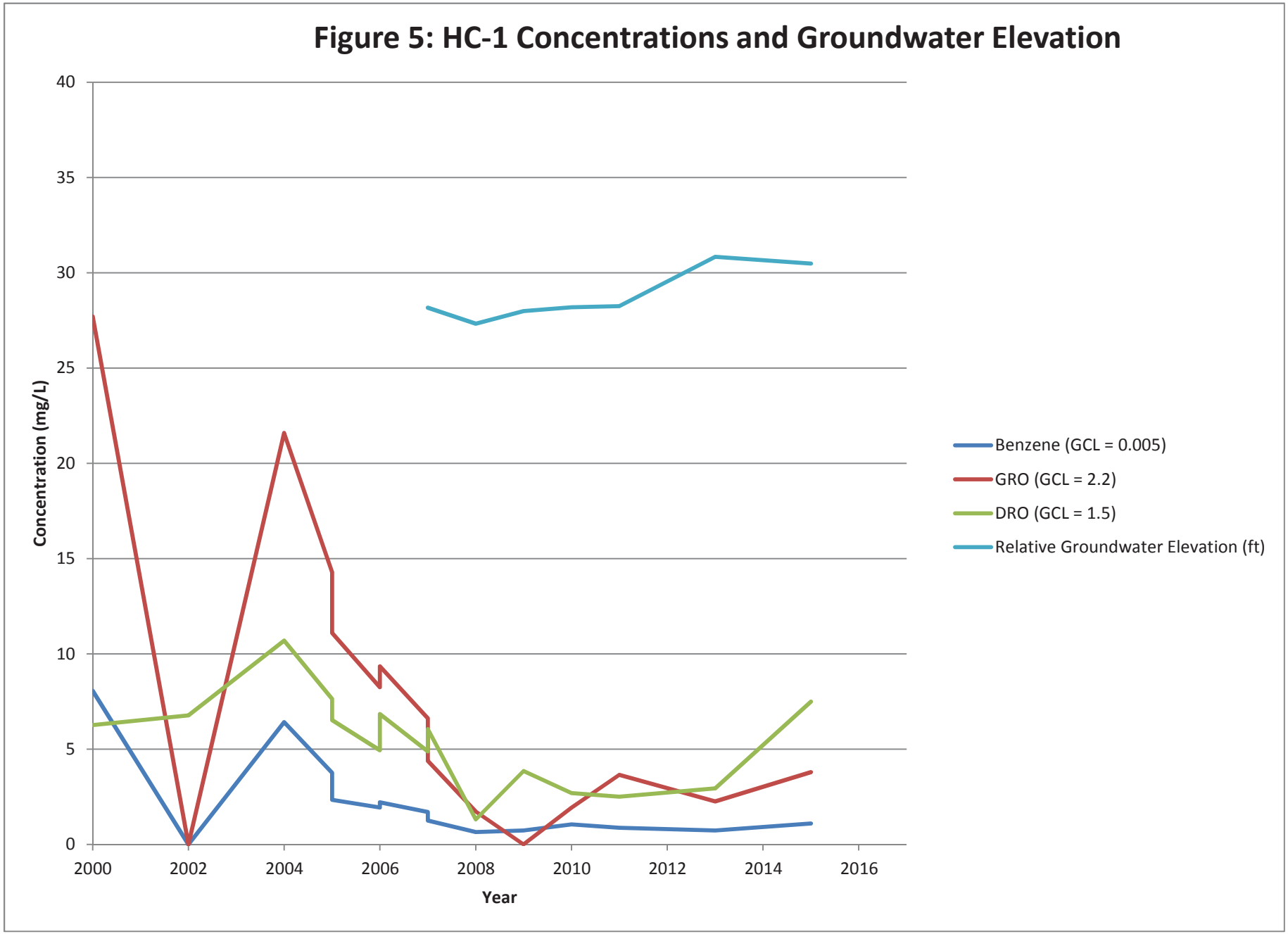
Figure 5: HC-1 Concentrations and Groundwater Elevation
Concentration (mg/L)
40
35
30
25
20
15
10
5
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Benzene (GCL = 0.005)
GRO (GCL = 2.2)
DRO (GCL = 1.5)
Relative Groundwater Elevation (ft)

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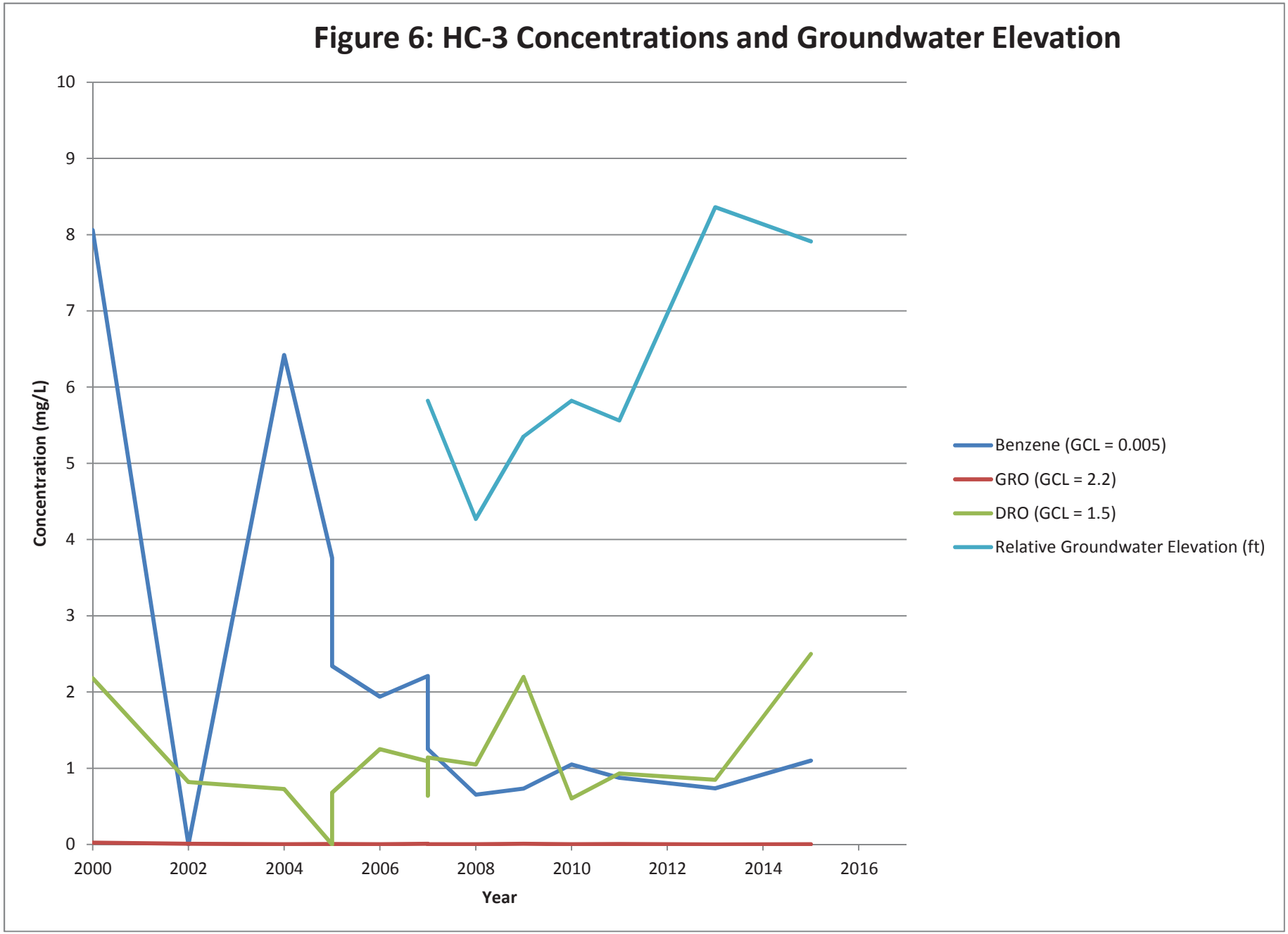
Figure 6: HC-3 Concentrations and Groundwater Elevation
Concentration (mg/L)
10
9
8
7
6
5
4
3
2
1
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Benzene (GCL = 0.005)
GRO (GCL = 2.2)
DRO (GCL = 1.5)
Relative Groundwater Elevation (ft)

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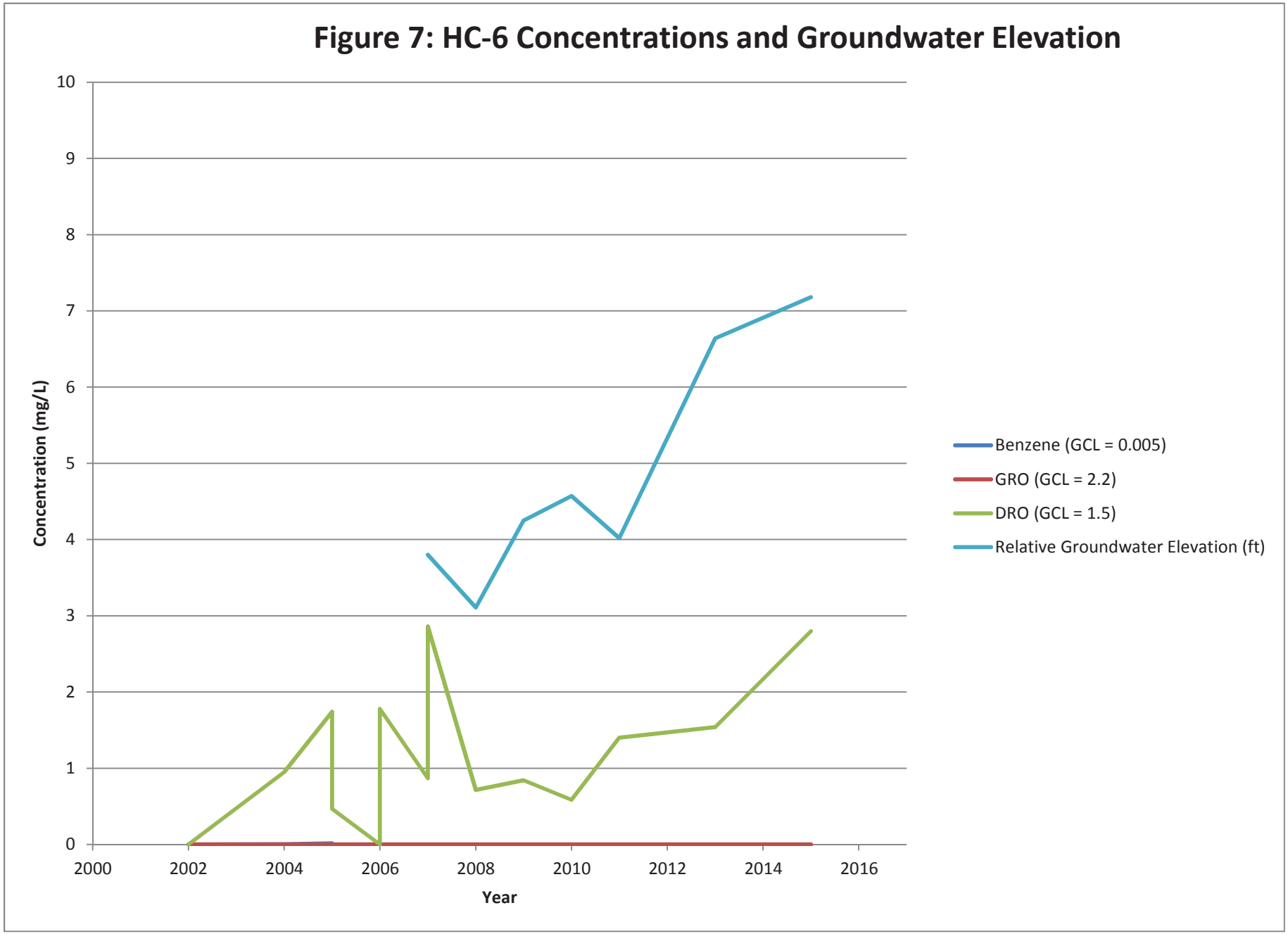
Figure 7: HC-6 Concentrations and Groundwater Elevation
Concentration (mg/L)
10
9
8
7
6
5
4
3
2
1
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Benzene (GCL = 0.005)
GRO (GCL = 2.2)
DRO (GCL = 1.5)
Relative Groundwater Elevation (ft)

