Alaska Department of Environmental Conservation

Reuse & Redevelopment Initiative

Brownfield Assessment

Report for Site Characterization
Former AVEC Bulk Fuel Facility
Lower Kalskag, Alaska

Submitted to:
Department of Environmental Conservation
Brownfield Program

oasis ENVIRONMENTAL

By:
OASIS Environmental, Inc.
January 26, 2009

REPORT FOR SITE CHARACTERIZATION
INACTIVE AVEC BULK FUEL FACILITY

LOWER KALSKAG, ALASKA

January 26, 2009

Prepared for:

Alaska Department of Environmental Conservation

Prepared by:

oasis
ENVIRONMENTAL

825 W. 8th Ave.
Anchorage, AK 99501

Prepared by: _____
Herminio R. Muniz, R.P.G.
Sr. Hydrogeologist

Reviewed by: _____
Max Schwenne
Contract Manager

- Page Intentionally Left Blank -

TABLE OF CONTENTS

TABLE:

FIGURES:

APPENDICES:

ACRONYMS AND ABBREVIATIONS

°C ..... Degrees Celsius
°F ..... Degrees Fahrenheit
DEC..... Alaska Department of Environmental Conservation
AST ..... Aboveground storage tank
AVEC ..... Alaska Village Electric Cooperative
bgs ..... Below ground surface
BTEX..... Benzene, toluene, ethylbenzene, and xylenes
CSM ..... Conceptual Site Model
DRO ..... Diesel-range organics
EPA..... US Environmental Protection Agency
eV..... Electron volt
GRO ..... Gasoline-range organics
IDW ..... Investigation-derived waste
LCS/LCSD..... Laboratory control sample/laboratory control sample duplicate
mg/kg ..... Milligrams per kilogram
mL ..... Milliliter
MS/MSD..... Matrix spike/matrix spike duplicate
ND ..... Non-detect
OASIS ..... OASIS Environmental, Inc.
PAH..... Polynuclear aromatic hydrocarbon
PID ..... Photoionization detector
PPE..... Personal protective equipment
PQL ..... Practical quantitation limit
QAPP ..... Quality Assurance Program Plan
RPD..... Relative percent difference
RRO ..... Residual-range organics

- Page Intentionally Left Blank -

1. INTRODUCTION

OASIS Environmental, Inc. (OASIS) has been contracted by the Alaska Department of Environmental Conservation (DEC) to conduct Site Characterization for the inactive Alaska Village Electric Cooperative (AVEC) power generation facility in Lower Kalskag, Alaska (Figure 1). This work was conducted under Term Contract No. 18-9028-13, Notice to Proceed No. 18-9028-13-68 (dated September 4, 2008). This report addresses site-specific sampling procedures, sample location rationale, field-screening techniques, and analytical methods.

A Quality Assurance Program Plan (QAPP) was developed in accordance with DEC's regulations set forth in 18 AAC 75.335 (October 2008) to provide site-specific guidance on the collection and analysis of environmental samples. The QAPP was included in Appendix A of the Work Plan (OASIS 2008). In addition, a site-specific Health and Safety Plan has been developed for the project under a separate cover.

1.1. Site Description and Background

Lower Kalskag is located on the north bank of the Kuskokwim River, 2 miles downriver from Kalskag. It lies 26 miles west of Aniak, 89 miles northeast of Bethel, and 350 miles west of Anchorage. The area encompasses 1.3 sq. miles of land and 0.4 sq. miles of water. The climate is semi-arctic with maritime influences from the Bering Sea. Precipitation averages 19 inches, with 60 inches of snowfall. Temperatures range between -55 and 87 degrees Fahrenheit (°F). The Kuskokwim River is ice free from mid-June through October (CIS 2009).

The site is located in the floodplain of the Kuskokwim River and consists of fluvial and floodplain deposits. Groundwater depth is not certain; however, water from a well located adjacent to the tank farm (Well No. 1, Figure 2)) was pumped for a depth of 35 feet below ground surface (bgs), so it is likely present at depth shallower than 30 feet bgs.

The inactive AVEC power plant and bulk fuel facility is located in Section 33, Township 17 North, Range 61 West, Seward Meridian, at approximately 61.512810° north latitude and 160.363054° west longitude. The legal description for the property is Lower Kalskag Townsite, U.S. Survey 4414, Tract A, Block 7. AVEC owns the property, tanks, and structures (Figure 2).

1.2. Past Site Uses/Operations

Based on information provided by Mark Teitzel of AVEC, the site is believed to have operated as a power generation facility from 1969 to December 2004 when a new plant became operational. No historical spills have been reported for the facility.

1.3. Site Description and Current Site Uses/Operations

At the current time, the facility is not active but the tanks and the structures remain. A review of aerial photography appears to show eight to ten aboveground storage tanks

(ASTs) within a bermed gravel pad. A building, the power generation facility, is adjacent to the tank farm.

1.4. Project Objectives

The project objectives were as listed below:

- Evaluate whether soil contamination exists at the site.
- Assess the extent of contamination to the degree possible.
- If contamination is present, evaluate if it could potentially impact the existing water supply.
- Assess additional assessment and/or remediation needs.

1.5. Regulatory Framework

All soil sampling results for benzene, toluene, ethylbenzene, and xylenes (BTEX), gasoline-range organics (GRO), diesel-range organics (DRO), and residual-range organics (RRO) were compared to DEC cleanup levels set forth in 18 AAC 75.341, Tables B1 and B2, migration to groundwater criteria as amended through October 9, 2008. Cleanup levels are shown in Table 1.

2. INTERVIEW SUMMARY

The following section summarizes the findings of interviews conducted in Lower Kalskag on September 30, 2008.

2.1. Mr. Paul Evan

Mr. Paul Evan has worked as the Lower Kalskag pump house operator since 2003. He noted that when he began in his position, a number of fuel drums were stored in front of and adjacent to the well house (Figure 2). He believed that they were placed there during the late 1970s by a state road contractor. He estimated that 1.5 drum volumes leaked out onto the ground from corroded fuel drums stored about 100 feet from Well No. 1. Water is no longer being pumped