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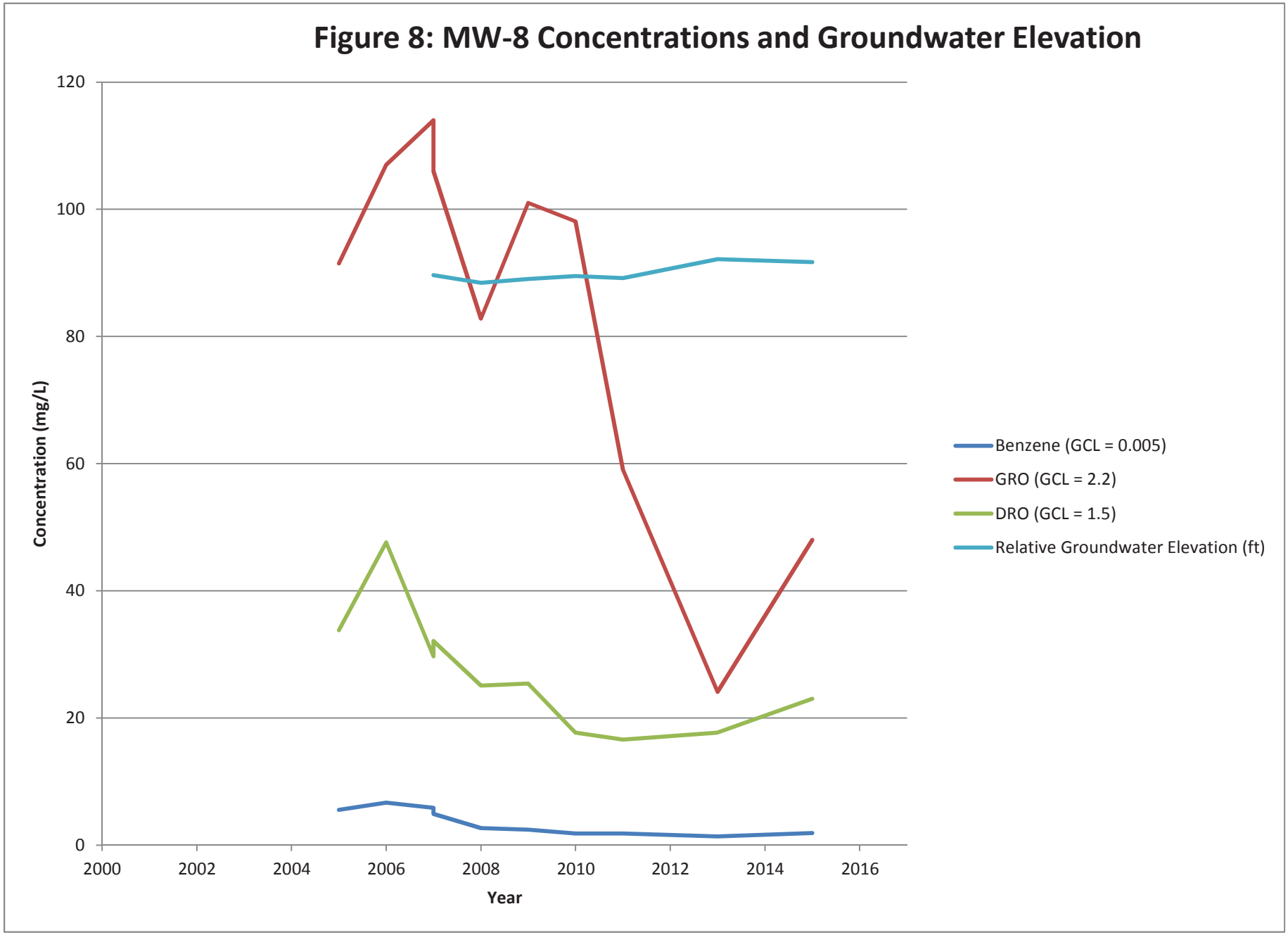
Figure 8: MW-8 Concentrations and Groundwater Elevation
120
100
80
60
40
20
0
Concentration (mg/L)
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Benzene (GCL = 0.005)
GRO (GCL = 2.2)
DRO (GCL = 1.5)
Relative Groundwater Elevation (ft)

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APPENDIX A

Field Notes

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New file #
0220880
2013 Proj #

Horizon Lines
GW Monitoring
Anchorage, AK
OASIS # 271-001

4 5/8" x 7" - 64 Pages

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28 Sept 2015 K. BRAGG & K. Johnson
0600 Calibrate YSI & RKI
0730 Load truck
0745 Depart office for location
0800 Check in @ Port site walk w/client
0815 Safety meeting
0830 Begin BioVent & set up on Sample HC3

Lines (L to R)	HEX (PPM)	O_2 %	CO_2 %	Sample time
1	5PPM	16.6	2.20	15:10
2	0	16.5	2.46	15:16
3	0	18.5	1.02	15:28
4	0	17.6	0.74	15:35
5	Ø25	16.6	2.60	15:45
6	0	18.5	1.86	15:55

0930 RKI needs Batteries Replaced
Replaced Batteries. Still Not Working. Will investigate RKI @ lunch.
1000 Set up on MW-10. Unable to locate MW-10. looks like it was covered up by new pavement job.
1050 Begin to sample HC3

1100 Set up on HC1 and HC6
1245 Sample HC6
1320 Sample HC1 need to fix pumps
1345 Lunch break
note: HC-1 is frost-jacked & needs new monument & trim. We were able to place monument cover on well, but not screw down. see photo.
1430 Stop by office get more tubing talk w PK about MW10

1500 Set up on MW-8 & collect BioVent Data. See previous page for BioVent readings. Purge each line for 4 min before taking reading
1600 Done BioVenting open system valves back up.
1610 Cut 1 inch (one inch) off HC-1 to allow space for frost jacking
1715 email client & office for day. See next page for MW-8 sampling details

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(While KB samples bioventt,
KJ samples MW-8)

15:00 set up at MW-8
stabilize parameters

1545 sample MW-8 & MW-2 (dup)
@ MW-8

1615 collect MS/MSD @ ~~8~~ MW-8

9/28/15

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Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Well ID: HC1
Project # : 02 20880
Date: 09/28/2015
Project Name: Horizon (Hel LMP
Start Time: 1100
Site: Arc Port
End Time:
Field Team: KB & KS
Sample ID: Time: 1320 primary dup split ms/msd
Sample ID: Time: primary dup split ms/msd

Weather Conditions:

Depth to Top of Product (ft BTOC):
Depth to Oil/Water Interface* (ft BTOC):
* Note: Same as depth to water

Depth to Water (ft BTOC): 7.2 ft
Total Depth (ft BTOC): 13.1 ft
Final Depth (ft BTOC):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Notes
Temperature	>0.00 °C	± 0.5 °C	
pH	0-14	± 0.1	
Conductivity	0-99999 µS/cm	± 5%	
ORP	± 1999 mV		
Dissolved Oxygen	0-19.99 mg/L	± 10%	
Turbidity	0-800 NTU		

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical ?, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Instrument Observations

Flow Rate (ml/min)	Time	Temp °C	Spec. Cond. (mS/cm^C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down
350	1230	12.95	3.405	2.622	1.22	6.87	-53.8	Clear	Fuel	7.9	
350	1300	12.97	3.381	2.604	0.87	6.90	-78.8	"	"	8.8	
350	1305	12.75	3.315	2.540	1.40	6.94	-90.4	"	"	8.9	
350	1310	12.55	3.420	2.607	0.75	6.89	-89.7	"	"	9.1	
350	1315	12.64	3.379	2.581	0.71	6.86	-90.7	"	"	9.4	
350	1320	12.63	3.373	2.576	0.71	6.85	-93.7	"	"	9.7	

Notes: Drawdown should be less than 0.3 feet while sampling. Minimal drawdown shall be achieved and measured by pumping at a low rate (approximately 0.1 to 0.5 liter/minute) and continually measuring water levels in the well. Note that site's hyrogeology may make it difficult to achieve this specification.

Analyses	# of Bottles Collected	Bottle Type (preservative)	Comments:

Signed: Date: 9/28

Signed/reviewer Date:

Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Project # : 0220880
Project Name: Horizon Line1
Site:
Field Team: KJ, KB
Sample ID: HC-03 Time: 0945 primary dup split ms/msd
Sample ID: Time: primary dup split ms/msd

Well ID: HC-03
Date: 9/28
Start Time: 9:35
End Time:

Weather Conditions: rainy, 50°

Depth to Top of Product (ft BTOC): ~~7.21~~ NA
Depth to Oil/Water Interface* (ft BTOC): ~~7.21~~ NA
* Note: Same as depth to water

Depth to Water (ft BTOC): 7.21
Total Depth (ft BTOC): 13.62
Final Depth (ft BTOC):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Notes
Temperature	>0.00 °C	± 0.5 °C	
pH	0-14	± 0.1	
Conductivity	0-99999 µS/cm	± 5%	
ORP	± 1999 mV		
Dissolved Oxygen	0-19.99 mg/L	± 10%	if <0.5 → OK
Turbidity	0-800 NTU		

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical ?, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Instrument Observations

Flow Rate (ml/min)	Time	Temp °C	Spec. Cond. (mS/cm^C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down
		✓		+210 ✓	✓	✓					
400	1028	10.29	5.782	4206	4.51	5.53	66.7	clear	none	7.61	0.4
400	1031	10.75	5.896	4294	0.81	5.86	79.6	"	"	7.8	0.6
300	1034	10.82	5.895	4298	0.33	6.05	0.6	"	"	7.95	0.75
300	1040	10.74	5.907	4298	0.4	6.18	-18.2	"	"	8.24	0.94
200	1045	10.56	5.851	4286	0.44	6.21	-32.9	"	"	8.25	0.95
200	1050	10.57	5.828	4221	0.41	6.22	-35.8	"	"	8.25	0.95

Notes: Drawdown should be less than 0.3 feet while sampling. Minimal drawdown shall be achieved and measured by pumping at a low rate (approximately 0.1 to 0.5 liter/minute) and continually measuring water levels in the well. Note that site's hyrogeology may make it difficult to achieve this specification.

Analyses	# of Bottles Collected	Bottle Type (preservative)	Comments:
GRO	3	~~HCL~~ 40 ml, HCL	
DRO	2	1L, HCL	
BTEX	3	40 ml, HCL	

Signed: [signature] Date: 9/28
Signed/reviewer Date:

Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Project # : 0220880
Project Name: Hanzen Mines
Site:
Field Team: KT, KB
Sample ID: HC-06 Time: 1215 primary dup split ms/msd
Sample ID: Time: primary dup split ms/msd

Well ID: HC-6
Date: 9/28
Start Time:
End Time:

Weather Conditions: rainy, 50°

Depth to Top of Product (ft BTOC):
Depth to Oil/Water Interface* (ft BTOC):
* Note: Same as depth to water

Depth to Water (ft BTOC): 8.65
Total Depth (ft BTOC): 13.74
Final Depth (ft BTOC):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Notes
Temperature	>0.00 °C	± 0.5 °C	
pH	0-14	± 0.1	
Conductivity	0-99999 µS/cm	± 5%	
ORP	± 1999 mV		
Dissolved Oxygen	0-19.99 mg/L	± 10%	or <0.5
Turbidity	0-800 NTU		

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical ?, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Instrument Observations

Flow Rate (ml/min)	Time	Temp °C	Spec. Cond. (mS/cm^C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down
200	1212	9.93	3.623	2580	1.90	6.41	-26.8	clear	slight hydrocarbon	8.65	0
200	1217	9.68	3.651	2583	4.5	6.52	-31.3	clear	"	8.65	0
200	1222	9.67	3.664	2591	0.35	6.57	-29.0	"	"	8.65	0
200	1227	9.70	3.694	2615	0.28	6.60	-30.0	"	"	8.65	0
200	1232	9.66	3.705	2620	0.32	6.62	-33.2	"	"	8.65	0

Notes: Drawdown should be less than 0.3 feet while sampling. Minimal drawdown shall be achieved and measured by pumping at a low rate (approximately 0.1 to 0.5 liter/minute) and continually measuring water levels in the well. Note that site's hyrogeology may make it difficult to achieve this specification.

Analyses	# of Bottles Collected	Bottle Type (preservative)	Comments:
GRO/BTEX	6	40mL, HCL	good recharge
DRO	2	1L, HCL	

Signed: [signature] Date: 9/28
Signed/reviewer Date:

Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Project # : 0220880
Project Name: Horizon Lines
Site:
Field Team: KJ, KB
Sample ID: MW-8 Time: 1545 primary dup split ms/msd
Sample ID: Time: primary dup split ms/msd

Well ID: MW-8
Date: 9/28
Start Time: 15:00
End Time:

Weather Conditions: rainy, 50°

Depth to Top of Product (ft BTOC): —
Depth to Oil/Water Interface* (ft BTOC): —
* Note: Same as depth to water

Depth to Water (ft BTOC): 6.49
Total Depth (ft BTOC): 9.78
Final Depth (ft BTOC):

Criteria for Stable Parameters

Parameter	Working Range	Stability Criteria	Notes
Temperature	>0.00 °C	± 0.5 °C	
pH	0-14	± 0.1	
Conductivity	0-99999 µS/cm	± 5%	
ORP	± 1999 mV		
Dissolved Oxygen	0-19.99 mg/L	± 10%	or < 0.5
Turbidity	0-800 NTU		

Sensory Observations

Color: Clear, Amber, Tan, Brown, Grey, Milky White, Other:
Odor: None, Low, Medium, High, Very Strong, H2S, Fuel Like, Chemical ?, Unknown
Turbidity: None, Low, Medium, High, Very Turbid, Heavy Silts

Instrument Observations

± 130 ± 0.09 strong hydrocarbon

Flow Rate (ml/min)	Time	Temp °C	Spec. Cond. (mS/cm^C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down
200	1524	12.3	3.404	2625	2.9	6.4	-19.3	clear		6.49	0
200	1529	12.4	3.423	2598	0.46	6.48	-39.0	"	"	6.49	0
200	1534	12.54	3.3338	2543	0.38	6.54	-46.3	"	"	6.49	0
200	1539	12.61	3.292	2512	0.36	6.56	-48.4	"	"	6.49	0
200	1544	12.64	3.271	2498	0.30	6.57	-51.9	"	"	6.49	0

Notes: Drawdown should be less than 0.3 feet while sampling. Minimal drawdown shall be achieved and measured by pumping at a low rate (approximately 0.1 to 0.5 liter/minute) and continually measuring water levels in the well. Note that site's hyrogeology may make it difficult to achieve this specification.

Analyses	# of Bottles Collected	Bottle Type (preservative)	Comments:
DRO			good recharge
GRO/BTEX			

Signed: [signature] Date: 9/28
Signed/reviewer Date:

APPENDIX B

Analytical Results

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TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Anchorage
2000 West International Airport Road
Suite A10
Anchorage, AK 99502-1119
Tel: (907)563-9200

TestAmerica Job ID: 230-648-1
Client Project/Site: ERM Alaska

For:
ERM Alaska, Inc.
825 W 8th Ave, Suite 200
Anchorage, Alaska 99501-4427

Attn: Kate Bragg

Authorized for release by:
10/19/2015 11:25:34 AM

Wendy Jonas, Project Manager I
(253)922-2310
wendy.jonas@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 5
Client Sample Results 7
Surrogate Summary 14
QC Sample Results 16
QC Association Summary 26
Lab Chronicle 29
Certification Summary 31
Method Summary 32
Sample Summary 33
Chain of Custody 34
Receipt Checklists 36

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

GC/MS Semi VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
D	Sample results are obtained from a dilution; the surrogate or matrix spike recoveries reported are calculated from diluted samples.
H	Sample was prepped or analyzed beyond the specified holding time
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
E	Result exceeded calibration range.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 230-648-1

Laboratory: TestAmerica Anchorage

Narrative

Receipt
The samples were received on 9/29/2015 10:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.4º C and 6.1º C.

Receipt Exceptions

A trip blank was submitted for analysis with these samples; however, it was not listed on the Chain of Custody (COC).

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA
Method(s) 8270D SIM: Surrogate recovery for the following samples in preparation batch 280-297938 and 280-297938 and analytical batch 280-298545 was outside control limits: 15-HLA-MW8-1012 (230-648-4) and 15-HLA-MW8MSD-1011 (230-648-6). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

8270_SIM_LVI

GC Semi VOA
Method(s) AK102 & 103: Recoveries for samples surrogates fall within the method recovery limits of 50-150%.: 15-HLA-MW8MSD-1011 (230-648-6) and 15-HLA-MW8MSD-1011 (230-648-6[MS]).

Organic Prep
Method(s) 3510C: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with analytical batch 280-297938.

Method: 8270D_SIM (3510C_LVI)

Method(s) 3510C: The following sample formed emulsions during the extraction procedure: 15-HLA-MW8MSD-1011 (230-648-6). The emulsions were broken up using pour backs on all 3 extractions.

Batch: analytical batch 280-297938
Method: 8270D_SIM (3510C_LVI)

Method(s) 3510C: The following samples was prepared outside of preparation holding time due to sample MS and MSD were not requested until after the holding time expired.
15-HLA-MW8MSD-1011 (230-648-6), 15-HLA-MW8MSD-1011 (230-648-6[MS]) and 15-HLA-MW8MSD-1011 (230-648-6[MSD]).
analytical batch 280-298313
Method: 3510C_LVI/8270D_SIM

Method(s) 3510C: The following samples formed emulsions during the extraction procedure: 15-HLA-MW8MSD-1011 (230-648-6), 15-HLA-MW8MSD-1011 (230-648-6[MS]) and 15-HLA-MW8MSD-1011 (230-648-6[MSD]). The emulsions were broken up using a pour back on all samples for the first and second extractions.
analytical batch 280-298313
Method: 3510C_LVI/8270D_SIM

Detection Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-HC1-1008 — Lab Sample ID: 230-648-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Benzene	1100		4.0	ug/L	20		8260C	Total/NA
Ethylbenzene	140		20	ug/L	20		8260C	Total/NA
m,p-Xylene	310		40	ug/L	20		8260C	Total/NA
Toluene	1.1		1.0	ug/L	1		8260C	Total/NA
Xylenes, Total	310		60	ug/L	20		8260C	Total/NA
Gasoline Range Organics [C6 - C10]	3800		100	ug/L	1		AK101	Total/NA
Diesel Range Organics (DRO) (C10-C25)	7.5		0.40	mg/L	1		AK102 & 103	Total/NA

Client Sample ID: 15-HLA-HC3-1009 — Lab Sample ID: 230-648-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Benzene	3.1		0.20	ug/L	1		8260C	Total/NA
Diesel Range Organics (DRO) (C10-C25)	2.5		0.40	mg/L	1		AK102 & 103	Total/NA

Client Sample ID: 15-HLA-HC6-1010 — Lab Sample ID: 230-648-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Diesel Range Organics (DRO) (C10-C25)	2.8		0.40	mg/L	1		AK102 & 103	Total/NA

Client Sample ID: 15-HLA-MW8-1012 — Lab Sample ID: 230-648-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Benzene	1900		40	ug/L	200		8260C	Total/NA
Ethylbenzene	1600		200	ug/L	200		8260C	Total/NA
m,p-Xylene	9800		400	ug/L	200		8260C	Total/NA
o-Xylene	1800		200	ug/L	200		8260C	Total/NA
Xylenes, Total	12000		600	ug/L	200		8260C	Total/NA
Gasoline Range Organics [C6 - C10]	48000		20000	ug/L	200		AK101	Total/NA
Acenaphthene	530		100	ng/L	1		8270D SIM	Total/NA
Fluorene	580		100	ng/L	1		8270D SIM	Total/NA
Phenanthrene	390		100	ng/L	1		8270D SIM	Total/NA
2-Methylnaphthalene - DL	66000		8100	ng/L	80		8270D SIM	Total/NA
Naphthalene - DL	220000		8100	ng/L	80		8270D SIM	Total/NA
1-Methylnaphthalene - DL	48000		8100	ng/L	80		8270D SIM	Total/NA
Diesel Range Organics (DRO) (C10-C25)	23		0.40	mg/L	1		AK102 & 103	Total/NA

Client Sample ID: 15-HLA-HCZ-1013 — Lab Sample ID: 230-648-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Benzene	2300		40	ug/L	200		8260C	Total/NA
Ethylbenzene	2000		200	ug/L	200		8260C	Total/NA
m,p-Xylene	12000		400	ug/L	200		8260C	Total/NA
o-Xylene	1700		200	ug/L	200		8260C	Total/NA
Toluene	96		10	ug/L	10		8260C	Total/NA
Xylenes, Total	13000		600	ug/L	200		8260C	Total/NA
Gasoline Range Organics [C6 - C10]	61000		20000	ug/L	200		AK101	Total/NA
Acenaphthene	430		100	ng/L	1		8270D SIM	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-HCZ-1013 (Continued) — Lab Sample ID: 230-648-5

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Fluorene	470		100		ng/L	1		8270D SIM	Total/NA
Phenanthrene	300		100		ng/L	1		8270D SIM	Total/NA
2-Methylnaphthalene - DL	46000		4100		ng/L	40		8270D SIM	Total/NA
Naphthalene - DL	140000		4100		ng/L	40		8270D SIM	Total/NA
1-Methylnaphthalene - DL	33000		4100		ng/L	40		8270D SIM	Total/NA
Diesel Range Organics (DRO) (C10-C25)	22		0.40		mg/L	1		AK102 & 103	Total/NA

Client Sample ID: 15-HLA-MW8MSD-1011 — Lab Sample ID: 230-648-6

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Benzene	1400		40		ug/L	200		8260C	Total/NA
Ethylbenzene	1500		200		ug/L	200		8260C	Total/NA
m,p-Xylene	9000		400		ug/L	200		8260C	Total/NA
o-Xylene	1900		200		ug/L	200		8260C	Total/NA
Xylenes, Total	11000		600		ug/L	200		8260C	Total/NA
Gasoline Range Organics [C6 - C10]	45000		20000		ug/L	200		AK101	Total/NA
Acenaphthene - RE	430	H	100		ng/L	1		8270D SIM	Total/NA
Fluorene - RE	520	H	100		ng/L	1		8270D SIM	Total/NA
Phenanthrene - RE	330	H	100		ng/L	1		8270D SIM	Total/NA
2-Methylnaphthalene - REDL	43000	H	4100		ng/L	40		8270D SIM	Total/NA
Naphthalene - REDL	120000	H	4100		ng/L	40		8270D SIM	Total/NA
1-Methylnaphthalene - REDL	32000	H	4100		ng/L	40		8270D SIM	Total/NA
Diesel Range Organics (DRO) (C10-C25)	22		0.40		mg/L	1		AK102 & 103	Total/NA

Client Sample ID: Trip Blank — Lab Sample ID: 230-648-7

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-HC1-1008

Lab Sample ID: 230-648-1
Matrix: Water
Date Collected: 09/28/15 13:20
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1100		4.0	ug/L			10/07/15 10:09	20
Ethylbenzene	140		20	ug/L			10/07/15 10:09	20
m,p-Xylene	310		40	ug/L			10/07/15 10:09	20
o-Xylene	ND		20	ug/L			10/07/15 10:09	20
Toluene	1.1		1.0	ug/L			10/07/15 01:32	1
Xylenes, Total	310		60	ug/L			10/07/15 10:09	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*101*		*68.7 - 141*		*10/07/15 01:32*	*1*
4-Bromofluorobenzene (Surr)	*112*		*68.7 - 141*		*10/07/15 10:09*	*20*
Dibromofluoromethane (Surr)	*98*		*71.2 - 143*		*10/07/15 01:32*	*1*
Dibromofluoromethane (Surr)	*97*		*71.2 - 143*		*10/07/15 10:09*	*20*
Toluene-d8 (Surr)	*105*		*74.1 - 135*		*10/07/15 01:32*	*1*
Toluene-d8 (Surr)	*103*		*74.1 - 135*		*10/07/15 10:09*	*20*

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	3800		100	ug/L			10/07/15 01:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*101*		*68.7 - 141*		*10/07/15 01:32*	*1*

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	7.5		0.40	mg/L		10/07/15 11:26	10/09/15 17:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*96*		*60 - 120*	*10/07/15 11:26*	*10/09/15 17:00*	*1*

Client Sample ID: 15-HLA-HC3-1009

Lab Sample ID: 230-648-2
Matrix: Water
Date Collected: 09/28/15 10:50
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	3.1		0.20	ug/L			10/07/15 10:29	1
Ethylbenzene	ND		1.0	ug/L			10/07/15 10:29	1
m,p-Xylene	ND		2.0	ug/L			10/07/15 10:29	1
o-Xylene	ND		1.0	ug/L			10/07/15 10:29	1
Toluene	ND		1.0	ug/L			10/07/15 10:29	1
Xylenes, Total	ND		3.0	ug/L			10/07/15 10:29	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*112*		*68.7 - 141*		*10/07/15 10:29*	*1*
Dibromofluoromethane (Surr)	*93*		*71.2 - 143*		*10/07/15 10:29*	*1*
Toluene-d8 (Surr)	*104*		*74.1 - 135*		*10/07/15 10:29*	*1*

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	ND		100	ug/L			10/07/15 10:29	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	112		68.7 - 141		10/07/15 10:29	1

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	2.5		0.40	mg/L		10/07/15 11:26	10/09/15 18:04	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1-Chlorooctadecane	99		60 - 120	10/07/15 11:26	10/09/15 18:04	1

Client Sample ID: 15-HLA-HC6-1010 — Lab Sample ID: 230-648-3

Date Collected: 09/28/15 12:45 — **Matrix: Water**
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.20	ug/L			10/07/15 02:11	1
Ethylbenzene	ND		1.0	ug/L			10/07/15 02:11	1
m,p-Xylene	ND		2.0	ug/L			10/07/15 02:11	1
o-Xylene	ND		1.0	ug/L			10/07/15 02:11	1
Toluene	ND		1.0	ug/L			10/07/15 02:11	1
Xylenes, Total	ND		3.0	ug/L			10/07/15 02:11	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	106		68.7 - 141		10/07/15 02:11	1
Dibromofluoromethane (Surr)	100		71.2 - 143		10/07/15 02:11	1
Toluene-d8 (Surr)	100		74.1 - 135		10/07/15 02:11	1

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	ND		100	ug/L			10/07/15 02:11	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	106		68.7 - 141		10/07/15 02:11	1

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	2.8		0.40	mg/L		10/07/15 11:26	10/09/15 18:36	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1-Chlorooctadecane	112		60 - 120	10/07/15 11:26	10/09/15 18:36	1

Client Sample ID: 15-HLA-MW8-1012 — Lab Sample ID: 230-648-4

Date Collected: 09/28/15 15:45 — **Matrix: Water**
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1900		40	ug/L			10/07/15 10:49	200
Ethylbenzene	1600		200	ug/L			10/07/15 10:49	200
m,p-Xylene	9800		400	ug/L			10/07/15 10:49	200
o-Xylene	1800		200	ug/L			10/07/15 10:49	200
Toluene	ND		200	ug/L			10/07/15 10:49	200
Xylenes, Total	12000		600	ug/L			10/07/15 10:49	200

Client Sample Results

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-MW8-1012

Date Collected: 09/28/15 15:45
Date Received: 09/29/15 10:15

Lab Sample ID: 230-648-4

Matrix: Water

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	111		68.7 - 141		10/07/15 10:49	200
Dibromofluoromethane (Surr)	96		71.2 - 143		10/07/15 10:49	200
Toluene-d8 (Surr)	104		74.1 - 135		10/07/15 10:49	200

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	**48000**		20000	ug/L			10/07/15 10:49	200

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	111		68.7 - 141		10/07/15 10:49	200

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	**530**		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Acenaphthylene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Benzo[a]anthracene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Benzo[a]pyrene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Benzo[b]fluoranthene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Benzo[g,h,i]perylene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Benzo[k]fluoranthene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Chrysene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Dibenz(a,h)anthracene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Fluoranthene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Fluorene	**580**		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Indeno[1,2,3-cd]pyrene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Phenanthrene	**390**		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Pyrene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1
Anthracene	ND		100	ng/L		10/05/15 17:39	10/09/15 05:58	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	74		42 - 120	10/05/15 17:39	10/09/15 05:58	1
Nitrobenzene-d5	133	X	43 - 120	10/05/15 17:39	10/09/15 05:58	1
Terphenyl-d14	87		47 - 120	10/05/15 17:39	10/09/15 05:58	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - DL

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylnaphthalene	**66000**		8100	ng/L		10/05/15 17:39	10/16/15 18:03	80
Naphthalene	**220000**		8100	ng/L		10/05/15 17:39	10/16/15 18:03	80
1-Methylnaphthalene	**48000**		8100	ng/L		10/05/15 17:39	10/16/15 18:03	80

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	95	D	42 - 120	10/05/15 17:39	10/16/15 18:03	80
Nitrobenzene-d5	126	X D	43 - 120	10/05/15 17:39	10/16/15 18:03	80
Terphenyl-d14	103	D	47 - 120	10/05/15 17:39	10/16/15 18:03	80

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	**23**		0.40	mg/L		10/07/15 11:26	10/09/15 19:08	1

Client Sample Results

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-MW8-1012

Lab Sample ID: 230-648-4
Matrix: Water
Date Collected: 09/28/15 15:45
Date Received: 09/29/15 10:15

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1-Chlorooctadecane	113		60 - 120	10/07/15 11:26	10/09/15 19:08	1

Client Sample ID: 15-HLA-HCZ-1013

Lab Sample ID: 230-648-5
Matrix: Water
Date Collected: 09/28/15 15:30
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2300		40	ug/L			10/07/15 11:09	200
Ethylbenzene	2000		200	ug/L			10/07/15 11:09	200
m,p-Xylene	12000		400	ug/L			10/07/15 11:09	200
o-Xylene	1700		200	ug/L			10/07/15 11:09	200
Toluene	96		10	ug/L			10/07/15 02:51	10
Xylenes, Total	13000		600	ug/L			10/07/15 11:09	200

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	110		68.7 - 141		10/07/15 02:51	10
4-Bromofluorobenzene (Surr)	110		68.7 - 141		10/07/15 11:09	200
Dibromofluoromethane (Surr)	92		71.2 - 143		10/07/15 02:51	10
Dibromofluoromethane (Surr)	90		71.2 - 143		10/07/15 11:09	200
Toluene-d8 (Surr)	102		74.1 - 135		10/07/15 02:51	10
Toluene-d8 (Surr)	101		74.1 - 135		10/07/15 11:09	200

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	61000		20000	ug/L			10/07/15 11:09	200

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	110		68.7 - 141		10/07/15 11:09	200

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	430		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Acenaphthylene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Benzo[a]anthracene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Benzo[a]pyrene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Benzo[b]fluoranthene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Benzo[g,h,i]perylene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Benzo[k]fluoranthene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Chrysene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Dibenz(a,h)anthracene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Fluoranthene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Fluorene	470		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Indeno[1,2,3-cd]pyrene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Phenanthrene	300		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Pyrene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1
Anthracene	ND		100	ng/L		10/05/15 17:39	10/09/15 06:23	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	59		42 - 120	10/05/15 17:39	10/09/15 06:23	1
Nitrobenzene-d5	101		43 - 120	10/05/15 17:39	10/09/15 06:23	1

Client Sample ID: 15-HLA-HCZ-1013

Lab Sample ID: 230-648-5
Matrix: Water

Date Collected: 09/28/15 15:30
Date Received: 09/29/15 10:15

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	72		47 - 120	10/05/15 17:39	10/09/15 06:23	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - DL

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylnaphthalene	46000		4100	ng/L		10/05/15 17:39	10/15/15 21:59	40
Naphthalene	140000		4100	ng/L		10/05/15 17:39	10/15/15 21:59	40
1-Methylnaphthalene	33000		4100	ng/L		10/05/15 17:39	10/15/15 21:59	40

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	71	D	42 - 120	10/05/15 17:39	10/15/15 21:59	40
Nitrobenzene-d5	0	X D	43 - 120	10/05/15 17:39	10/15/15 21:59	40
Terphenyl-d14	91	D	47 - 120	10/05/15 17:39	10/15/15 21:59	40

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	22		0.40	mg/L		10/07/15 11:26	10/09/15 19:40	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1-Chlorooctadecane	107		60 - 120	10/07/15 11:26	10/09/15 19:40	1

Client Sample ID: 15-HLA-MW8MSD-1011

Lab Sample ID: 230-648-6
Matrix: Water

Date Collected: 09/28/15 16:15
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1400		40	ug/L			10/07/15 14:53	200
Ethylbenzene	1500		200	ug/L			10/07/15 14:53	200
m,p-Xylene	9000		400	ug/L			10/07/15 14:53	200
o-Xylene	1900		200	ug/L			10/07/15 14:53	200
Toluene	ND		200	ug/L			10/07/15 14:53	200
Xylenes, Total	11000		600	ug/L			10/07/15 14:53	200

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	112		68.7 - 141		10/07/15 14:53	200
Dibromofluoromethane (Surr)	88		71.2 - 143		10/07/15 14:53	200
Toluene-d8 (Surr)	105		74.1 - 135		10/07/15 14:53	200

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	45000		20000	ug/L			10/07/15 14:53	200

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	112		68.7 - 141		10/07/15 14:53	200

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	75		42 - 120	10/05/15 21:15	10/09/15 06:48	1
Nitrobenzene-d5	133	X	43 - 120	10/05/15 21:15	10/09/15 06:48	1

Client Sample ID: 15-HLA-MW8MSD-1011

Date Collected: 09/28/15 16:15
Date Received: 09/29/15 10:15

Lab Sample ID: 230-648-6

Matrix: Water

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	85		47 - 120	10/05/15 21:15	10/09/15 06:48	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - DL

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	81	D	42 - 120	10/05/15 21:15	10/16/15 18:29	50
Nitrobenzene-d5	132	X D	43 - 120	10/05/15 21:15	10/16/15 18:29	50
Terphenyl-d14	88	D	47 - 120	10/05/15 21:15	10/16/15 18:29	50

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - RE

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	**430**	**H**	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Acenaphthylene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Benzo[a]anthracene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Benzo[a]pyrene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Benzo[b]fluoranthene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Benzo[g,h,i]perylene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Benzo[k]fluoranthene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Chrysene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Dibenz(a,h)anthracene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Fluoranthene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Fluorene	**520**	**H**	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Indeno[1,2,3-cd]pyrene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Phenanthrene	**330**	**H**	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Pyrene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1
Anthracene	ND	H	100	ng/L		10/07/15 19:35	10/09/15 03:29	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	61		42 - 120	10/07/15 19:35	10/09/15 03:29	1
Nitrobenzene-d5	93		43 - 120	10/07/15 19:35	10/09/15 03:29	1
Terphenyl-d14	92		47 - 120	10/07/15 19:35	10/09/15 03:29	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - REDL

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylnaphthalene	**43000**	**H**	4100	ng/L		10/07/15 19:35	10/15/15 22:49	40
Naphthalene	**120000**	**H**	4100	ng/L		10/07/15 19:35	10/15/15 22:49	40
1-Methylnaphthalene	**32000**	**H**	4100	ng/L		10/07/15 19:35	10/15/15 22:49	40

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	90	D	42 - 120	10/07/15 19:35	10/15/15 22:49	40
Nitrobenzene-d5	0	X D	43 - 120	10/07/15 19:35	10/15/15 22:49	40
Terphenyl-d14	150	D X	47 - 120	10/07/15 19:35	10/15/15 22:49	40

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	**22**		0.40	mg/L		10/07/15 11:26	10/09/15 20:43	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1-Chlorooctadecane	102		60 - 120	10/07/15 11:26	10/09/15 20:43	1

Client Sample Results

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: Trip Blank

Lab Sample ID: 230-648-7

Date Collected: 09/28/15 00:00
Matrix: Water
Date Received: 09/29/15 10:15

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.20	ug/L			10/07/15 11:28	1
Ethylbenzene	ND		1.0	ug/L			10/07/15 11:28	1
m,p-Xylene	ND		2.0	ug/L			10/07/15 11:28	1
o-Xylene	ND		1.0	ug/L			10/07/15 11:28	1
Toluene	ND		1.0	ug/L			10/07/15 11:28	1
Xylenes, Total	ND		3.0	ug/L			10/07/15 11:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*111*		*68.7 - 141*		*10/07/15 11:28*	*1*
Dibromofluoromethane (Surr)	*97*		*71.2 - 143*		*10/07/15 11:28*	*1*
Toluene-d8 (Surr)	*101*		*74.1 - 135*		*10/07/15 11:28*	*1*

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics [C6 - C10]	ND		100	ug/L			10/07/15 11:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*111*		*68.7 - 141*		*10/07/15 11:28*	*1*

Surrogate Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(68.7-141)	(71.2-143)	(74.1-135)
230-648-1	15-HLA-HC1-1008	101	98	105
230-648-1	15-HLA-HC1-1008	112	97	103
230-648-2	15-HLA-HC3-1009	112	93	104
230-648-3	15-HLA-HC6-1010	106	100	100
230-648-4	15-HLA-MW8-1012	111	96	104
230-648-5	15-HLA-HCZ-1013	110	92	102
230-648-5	15-HLA-HCZ-1013	110	90	101
230-648-6	15-HLA-MW8MSD-1011	112	88	105
230-648-6 MS	15-HLA-MW8MSD-1011	111	95	104
230-648-6 MSD	15-HLA-MW8MSD-1011	111	96	98
230-648-7	Trip Blank	111	97	101
LCS 590-3835/6	Lab Control Sample	107	101	100
LCSD 590-3835/7	Lab Control Sample Dup	105	102	101
MB 590-3835/5	Method Blank	105	96	106

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
		BFB
Lab Sample ID	Client Sample ID	(68.7-141)
230-648-1	15-HLA-HC1-1008	101
230-648-2	15-HLA-HC3-1009	112
230-648-3	15-HLA-HC6-1010	106
230-648-4	15-HLA-MW8-1012	111
230-648-5	15-HLA-HCZ-1013	110
230-648-6	15-HLA-MW8MSD-1011	112
230-648-6 MS	15-HLA-MW8MSD-1011	110
230-648-6 MSD	15-HLA-MW8MSD-1011	114
230-648-7	Trip Blank	111
LCS 590-3834/8	Lab Control Sample	107
LCSD 590-3834/9	Lab Control Sample Dup	108
MB 590-3834/5	Method Blank	105

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		FBP	NBZ	TPH
Lab Sample ID	Client Sample ID	(42-120)	(43-120)	(47-120)
230-648-4	15-HLA-MW8-1012	74	133 X	87
230-648-4 - DL	15-HLA-MW8-1012	95 D	126 X D	103 D

Surrogate Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		FBP	NBZ	TPH
Lab Sample ID	Client Sample ID	(42-120)	(43-120)	(47-120)
230-648-5	15-HLA-HCZ-1013	59	101	72
230-648-5 - DL	15-HLA-HCZ-1013	71 D	0 X D	91 D
230-648-6 - RE	15-HLA-MW8MSD-1011	61	93	92
230-648-6	15-HLA-MW8MSD-1011	75	133 X	85
230-648-6 - REDL	15-HLA-MW8MSD-1011	90 D	0 X D	150 D X
230-648-6 - DL	15-HLA-MW8MSD-1011	81 D	132 X D	88 D
230-648-6 MS - RE	15-HLA-MW8MSD-1011	65	108	95
230-648-6 MSD - RE	15-HLA-MW8MSD-1011	60	91	89
LCS 280-297938/2-A	Lab Control Sample	94	104	103
LCS 280-298313/2-A	Lab Control Sample	69	70	99
LCSD 280-297938/3-A	Lab Control Sample Dup	93	99	108
MB 280-297938/1-A	Method Blank	94	105	103
MB 280-298313/1-A	Method Blank	92	84	104

Surrogate Legend

FBP = 2-Fluorobiphenyl
NBZ = Nitrobenzene-d5
TPH = Terphenyl-d14

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
		1COD
Lab Sample ID	Client Sample ID	(60-120)
230-648-1	15-HLA-HC1-1008	96
230-648-1 DU	15-HLA-HC1-1008	81
230-648-2	15-HLA-HC3-1009	99
230-648-3	15-HLA-HC6-1010	112
230-648-4	15-HLA-MW8-1012	113
230-648-5	15-HLA-HCZ-1013	107
230-648-6	15-HLA-MW8MSD-1011	102
230-648-6 MS	15-HLA-MW8MSD-1011	119
230-648-6 MSD	15-HLA-MW8MSD-1011	86
LCS 230-2280/17-A	Lab Control Sample	101
LCS 230-2294/2-A	Lab Control Sample	88
LCS 230-2294/4-A	Lab Control Sample	80
LCSD 230-2280/18-A	Lab Control Sample Dup	104
LCSD 230-2294/3-A	Lab Control Sample Dup	89
LCSD 230-2294/5-A	Lab Control Sample Dup	76
MB 230-2280/16-A	Method Blank	111
MB 230-2294/1-A	Method Blank	73

Surrogate Legend

1COD = 1-Chlorooctadecane

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 590-3835/5
Matrix: Water
Analysis Batch: 3835

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
uengene	L D		0.20		75/9			10/06/1X 20:3X	1
EtyNbengene	L D		1.0		75/9			10/06/1X 20:3X	1
m,h-z Nene	L D		2.0		75/9			10/06/1X 20:3X	1
o-z Nene	L D		1.0		75/9			10/06/1X 20:3X	1
Tol7ene	L D		1.0		75/9			10/06/1X 20:3X	1
z Nenes, Total	L D		3.0		75/9			10/06/1X 20:3X	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*68.7 - 141*		*10/06/15 20:35*	*1*
Dibromofluoromethane (Surr)	*96*		*71.2 - 143*		*10/06/15 20:35*	*1*
Toluene-d8 (Surr)	*106*		*74.1 - 135*		*10/06/15 20:35*	*1*

Lab Sample ID: LCS 590-3835/6
Matrix: Water
Analysis Batch: 3835

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
uengene			10.0	10.p		75/9		10p	80 - 140		
EtyNbengene			10.0	G6p		75/9		G6	80 - 120		
m,h-z Nene			10.0	G8p		75/9		G8	80 - 120		
o-z Nene			10.0	Gp8		75/9		G8	80 - 120		
Tol7ene			10.0	G04		75/9		G0	80 - 123		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*68.7 - 141*
Dibromofluoromethane (Surr)	*101*		*71.2 - 143*
Toluene-d8 (Surr)	*100*		*74.1 - 135*

Lab Sample ID: LCSD 590-3835/7
Matrix: Water
Analysis Batch: 3835

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
uengene			10.0	10.6		75/9		10X	80 - 140	2	2X
EtyNbengene			10.0	G3X		75/9		G3	80 - 120	3	2X
m,h-z Nene			10.0	Gp4		75/9		Gp	80 - 120	1	2X
o-z Nene			10.0	G40		75/9		G4	80 - 120	4	2X
Tol7ene			10.0	G00		75/9		G0	80 - 123	0	2X

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*105*		*68.7 - 141*
Dibromofluoromethane (Surr)	*102*		*71.2 - 143*
Toluene-d8 (Surr)	*101*		*74.1 - 135*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 230-648-6 MS — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 3835

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
uengene	1400		2010	4410		75/9		148	X0 - 1X0
EtyNbengene	1X00		2010	4080		75/9		12G	X0 - 1X0
m,h-z Nene	G000		2000	13800	4	75/9		23p	X0 - 1X0
o-z Nene	1G00		2000	41G0		75/9		11X	X0 - 1X0
Tol7ene	L D		2000	2110		75/9		101	X0 - 1X0

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*111*		*68.7 - 141*
Dibromofluoromethane (Surr)	*95*		*71.2 - 143*
Toluene-d8 (Surr)	*104*		*74.1 - 135*

Lab Sample ID: 230-648-6 MSD — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 3835

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
uengene	1400		2010	4240		75/9		140	X0 - 1X0	4	3X
EtyNbengene	1X00		2010	38X0		75/9		11p	X0 - 1X0	6	3X
m,h-z Nene	G000		2000	13300	4	75/9		213	X0 - 1X0	4	3X
o-z Nene	1G00		2000	3GG0		75/9		10X	X0 - 1X0	X	3X
Tol7ene	L D		2000	1G80		75/9		G4	X0 - 1X0	p	3X

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*111*		*68.7 - 141*
Dibromofluoromethane (Surr)	*96*		*71.2 - 143*
Toluene-d8 (Surr)	*98*		*74.1 - 135*

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS)

Lab Sample ID: MB 590-3834/5 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 3834

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Oasoline Ran5e [r5anics]C6 - C10B	L D		100	75/9			10/06/1X 20:3X	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*68.7 - 141*		*10/06/15 20:35*	*1*

Lab Sample ID: LCS 590-3834/8 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 3834

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oasoline Ran5e [r5anics]C6 - C10B	1000	G88		75/9		GG	60 - 120

Method: AK101 - Alaska - Gasoline Range Organics (GC/MS) (Continued)

Lab Sample ID: LCS 590-3834/8
Matrix: Water
Analysis Batch: 3834

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*68.7 - 141*

Lab Sample ID: LCSD 590-3834/9
Matrix: Water
Analysis Batch: 3834

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oasoline Ran5e [r5anics]C6 - C10B			1000	1020		75/9		102	60 - 120	3	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*108*		*68.7 - 141*

Lab Sample ID: 230-648-6 MS
Matrix: Water
Analysis Batch: 3834

Client Sample ID: 15-HLA-MW8MSD-1011
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Oasoline Ran5e [r5anics]C6 - C10B	4X000		200000	2p0000		75/9		113	XX.6 - 126		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*110*		*68.7 - 141*

Lab Sample ID: 230-648-6 MSD
Matrix: Water
Analysis Batch: 3834

Client Sample ID: 15-HLA-MW8MSD-1011
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oasoline Ran5e [r5anics]C6 - C10B	4X000		200000	266000		75/9		110	XX.6 - 126	2	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*114*		*68.7 - 141*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 280-297938/1-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 297938

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
2-MetyNnahytyalene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Acenahytyene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
AcenahytyNene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
uengo]aBantyracene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
uengo]aBnNene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
uengo]bE7orantyene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 280-297938/1-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 297938

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
uengo]5,y,iBherNene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
uengo]kBl7orantyene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
CyrNsene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Dibeng(a,y)antyracene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Fl7orantyene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Fl7orene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Indeno]1,2,3-cdBhNrene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
L ahytyalene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Pyenantyrene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
PNrene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
Antyracene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1
1-MetyNnahytyalene	L D		100		n5/9		10/0X/1X 1p:3G	10/0G/1X 04:43	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*94*		*42 - 120*	*10/05/15 17:39*	*10/09/15 04:43*	*1*
Nitrobenzene-d5	*105*		*43 - 120*	*10/05/15 17:39*	*10/09/15 04:43*	*1*
Terphenyl-d14	*103*		*47 - 120*	*10/05/15 17:39*	*10/09/15 04:43*	*1*

Lab Sample ID: LCS 280-297938/2-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 297938

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenahytyene	G00	pXp		n5/9		84	4p - 120
AcenahytyNene	G00	pGG		n5/9		8G	3G - 120
uengo]aBantyracene	G00	8GX		n5/9		GG	42 - 120
uengo]aBhNrene	G00	1040		n5/9		116	38 - 120
uengo]bBl7orantyene	G00	G80		n5/9		10G	44 - 120
uengo]5,y,iBherNene	G00	860		n5/9		G6	3G - 120
uengo]kBl7orantyene	G00	GG0		n5/9		110	43 - 120
CyrNsene	G00	8Xp		n5/9		GX	3X - 120
Dibeng(a,y)antyracene	G00	G24		n5/9		103	2p - 126
Fl7orantyene	G00	864		n5/9		G6	46 - 120
Fl7orene	G00	p61		n5/9		8X	4G - 120
Indeno]1,2,3-cdBhNrene	G00	G43		n5/9		10X	38 - 120
L ahytyalene	G00	pX8		n5/9		84	3p - 120
Pyenantyrene	G00	pG6		n5/9		88	46 - 120
PNrene	G00	83p		n5/9		G3	4G - 120
Antyracene	G00	84X		n5/9		G4	28 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*94*		*42 - 120*
Nitrobenzene-d5	*104*		*43 - 120*
Terphenyl-d14	*103*		*47 - 120*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCSD 280-297938/3-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 297938

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acenahytyene	G00	pX6		n5/9		84	4p - 120	0	X0
AcenahytyNlene	G00	p88		n5/9		88	3G - 120	1	X0
uengo]aBantyracene	G00	G02		n5/9		100	42 - 120	1	40
uengo]aBhNrene	G00	G80		n5/9		10G	38 - 120	6	21
uengo]bBl7orantyene	G00	G4p		n5/9		10X	44 - 120	3	28
uengo]5,y,iBherNlene	G00	8X8		n5/9		GX	3G - 120	0	23
uengo]kBl7orantyene	G00	GX3		n5/9		106	43 - 120	4	28
CyrNsene	G00	868		n5/9		G6	3X - 120	1	41
Dibeng(a,y)antyracene	G00	G1X		n5/9		102	2p - 126	1	2X
Fl7orantyene	G00	880		n5/9		G8	46 - 120	2	24
Fl7orene	G00	pp3		n5/9		86	4G - 120	2	X0
Indeno]1,2,3-cdBhNrene	G00	G2p		n5/9		103	38 - 120	2	2X
L ahytyalene	G00	p43		n5/9		83	3p - 120	2	X0
Pyenantyrene	G00	804		n5/9		8G	46 - 120	1	42
PNrene	G00	84G		n5/9		G4	4G - 120	1	22
Antyracene	G00	84G		n5/9		G4	28 - 120	0	X0

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2-Fluorobiphenyl	*93*		*42 - 120*
Nitrobenzene-d5	*99*		*43 - 120*
Terphenyl-d14	*108*		*47 - 120*

Lab Sample ID: MB 280-298313/1-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 298313

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
2-MetyNnahytyalene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Acenahytyene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
AcenahytyNlene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
uengo]aBantyracene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
uengo]aBhNrene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
uengo]bBl7orantyene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
uengo]5,y,iBherNlene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
uengo]kBl7orantyene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
CyrNsene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Dibeng(a,y)antyracene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Fl7orantyene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Fl7orene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Indeno]1,2,3-cdBhNrene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
L ahytyalene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Pyenantyrene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
PNrene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
Antyracene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1
1-MetyNnahytyalene	L D		100	n5/9		10/0p/1X 1G3X	10/0G/1X 02:3G	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 280-298313/1-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 298313

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*92*		*42 - 120*	*10/07/15 19:35*	*10/09/15 02:39*	*1*
Nitrobenzene-d5	*84*		*43 - 120*	*10/07/15 19:35*	*10/09/15 02:39*	*1*
Terphenyl-d14	*104*		*47 - 120*	*10/07/15 19:35*	*10/09/15 02:39*	*1*

Lab Sample ID: LCS 280-298313/2-A
Matrix: Water
Analysis Batch: 298545

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 298313

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenahytyene	G00	XX4		n5/9		62	4p - 120
AcenahytyNene	G00	XX8		n5/9		62	3G - 120
uengo]aBantyracene	G00	ppX		n5/9		86	42 - 120
uengo]aBhNrene	G00	p2G		n5/9		81	38 - 120
uengo]bBl7orantyene	G00	pG8		n5/9		8G	44 - 120
uengo]5,y,iBherNene	G00	p64		n5/9		8X	3G - 120
uengo]kBl7orantyene	G00	844		n5/9		G4	43 - 120
CyrNsene	G00	828		n5/9		G2	3X - 120
Dibeng(a,y)antyracene	G00	p6p		n5/9		8X	2p - 126
Fl7orantyene	G00	p61		n5/9		8X	46 - 120
Fl7orene	G00	601		n5/9		6p	4G - 120
Indeno]1,2,3-cdBhNrene	G00	pX3		n5/9		84	38 - 120
L ahytyalene	G00	4G0		n5/9		X4	3p - 120
Pyenantyrene	G00	6pG		n5/9		pX	46 - 120
PNrene	G00	p36		n5/9		82	4G - 120
Antyracene	G00	6p1		n5/9		pX	28 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*69*		*42 - 120*
Nitrobenzene-d5	*70*		*43 - 120*
Terphenyl-d14	*99*		*47 - 120*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - RE

Lab Sample ID: 230-648-6 MS
Matrix: Water
Analysis Batch: 298545

Client Sample ID: 15-HLA-MW8MSD-1011
Prep Type: Total/NA
Prep Batch: 298313

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenahytyene - RE	430	H	GX6	1020	H	n5/9		61	4p - 120
AcenahytyNene - RE	L D	H	GX6	p43	H	n5/9		p8	3G - 120
uengo]aBantyracene - RE	L D	H	GX6	GX3	H	n5/9		100	42 - 120
uengo]aBhNrene - RE	L D	H	GX6	10G0	H	n5/9		114	38 - 120
uengo]bBl7orantyene - RE	L D	H	GX6	G32	H	n5/9		G8	44 - 120
uengo]5,y,iBherNene - RE	L D	H	GX6	p43	H	n5/9		p8	3G - 120
uengo]kBl7orantyene - RE	L D	H	GX6	G4G	H	n5/9		GG	43 - 120
CyrNsene - RE	L D	H	GX6	864	H	n5/9		G0	3X - 120
Dibeng(a,y)antyracene - RE	L D	H	GX6	804	H	n5/9		84	2p - 126

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) - RE (Continued)

Lab Sample ID: 230-648-6 MS — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 298545 — **Prep Batch: 298313**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fl7orantyene - RE	L D	H	GX6	Gp0	H	n5/9		101	46 - 120
Fl7orene - RE	X20	H	GX6	1160	H	n5/9		6p	4G - 120
Indeno]1,2,3-cdB hN ene - RE	L D	H	GX6	82p	H	n5/9		8p	38 - 120
L ahytyalene - RE	110000	H E	GX6	140000	H E 4	n5/9		31XG	3p - 120
Pyenantyrene - RE	330	H	GX6	1240	H	n5/9		GX	46 - 120
PN ene - RE	L D	H	GX6	G3X	H	n5/9		G8	4G - 120
Antyracene - RE	L D	H	GX6	1040	H	n5/9		101	28 - 120

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2-Fluorobiphenyl - RE	*65*		*42 - 120*
Nitrobenzene-d5 - RE	*108*		*43 - 120*
Terphenyl-d14 - RE	*95*		*47 - 120*

Lab Sample ID: 230-648-6 MSD — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 298545 — **Prep Batch: 298313**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acenahytyene - RE	430	H	G26	881	H	n5/9		4G	4p - 120	14	X0
AcenahytyN ene - RE	L D	H	G26	648	H	n5/9		p0	3G - 120	14	X0
u engo]aB antyracene - RE	L D	H	G26	G02	H	n5/9		Gp	42 - 120	X	40
u engo]aB hN ene - RE	L D	H	G26	G8G	H	n5/9		10p	38 - 120	10	21
u engo]bB l7orantyene - RE	L D	H	G26	841	H	n5/9		G1	44 - 120	10	28
u engo]5,y,iB herN ene - RE	L D	H	G26	6p0	H	n5/9		p2	3G - 120	10	23
u engo]kB l7orantyene - RE	L D	H	G26	8p0	H	n5/9		G4	43 - 120	G	28
CyrN sene - RE	L D	H	G26	81p	H	n5/9		88	3X - 120	6	41
Dibeng(a,y)antyracene - RE	L D	H	G26	p18	H	n5/9		p8	2p - 126	11	2X
Fl7orantyene - RE	L D	H	G26	8G3	H	n5/9		G6	46 - 120	8	24
Fl7orene - RE	X20	H	G26	10X0	H	n5/9		Xp	4G - 120	10	X0
Indeno]1,2,3-cdB hN ene - RE	L D	H	G26	p48	H	n5/9		81	38 - 120	10	2X
L ahytyalene - RE	110000	H E	G26	118000	H E 4	n5/9		81X	3p - 120	18	X0
Pyenantyrene - RE	330	H	G26	1130	H	n5/9		86	46 - 120	G	42
PN ene - RE	L D	H	G26	86X	H	n5/9		G3	4G - 120	8	22
Antyracene - RE	L D	H	G26	G3G	H	n5/9		G3	28 - 120	11	X0

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
2-Fluorobiphenyl - RE	*60*		*42 - 120*
Nitrobenzene-d5 - RE	*91*		*43 - 120*
Terphenyl-d14 - RE	*89*		*47 - 120*

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Lab Sample ID: MB 230-2280/16-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)	L D		0.40		m5/9		10/0p/1X 11:26	10/0G/1X 1X:2X	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*111*		*60 - 120*	*10/07/15 11:26*	*10/09/15 15:25*	*1*

Lab Sample ID: LCS 230-2280/17-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)			8.00	GpG		m5/9		122	pX - 12X		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1-Chlorooctadecane	*101*		*60 - 120*

Lab Sample ID: LCSD 230-2280/18-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)			8.00	8.pX		m5/9		10G	pX - 12X	11	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1-Chlorooctadecane	*104*		*60 - 120*

Lab Sample ID: 230-648-6 MS — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)	22		8.00	2Gp		m5/9		Gp	pX - 12X		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1-Chlorooctadecane	*119*		*60 - 120*

Lab Sample ID: 230-648-6 MSD — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)	22		8.00	30.X		m5/9		10p	pX - 12X	2	20

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC) (Continued)

Lab Sample ID: 230-648-6 MSD — **Client Sample ID: 15-HLA-MW8MSD-1011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1-Chlorooctadecane	*86*		*60 - 120*

Lab Sample ID: 230-648-1 DU — **Client Sample ID: 15-HLA-HC1-1008**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2290 — **Prep Batch: 2280**

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)	p.X			p.00		m5/9				p	20

Surrogate	*DU %Recovery*	*DU Qualifier*	*Limits*
1-Chlorooctadecane	*81*		*60 - 120*

Lab Sample ID: MB 230-2294/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2316 — **Prep Batch: 2294**

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)	L D		0.40		m5/9		10/0G/1X 11:34	10/16/1X 13:32	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*73*		*60 - 120*	*10/09/15 11:34*	*10/16/15 13:32*	*1*

Lab Sample ID: LCS 230-2294/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2316 — **Prep Batch: 2294**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)			8.00	6.60		m5/9		83	pX - 12X		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1-Chlorooctadecane	*88*		*60 - 120*

Lab Sample ID: LCS 230-2294/4-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 2316 — **Prep Batch: 2294**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)			8.00	6.46		m5/9		81	pX - 12X		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1-Chlorooctadecane	*80*		*60 - 120*

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC) (Continued)

Lab Sample ID: LCSD 230-2294/3-A
Matrix: Water
Analysis Batch: 2316

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 2294

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)			8.00	6.68		m5/9		83	pX - 12X	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1-Chlorooctadecane	*89*		*60 - 120*

Lab Sample ID: LCSD 230-2294/5-A
Matrix: Water
Analysis Batch: 2316

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 2294

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Ran5e [r5anics (DR[ ) (C10-C2X)			8.00	6.1p		m5/9		pp	pX - 12X	X	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1-Chlorooctadecane	*76*		*60 - 120*

QC Association Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

GC/MS VOA

Analysis Batch: 3834

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-1	15-HLA-HC1-1008	Total/NA	Water	AK101	
230-648-2	15-HLA-HC3-1009	Total/NA	Water	AK101	
230-648-3	15-HLA-HC6-1010	Total/NA	Water	AK101	
230-648-4	15-HLA-MW8-1012	Total/NA	Water	AK101	
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	AK101	
230-648-6	15-HLA-MW8MSD-1011	Total/NA	Water	AK101	
230-648-6 MS	15-HLA-MW8MSD-1011	Total/NA	Water	AK101	
230-648-6 MSD	15-HLA-MW8MSD-1011	Total/NA	Water	AK101	
230-648-7	Trip Blank	Total/NA	Water	AK101	
LCS 590-3834/8	Lab Control Sample	Total/NA	Water	AK101	
LCSD 590-3834/9	Lab Control Sample Dup	Total/NA	Water	AK101	
MB 590-3834/5	Method Blank	Total/NA	Water	AK101	

Analysis Batch: 3835

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-1	15-HLA-HC1-1008	Total/NA	Water	8260C	
230-648-1	15-HLA-HC1-1008	Total/NA	Water	8260C	
230-648-2	15-HLA-HC3-1009	Total/NA	Water	8260C	
230-648-3	15-HLA-HC6-1010	Total/NA	Water	8260C	
230-648-4	15-HLA-MW8-1012	Total/NA	Water	8260C	
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	8260C	
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	8260C	
230-648-6	15-HLA-MW8MSD-1011	Total/NA	Water	8260C	
230-648-6 MS	15-HLA-MW8MSD-1011	Total/NA	Water	8260C	
230-648-6 MSD	15-HLA-MW8MSD-1011	Total/NA	Water	8260C	
230-648-7	Trip Blank	Total/NA	Water	8260C	
LCS 590-3835/6	Lab Control Sample	Total/NA	Water	8260C	
LCSD 590-3835/7	Lab Control Sample Dup	Total/NA	Water	8260C	
MB 590-3835/5	Method Blank	Total/NA	Water	8260C	

GC/MS Semi VOA

Prep Batch: 297938

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-4	15-HLA-MW8-1012	Total/NA	Water	3510C	
230-648-4 - DL	15-HLA-MW8-1012	Total/NA	Water	3510C	
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	3510C	
230-648-5 - DL	15-HLA-HCZ-1013	Total/NA	Water	3510C	
230-648-6	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
230-648-6 - DL	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
LCS 280-297938/2-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 280-297938/3-A	Lab Control Sample Dup	Total/NA	Water	3510C	
MB 280-297938/1-A	Method Blank	Total/NA	Water	3510C	

Prep Batch: 298313

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-6 - REDL	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
230-648-6 - RE	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
230-648-6 MS - RE	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
230-648-6 MSD - RE	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	

GC/MS Semi VOA (Continued)

Prep Batch: 298313 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 280-298313/2-A	Lab Control Sample	Total/NA	Water	3510C	
MB 280-298313/1-A	Method Blank	Total/NA	Water	3510C	

Analysis Batch: 298545

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-4	15-HLA-MW8-1012	Total/NA	Water	8270D SIM	297938
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	8270D SIM	297938
230-648-6 - RE	15-HLA-MW8MSD-1011	Total/NA	Water	8270D SIM	298313
230-648-6	15-HLA-MW8MSD-1011	Total/NA	Water	8270D SIM	297938
230-648-6 MS - RE	15-HLA-MW8MSD-1011	Total/NA	Water	8270D SIM	298313
230-648-6 MSD - RE	15-HLA-MW8MSD-1011	Total/NA	Water	8270D SIM	298313
LCS 280-297938/2-A	Lab Control Sample	Total/NA	Water	8270D SIM	297938
LCS 280-298313/2-A	Lab Control Sample	Total/NA	Water	8270D SIM	298313
LCSD 280-297938/3-A	Lab Control Sample Dup	Total/NA	Water	8270D SIM	297938
MB 280-297938/1-A	Method Blank	Total/NA	Water	8270D SIM	297938
MB 280-298313/1-A	Method Blank	Total/NA	Water	8270D SIM	298313

Analysis Batch: 299435

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-5 - DL	15-HLA-HCZ-1013	Total/NA	Water	8270D SIM	297938
230-648-6 - REDL	15-HLA-MW8MSD-1011	Total/NA	Water	8270D SIM	298313

Analysis Batch: 299704

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-4 - DL	15-HLA-MW8-1012	Total/NA	Water	8270D SIM	297938
230-648-6 - DL	15-HLA-MW8MSD-1011	Total/NA	Water	8270D SIM	297938

GC Semi VOA

Prep Batch: 2280

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-1	15-HLA-HC1-1008	Total/NA	Water	3510C	
230-648-1 DU	15-HLA-HC1-1008	Total/NA	Water	3510C	
230-648-2	15-HLA-HC3-1009	Total/NA	Water	3510C	
230-648-3	15-HLA-HC6-1010	Total/NA	Water	3510C	
230-648-4	15-HLA-MW8-1012	Total/NA	Water	3510C	
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	3510C	
230-648-6	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
230-648-6 MS	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
230-648-6 MSD	15-HLA-MW8MSD-1011	Total/NA	Water	3510C	
LCS 230-2280/17-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 230-2280/18-A	Lab Control Sample Dup	Total/NA	Water	3510C	
MB 230-2280/16-A	Method Blank	Total/NA	Water	3510C	

Analysis Batch: 2290

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-1	15-HLA-HC1-1008	Total/NA	Water	AK102 & 103	2280
230-648-1 DU	15-HLA-HC1-1008	Total/NA	Water	AK102 & 103	2280
230-648-2	15-HLA-HC3-1009	Total/NA	Water	AK102 & 103	2280
230-648-3	15-HLA-HC6-1010	Total/NA	Water	AK102 & 103	2280

GC Semi VOA (Continued)

Analysis Batch: 2290 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
230-648-4	15-HLA-MW8-1012	Total/NA	Water	AK102 & 103	2280
230-648-5	15-HLA-HCZ-1013	Total/NA	Water	AK102 & 103	2280
230-648-6	15-HLA-MW8MSD-1011	Total/NA	Water	AK102 & 103	2280
230-648-6 MS	15-HLA-MW8MSD-1011	Total/NA	Water	AK102 & 103	2280
230-648-6 MSD	15-HLA-MW8MSD-1011	Total/NA	Water	AK102 & 103	2280
LCS 230-2280/17-A	Lab Control Sample	Total/NA	Water	AK102 & 103	2280
LCSD 230-2280/18-A	Lab Control Sample Dup	Total/NA	Water	AK102 & 103	2280
MB 230-2280/16-A	Method Blank	Total/NA	Water	AK102 & 103	2280

Prep Batch: 2294

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 230-2294/2-A	Lab Control Sample	Total/NA	Water	3510C	
LCS 230-2294/4-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 230-2294/3-A	Lab Control Sample Dup	Total/NA	Water	3510C	
LCSD 230-2294/5-A	Lab Control Sample Dup	Total/NA	Water	3510C	
MB 230-2294/1-A	Method Blank	Total/NA	Water	3510C	

Analysis Batch: 2316

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 230-2294/2-A	Lab Control Sample	Total/NA	Water	AK102 & 103	2294
LCS 230-2294/4-A	Lab Control Sample	Total/NA	Water	AK102 & 103	2294
LCSD 230-2294/3-A	Lab Control Sample Dup	Total/NA	Water	AK102 & 103	2294
LCSD 230-2294/5-A	Lab Control Sample Dup	Total/NA	Water	AK102 & 103	2294
MB 230-2294/1-A	Method Blank	Total/NA	Water	AK102 & 103	2294

Lab Chronicle

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-HC1-1008 — Lab Sample ID: 230-648-1

Date Collected: 09/28/15 13:20 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	3835	10/07/15 01:32	CBW	TAL SPK
Total/NA	Analysis	8260C		20	3835	10/07/15 10:09	CBW	TAL SPK
Total/NA	Analysis	AK101		1	3834	10/07/15 01:32	CBW	TAL SPK
Total/NA	Prep	3510C			2280	10/07/15 11:26	OSS	TAL ANC
Total/NA	Analysis	AK102 & 103		1	2290	10/09/15 17:00	IKS	TAL ANC

Client Sample ID: 15-HLA-HC3-1009 — Lab Sample ID: 230-648-2

Date Collected: 09/28/15 10:50 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	3835	10/07/15 10:29	CBW	TAL SPK
Total/NA	Analysis	AK101		1	3834	10/07/15 10:29	CBW	TAL SPK
Total/NA	Prep	3510C			2280	10/07/15 11:26	OSS	TAL ANC
Total/NA	Analysis	AK102 & 103		1	2290	10/09/15 18:04	IKS	TAL ANC

Client Sample ID: 15-HLA-HC6-1010 — Lab Sample ID: 230-648-3

Date Collected: 09/28/15 12:45 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	3835	10/07/15 02:11	CBW	TAL SPK
Total/NA	Analysis	AK101		1	3834	10/07/15 02:11	CBW	TAL SPK
Total/NA	Prep	3510C			2280	10/07/15 11:26	OSS	TAL ANC
Total/NA	Analysis	AK102 & 103		1	2290	10/09/15 18:36	IKS	TAL ANC

Client Sample ID: 15-HLA-MW8-1012 — Lab Sample ID: 230-648-4

Date Collected: 09/28/15 15:45 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		200	3835	10/07/15 10:49	CBW	TAL SPK
Total/NA	Analysis	AK101		200	3834	10/07/15 10:49	CBW	TAL SPK
Total/NA	Prep	3510C			297938	10/05/15 17:39	KI	TAL DEN
Total/NA	Analysis	8270D SIM		1	298545	10/09/15 05:58	ELJ	TAL DEN
Total/NA	Prep	3510C	DL		297938	10/05/15 17:39	KI	TAL DEN
Total/NA	Analysis	8270D SIM	DL	80	299704	10/16/15 18:03	KGV	TAL DEN
Total/NA	Prep	3510C			2280	10/07/15 11:26	OSS	TAL ANC
Total/NA	Analysis	AK102 & 103		1	2290	10/09/15 19:08	IKS	TAL ANC

Lab Chronicle

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Client Sample ID: 15-HLA-HCZ-1013 — Lab Sample ID: 230-648-5

Date Collected: 09/28/15 15:30 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		10	3835	10/07/15 02:51	CBW	TAL SPK
Total/NA	Analysis	8260C		200	3835	10/07/15 11:09	CBW	TAL SPK
Total/NA	Analysis	AK101		200	3834	10/07/15 11:09	CBW	TAL SPK
Total/NA	Prep	3510C			297938	10/05/15 17:39	KI	TAL DEN
Total/NA	Analysis	8270D SIM		1	298545	10/09/15 06:23	ELJ	TAL DEN
Total/NA	Prep	3510C	DL		297938	10/05/15 17:39	KI	TAL DEN
Total/NA	Analysis	8270D SIM	DL	40	299435	10/15/15 21:59	KGV	TAL DEN
Total/NA	Prep	3510C			2280	10/07/15 11:26	OSS	TAL ANC
Total/NA	Analysis	AK102 & 103		1	2290	10/09/15 19:40	IKS	TAL ANC

Client Sample ID: 15-HLA-MW8MSD-1011 — Lab Sample ID: 230-648-6

Date Collected: 09/28/15 16:15 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		200	3835	10/07/15 14:53	CBW	TAL SPK
Total/NA	Analysis	AK101		200	3834	10/07/15 14:53	CBW	TAL SPK
Total/NA	Prep	3510C	RE		298313	10/07/15 19:35	KI	TAL DEN
Total/NA	Analysis	8270D SIM	RE	1	298545	10/09/15 03:29	ELJ	TAL DEN
Total/NA	Prep	3510C			297938	10/05/15 21:15	KI	TAL DEN
Total/NA	Analysis	8270D SIM		1	298545	10/09/15 06:48	ELJ	TAL DEN
Total/NA	Prep	3510C	REDL		298313	10/07/15 19:35	KI	TAL DEN
Total/NA	Analysis	8270D SIM	REDL	40	299435	10/15/15 22:49	KGV	TAL DEN
Total/NA	Prep	3510C	DL		297938	10/05/15 21:15	KI	TAL DEN
Total/NA	Analysis	8270D SIM	DL	50	299704	10/16/15 18:29	KGV	TAL DEN
Total/NA	Prep	3510C			2280	10/07/15 11:26	OSS	TAL ANC
Total/NA	Analysis	AK102 & 103		1	2290	10/09/15 20:43	IKS	TAL ANC

Client Sample ID: Trip Blank — Lab Sample ID: 230-648-7

Date Collected: 09/28/15 00:00 — **Matrix: Water**
Date Received: 09/29/15 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	3835	10/07/15 11:28	CBW	TAL SPK
Total/NA	Analysis	AK101		1	3834	10/07/15 11:28	CBW	TAL SPK

Laboratory References:

TAL ANC = TestAmerica Anchorage, 2000 West International Airport Road, Suite A10, Anchorage, AK 99502-1119, TEL (907)563-9200
TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100
TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

Certification Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Laboratory: TestAmerica Anchorage

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-067	06-16-16

Laboratory: TestAmerica Denver

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-15
A2LA	ISO/IEC 17025		2907.01	10-31-15
Alabama	State Program	4	40730	09-30-12 *
Alaska (UST)	State Program	10	UST-30	04-05-16
Arizona	State Program	9	AZ0713	12-19-15
Arkansas DEQ	State Program	6	88-0687	06-01-16
California	State Program	9	2513	08-31-16
Connecticut	State Program	1	PH-0686	09-30-16
Florida	NELAP	4	E87667	06-30-16
Georgia	State Program	4	N/A	01-09-15 *
Illinois	NELAP	5	200017	04-30-16
Iowa	State Program	7	370	11-30-16
Kansas	NELAP	7	E-10166	04-30-16
Louisiana	NELAP	6	02096	06-30-16
Maine	State Program	1	CO0002	03-03-17
Minnesota	NELAP	5	8-999-405	12-31-15
Nevada	State Program	9	CO0026	07-31-16
New Hampshire	NELAP	1	205310	04-28-16
New Jersey	NELAP	2	CO004	10-30-15
New York	NELAP	2	11964	04-01-16
North Carolina (WW/SW)	State Program	4	358	12-31-15
North Dakota	State Program	8	R-034	01-09-16
Oklahoma	State Program	6	8614	08-31-16
Oregon	NELAP	10	4025	01-09-16
Pennsylvania	NELAP	3	68-00664	07-31-16
South Carolina	State Program	4	72002001	01-09-16
Texas	NELAP	6	T104704183-15-11	09-30-16
USDA	Federal		P330-13-00202	07-02-16
Utah	NELAP	8	CO00026	07-31-16
Virginia	NELAP	3	460232	06-14-16
Washington	State Program	10	C583	08-03-16
West Virginia DEP	State Program	3	354	11-30-15
Wisconsin	State Program	5	999615430	08-31-16
Wyoming (UST)	A2LA	8	2907.01	10-31-15

Laboratory: TestAmerica Spokane

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-071	10-31-15
Washington	State Program	10	C569	01-06-16

* Certification renewal pending - certification considered valid.

Method Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL SPK
AK101	Alaska - Gasoline Range Organics (GC/MS)	ADEC	TAL SPK
8270D SIM	Semivolatile Organic Compounds (GC/MS SIM)	SW846	TAL DEN
AK102 & 103	Alaska - Diesel Range Organics & Residual Range Organics (GC)	ADEC	TAL ANC

Protocol References:

ADEC = Alaska Department of Environmental Conservation

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL ANC = TestAmerica Anchorage, 2000 West International Airport Road, Suite A10, Anchorage, AK 99502-1119, TEL (907)563-9200

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

Sample Summary

Client: ERM Alaska, Inc.
Project/Site: ERM Alaska

TestAmerica Job ID: 230-648-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
230-648-1	15-HLA-HC1-1008	Water	09/28/15 13:20	09/29/15 10:15
230-648-2	15-HLA-HC3-1009	Water	09/28/15 10:50	09/29/15 10:15
230-648-3	15-HLA-HC6-1010	Water	09/28/15 12:45	09/29/15 10:15
230-648-4	15-HLA-MW8-1012	Water	09/28/15 15:45	09/29/15 10:15
230-648-5	15-HLA-HCZ-1013	Water	09/28/15 15:30	09/29/15 10:15
230-648-6	15-HLA-MW8MSD-1011	Water	09/28/15 16:15	09/29/15 10:15
230-648-7	Trip Blank	Water	09/28/15 00:00	09/29/15 10:15

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2000 W Ir

230-648 Chain of Custody

-5302 509-924-9200 FAX 924-9290
-7145 503-906-9200 FAX 906-9210
-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: Horizon

REPORT TO: ERM AK
ADDRESS: 825 W 8 Ave
Anchorage, AK 99501
PHONE: 2584880 FAX:

INVOICE TO: ERM AK
825 W 8 Ave
Anchorage, AK 99501

P.O. NUMBER: 0220880

PROJECT NAME: Horizon
PROJECT NUMBER: 0220880
SAMPLED BY: KB & KJ

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: 10 (STD.) 7 5 4 3 2 1 <1
Petroleum Hydrocarbon Analyses: 5 (STD.) 4 3 2 1 <1
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	AK101	AK102	8260B	8270SIM	MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
PRESERVATIVE		HCL	HCL	HCL					
1 15-HLA-HC1-1008	28SEP2015/1320	3	2	3					01
15-HLA-HC3-1009	28SEP2015/	3	2	3					02
15-HLA-HC6-1010	28SEP2015/	3	2	3					03
~~15-HLA-MW10-1011/28SEP2015/~~									
15-HLA-MW8-1012	28SEP2015/	3	2	3	2				04
15-HLA-HC2-1013	28SEP2015/1530	3	2	3	2				05
15-HLA-MW8MSD-1011	28SEP15/1615	6	4	6	4				06
8									
9									
10									

RELEASED BY: PRINT NAME: Kate Johnson FIRM: ERM DATE: 9/29/2015 TIME: 0930
RECEIVED BY: PRINT NAME: Faisal Anees FIRM: TA-AK DATE: 9/29/15 TIME: 9:15
RELEASED BY: PRINT NAME: FIRM: DATE: TIME:
RECEIVED BY: PRINT NAME: FIRM: DATE: TIME:

ADDITIONAL REMARKS:

TEMP: 1.9 PAGE OF

6.1
3.4

TAL-1000 (0714)

TestAmerica Anchorage
2000 West International Airport Road Suite A10
Anchorage, AK 99502-1119
Phone (907) 563-9200 Fax (907) 563-9210

Chain of Custody Record

TestAmerica

10/19/2015

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Jonas, Wendy L	Carrier Tracking No(s):	COC No 230-1223.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: wendy.jonas@testamericainc.com		Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc				Job #: 230-648-1
Address: 11922 East 1st Ave, ,	Due Date Requested: 10/9/2015			
City: Spokane	TAT Requested (days):			
State, Zip: WA, 99206				
Phone: 509-924-9200(Tel) 509-924-9290(Fax)	PO #:			
Email:	WO #:			
Project Name: ERM Alaska	Project #: 23000378			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260C/5030C BTEX by GC/MS	AK101_MS/5030B Gasoline Range Organics	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
15-HLA-HC1-1008 (230-648-1)	9/28/15	13:20 Alaskan		Water			X	X	6	
15-HLA-HC3-1009 (230-648-2)	9/28/15	10:50 Alaskan		Water			X	X	6	
15-HLA-HC6-1010 (230-648-3)	9/28/15	12:45 Alaskan		Water			X	X	6	
15-HLA-MW8-1012 (230-648-4)	9/28/15	15:45 Alaskan		Water			X	X	6	
15-HLA-HCZ-1013 (230-648-5)	9/28/15	15:30 Alaskan		Water			X	X	6	
15-HLA-MW8MSD-1011 (230-648-6)	9/28/15	16:15 Alaskan		Water			X	X	12	
Trip Blank (230-648-7)	9/28/15	Alaskan		Water			X	X	3	

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 10/5/15 10:51	Company: TA-AK	Received by: Sheila Kratz	Date/Time: 10/6/15 9:30	Company: TA-SPOK
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.: 647122		Cooler Temperature(s) °C and Other Remarks: 1.5		

Login Sample Receipt Checklist

Client: ERM Alaska, Inc.

Job Number: 230-648-1

Login Number: 648
List Number: 1
Creator: Pilch, Andrew C

List Source: TestAmerica Anchorage

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.		
The cooler's custody seal, if present, is intact.		
Sample custody seals, if present, are intact.		
The cooler or samples do not appear to have been compromised or tampered with.		
Samples were received on ice.		
Cooler Temperature is acceptable.		
Cooler Temperature is recorded.		
COC is present.		
COC is filled out in ink and legible.		
COC is filled out with all pertinent information.		
Is the Field Sampler's name present on COC?		
There are no discrepancies between the containers received and the COC.		
Samples are received within Holding Time.		
Sample containers have legible labels.		
Containers are not broken or leaking.		
Sample collection date/times are provided.		
Appropriate sample containers are used.		
Sample bottles are completely filled.		
Sample Preservation Verified.		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs		
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").		
Multiphasic samples are not present.		
Samples do not require splitting or compositing.		
Residual Chlorine Checked.		

Login Sample Receipt Checklist

Client: ERM Alaska, Inc.

Job Number: 230-648-1

Login Number: 648
List Number: 2
Creator: White, Denise E

List Source: TestAmerica Denver
List Creation: 10/03/15 11:22 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: ERM Alaska, Inc.

Job Number: 230-648-1

Login Number: 648
List Number: 3
Creator: Dedio, Michael T

List Source: TestAmerica Denver
List Creation: 10/06/15 03:39 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: ERM Alaska, Inc.

Job Number: 230-648-1

Login Number: 648
List Number: 4
Creator: Kratz, Sheila J

List Source: TestAmerica Spokane
List Creation: 10/08/15 09:18 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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APPENDIX C

Quality Assurance Checklists

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1. QUALITY ASSURANCE REVIEW

Laboratory quality assurance/quality control (QA/QC) data associated with the analysis of project samples has been reviewed to evaluate the usability of the analytical data generated during sample collection for water sampling at Matson's Port of Anchorage Terminal Facility located in Anchorage, Alaska. Samples were collected on 28 September 2015.

A completeness check and data review was performed by ERM Alaska, Inc. and completed by an ERM Project Chemist. The data and usability review was performed using the United States EPA National Functional Guidelines for Superfund Organic Methods Data Review (EPA 2008) as a reference for qualification. The Alaska Department of Environmental Conservation (ADEC) laboratory data checklist was completed for this project (ADEC 2010).

All data were reviewed in accordance with United States EPA National Functional Guidelines for Organic Methods (EPA 2008) and ADEC regulatory guidance documents (ADEC 2009; 2010; 2012). This data review focuses on criteria for QA/QC parameters and their effect on the quality of data and usability.

All results are considered usable for project objectives. Some results are considered estimated due to quality control criteria not being met. The completeness for this project is 100%. The details of this review and qualification of the data are summarized in the following sections.

1.1. Sample Handling and Chain of Custody

Samples were collected, reported, and shipped in general accordance with the sampling plan requirements. Sample analysis was performed by Alaska Department of Environmental Conservation (ADEC) certified laboratories for applicable analytical methods.

Water samples were analyzed for the following:

- Gasoline Range Organics (GRO), Alaska (AK) Method 101;
- Diesel Range Organics (DRO), AK Method 102;
- Volatile Organic Compounds (VOC) – Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), US EPA Method 8260C; and
- Polycyclic Aromatic Hydrocarbons (PAH); US EPA Method 8270D-SIM.

Samples were delivered to TestAmerica, Inc. located in Anchorage, Alaska. GRO and VOC analytical methods were subcontracted to TestAmerica, Inc. located in Spokane, Washington. PAH results were subcontracted to TestAmerica, Inc. located in Denver, Colorado. Results were reported in one job ID, 230-648-1.

All sample coolers were shipped with custody seals intact. Chain of Custody (COC) forms, laboratory sample receipt forms, and case narratives were reviewed to evaluate the integrity of the samples and the quality of the associated data. All sample containers in the sample coolers were received at the laboratory intact and within the specified temperature range, with a few exceptions.

Two coolers were submitted with temperatures at the time of receipt noted as 1.4°C and 6.1°C, outside of the recommended temperature range of 4 ± 2°C. No samples were qualified due to temperature.

Due to field inaccuracy, the MS/MSD was incorrectly recorded on the COC form and was listed as a primary client sample, instead of designating additional sample volume submitted for MS/MSD analysis at MW8. The sample 15-HLA-MW8MSD-1011 was used as a quality assurance (QA) /quality control (QC) sample during laboratory analysis. However, the laboratory did not analyze this sample as a QA/QC sample concurrently with the submitted laboratory samples for 8270D-SIM analysis. Refer to the MS/MSD section of this report for additional information.

Additionally, the laboratory reported sample results for 15-HLA-MW8MSD-1011 as a primary client sample, and not just as additional volume submitted for MS/MSD analysis. Therefore, the laboratory reported results for client sample 15-HLA-MW8MSD-1011 within the 'client sample results' section of the laboratory report should not be used.

1.2. Holding Time Compliance

All samples were extracted, digested and analyzed within the holding time criteria for the applicable analytical methods and in accordance with work plan specifications.

1.3. Field QA/QC

Field QA/QC protocols are designed to measure for potential sample bias as a result of sampling procedures and possible contamination during collection and transport of samples. Collection and analysis of field duplicates facilitates an evaluation of precision that takes into account potential variables associated with sampling procedures, site heterogeneity and laboratory analyses. Trip blanks are used to monitor sample containers and possible cross-contamination of samples. During this sampling event, trip blanks and field duplicates were submitted for analysis.

1.3.1. Trip Blanks

A trip blank was prepared by the laboratory, shipped to the site with the empty sample bottles/containers, stored with sample containers during the field event, and transported with the collected samples back to the laboratory for analysis.

A trip blank was placed in the cooler with associated matrix specific volatile organics samples (GRO/BTEX). The trip blank was not requested on the chain of custody;

however, analysis was performed. One trip blank was submitted for analysis and analytes detected in the trip blank were not detected (ND) above the reporting limit (RL) for all analytes.

1.3.2. Field Duplicates

There were four primary samples submitted and one field duplicate – primary 15-HLA-MW8-1012 with duplicate 15-HLA-HCZ-1013. When analytes were present in concentrations below the LOQ in one or both samples, no valid comparison could be made. The primary sample and duplicate relative percent differences (RPDs) met ADEC applicable control limits of <30% between water samples, with the following exceptions noted below.

The RPD between the primary and duplicate sample exceeded the limits in 1-Methylnaphthalene (37.0%); 2-Methylnaphthalene (35.7%); and Naphthalene (44.4%). Results were qualified as estimated (J-D).

1.4. Laboratory QA/QC

1.4.1. Laboratory Blanks

Laboratory/ Method blanks were analyzed concurrent with an analytical batch of 20 or fewer primary samples for each of the analytical methods performed on project samples. Target analytes were not detected (ND) in any laboratory blanks.

1.4.2. Laboratory Control Samples

The laboratory monitors internal precision and accuracy for each analytical batch with a set of laboratory control samples (LCS/LCSD). A known quantity of target analytes are added to blank laboratory control samples prior to extraction and analysis and recoveries are calculated. Acceptable recovery criteria vary with each analytical method and matrix. All LCS/LCSD samples met laboratory and project QC goals for target analytes.

1.4.3. Matrix Spikes

Extra volumes of primary field samples were collected and submitted to the laboratory for matrix spike/matrix spike duplicate (MS/MSD) analyses. Matrix spikes have a known quantity of target analytes are added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control.

MS/MSD samples were analyzed within proper method holding times, with percent recoveries (%R) and relative percent differences (RPDs) within limits, with the following exceptions noted below.

In 8270D-SIM analysis, the MS/MSD analysis was requested after the holding time expired. The sample was analyzed outside of the method holding time and noted

within the laboratory report with the designation, "RE". Due to the analysis outside of the method holding time, the LCS/LCSD was used to assess accuracy for the 8270D-SIM analysis. No data required qualification.

Due to field inaccuracy, the MS/MSD was incorrectly recorded on the COC form and was listed as a primary client sample, instead of designating additional sample volume submitted for MS/MSD analysis at MW8. Therefore, the laboratory reported sample results for 15-HLA-MW8MSD-1011 as a primary client sample, and not just as additional volume submitted for MS/MSD analysis. Therefore, the laboratory reported results for client sample 15-HLA-MW8MSD-1011 within the 'client sample results' section of the laboratory report should not be used.

1.4.4. Surrogates

System Monitoring Compounds (Surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes and are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits for all primary samples, method blanks, LCS/LCSD, MS/MSD, and other QA/QC samples, with the following exceptions noted below.

Surrogate nitrobenzene-d5 was above the limits in method 8270D-SIM analysis and results in sample 15-HLA-MW8-1012. The other two surrogates were within limits; therefore qualification as not required. Surrogate nitrobenzene-d5 did not elute due to dilution in sample 15-HLA-HCZ-1013 and data did not require qualification.

1.4.5. Reporting Limits (Sensitivity)

Reporting limits (RLs) met or were below established criteria specified for all analyses in the project sampling plan and detection limits were also below the ADEC established cleanup levels.

1.5. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing LCS/LCSDs, MS/MSDs and field duplicate pairs for this project, with exceptions noted in above sections. Field duplicate samples were collected in accordance with sampling plan specifications. Field duplicate RPDs met applicable control limits, with exceptions noted in above sections. Recoveries and RPDs for all LCS/LSCD and MS/MSD samples were within required limits, with exceptions noted in above sections.

1.5.1. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

$$\% \text{ completeness} = \frac{\text{number of valid (i.e., non-R flagged) results}}{\text{number of possible results}}$$

All requested analyses were performed in accordance with Work Plan specifications. No sample results were rejected, noting that sample results for sample 15-HLA-MW8MSD-1011 should not be used due to the laboratory reporting results for submitted MS/MSD sample. All primary samples that were submitted were analyzed; therefore, completeness for this project is 100%.

1.5.2. Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental condition. The number and selection of samples were specified in the sampling plan and verified in the field to account accurately for site variations and sample matrices. The DQO for representativeness was met.

1.5.3. Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this project followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

1.6. Data Summary

In general, the overall quality of the data was acceptable. The data quality was determined as acceptable or estimated. Acceptable data are associated with QC data that meet all QC criteria or with QC samples that did not meet QC criteria but data quality objectives were not affected. Estimated J results are considered inaccurate due to a bias created by matrix interference or QC acceptance criteria which were not met. The EPA National Functional Guidelines (EPA 2008) were used to evaluate the acceptability of the data.

Data quality meets established DQO established for this project. Data are suitable for their intended use.

2. REFERENCES

ADEC. 2009. *Technical Memorandum: Environmental Laboratory Data and Quality Assurance Requirements.* March 2009.

ADEC. 2010. Laboratory Data Review Checklist. January.

ADEC. 2012. *Technical Memorandum: Guidelines for Data Reporting, Data Reduction, and Treatment of Non-detect Values.* June.

EPA. 2008. *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 540-R-08-01). June.

Laboratory Data Review Checklist

Completed by:	Melissa Pike		
Title:	Project Chemist	Date:	Dec 9, 2015
CS Report Name:	2015 Long-Term Monitoring Report, Port of Anchorage Terminal Facility, Horizon Lines of Alaska, LLC.	Report Date:	December 2015
Consultant Firm:	ERM Alaska, Inc.		
Laboratory Name:	TestAmerica, Inc.	Laboratory Report Number:	230-648-1
ADEC File Number:		ADEC RecKey Number:	

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:

VOCs by 8260C and AK Method 101 was subcontracted from TestAmerica Anchorage, Alaska to TestAmerica Spokane, Washington. PAH by EPA Method 8270D-SIM was subcontracted from TestAmerica Anchorage, Alaska to TestAmerica Denver, Colorado.

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:

Two coolers were received at 1.4°C and 6.1°C. No samples were reported as frozen upon receipt.

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:

Samples arrived in good condition, unbroken and with zero headspace.

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

○ Yes ○ No ◉ NA (Please explain) Comments:

NA. There are no discrepancies.

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

Comments:

Data quality and usability is not affected with respect to the reported sample receipt documentation. No sample results required qualification due to temperature.

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:

c. Were all corrective actions documented?

○ Yes ○ No ◉ NA (Please explain) Comments:

NA. There are no corrective actions.

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

Comments:

Data quality and usability is not affected with respect to the case narrative report.

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:

Some MS/MSD samples were run outside of the method holding time.

c. All soils reported on a dry weight basis?

( ) Yes ( ) No (●) NA (Please explain) Comments:

NA. There are no soil samples within this data package.

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? (Please explain)

Comments:

Data quality and usability is somewhat affected with respect to the reported sample results. Refer to the quality assurance report for additional information.

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:

iii. If above PQL, what samples are affected? Comments:

NA. All method blank results were below PQL.

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

○ Yes ○ No ◉ NA (Please explain) Comments:

NA. All method blank results were below PQL.

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

Data quality and usability is not affected with respect to the reported method blank results.

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:

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

○ Yes ○ No ◉ NA (Please explain) Comments:

NA. There are no metal or inorganic analyses.

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:

MS/MSD %R for m,p-xylene were outside of the quality control limits.

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/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

○ Yes ◉ No ○ NA (Please explain) Comments:

MSD RPD for m,p-xylene was outside of the quality control limits.

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

Comments:

15-HLA-MW8

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

(●) Yes ( ) No ( ) NA (Please explain) Comments:

vii. Data quality or usability affected? (Please explain) Comments:

Data quality and usability is not affected. The LCS/LCSD was used to assess accuracy.

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:

Several surrogate %R were outside the limits in PAH analysis.

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:

15-HLA-MW8-1012; 15-HLA-HCZ-1013

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

Comments:

Data quality and usability is not affected with respect to the reported surrogate results. Refer to quality assurance report for additional information.

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:

Laboratory analyzed trip blank and made note of the CoC discrepancy within the case narrative.

iii. All results less than PQL?

◉ Yes ○ No ○ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA. All results were less than PQL.

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

Comments:

Data quality and usability is not affected with respect to the reported trip blank results.

e. Field Duplicate

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

◉ Yes ○ No ○ NA (Please explain) Comments:

Primary 15-HLA-MW8-1012 with duplicate 15-HLA-HCZ-1013

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:

2-Mehtylnaphthalene (35.7%); Naphthalene (44.4%); 1-Methylnaphthalene (37.0%)

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

(●) Yes ( ) No ( ) NA (Please explain) Comments:

Data quality and usability is somewhat affected, with some results qualified as estimated (J-D).

f. Decontamination or Equipment Blank (if applicable)

( ) Yes ( ) No (●) NA (Please explain) Comments:

NA. Decontamination or equipment blanks were not required. All sampling equipment was disposable.

i. All results less than PQL?

( ) Yes ( ) No (●) NA (Please explain) Comments:

NA. Decontamination or equipment blanks were not required. All sampling equipment was disposable.

ii. If above PQL, what samples are affected?

Comments:

NA. Decontamination or equipment blanks were not required. All sampling equipment was disposable.

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

Comments:

NA. Decontamination or equipment blanks were not required. All sampling equipment was disposable.

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

a. Defined and appropriate?

(●) Yes ( ) No ( ) NA (Please explain) Comments:

Lab specific qualifiers are defined within the qualifier section of the laboratory report.

Reset Form

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APPENDIX D

Conceptual Site Model

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Print Form

Human Health Conceptual Site Model
Scoping Form

Site Name: CSX Lines, LLC - formerly Sealand Freight Services Inc.

File Number: 2100.26.238

Completed by: Erin McDonald

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☒ USTs
- ☐ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☐ Other:

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☐ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☐ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☐ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. **Exposure Pathways:** *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

Contamination is present between 0-15 feet below ground surface. However, the area of contamination is under a paved parking lot and road-way. For incidental soil ingestion to occur the asphalt would have to be removed or disturbed.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

The contaminants of concern at the site are not listed in Appendix B. However, naphthalene, a constituent in diesel fuel is recognized as a potential risk for dermal exposure. Naphthalene is present in groundwater at the site, below the 18 AAC 75, Table C criteria, but above the screening level of 1/10th. The concentration of naphthalene in site soils is unknown.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the ground-water is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

The nearest surface water body, Cook Inlet, could not be used as a current or future drinking water source, due to salinity.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

Benzo(a)pyrene and Dibenzo(a,h)anthracene where not detected at the site above method reporting limits (MRLs), however the MRLs were above the screening level. Though these compounds are listed in Appendix C, the site is industrial and secured which prevents the harvest and ingestion of wild foods.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

The area of contamination is paved and located adjacent to a building which is used as an auto shop, warehouse and for vehicle fueling.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

The adjacent building is used as an auto shop, warehouse and for vehicle fueling.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Contaminant concentrations in groundwater exceed the ADEC groundwater cleanup levels in 18 AAC 75, Table C. Exposure to groundwater could occur during construction activities.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

The contaminated water is not used for indoor household purposes.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Nonvolatile compounds are not found in the top 2 centimeters of soil.

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Sediment is not present at the site.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

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HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: CSX Lines, LLC - Formerly Sealond Freight Services, Inc.

Completed By: Erin McDonald

Date Completed: December 8, 2011

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

Media / Transport Mechanisms

Media	Transport Mechanisms	
☐ Surface Soil (0-2 ft bgs)	Direct release to surface soil	check soil
	☐ Migration to subsurface	check soil
	☐ Migration to groundwater	check groundwater
	☐ Volatilization	check air
	☐ Runoff or erosion	check surface water
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☑ Subsurface Soil (2-15 ft bgs)	Direct release to subsurface soil	check soil
	☑ Migration to groundwater	check groundwater
	☑ Volatilization	check air
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☑ Ground-water	Direct release to groundwater	check groundwater
	☑ Volatilization	check air
	☐ Flow to surface water body	check surface water
	☐ Flow to sediment	check sediment
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☐ Surface Water	Direct release to surface water	check surface water
	☐ Volatilization	check air
	☐ Sedimentation	check sediment
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	
☐ Sediment	Direct release to sediment	check sediment
	☐ Resuspension, runoff, or erosion	check surface water
	☐ Uptake by plants or animals	check biota
	☐ Other (list):	

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Exposure Media / Exposure Pathway/Route / Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ soil	☑ Incidental Soil Ingestion				F			
	☑ Dermal Absorption of Contaminants from Soil				F			
	☐ Inhalation of Fugitive Dust							
☑ groundwater	☑ Ingestion of Groundwater				F			
	☑ Dermal Absorption of Contaminants in Groundwater				F			
	☐ Inhalation of Volatile Compounds in Tap Water							
☑ air	☑ Inhalation of Outdoor Air		F	F	F			
	☑ Inhalation of Indoor Air		C/F	C/F	C/F			
	☐ Inhalation of Fugitive Dust							
☐ surface water	☐ Ingestion of Surface Water							
	☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Inhalation of Volatile Compounds in Tap Water							
☐ sediment	☐ Direct Contact with Sediment							
☐ biota	☐ Ingestion of Wild or Farmed Foods							

Revised, 10/01/2010

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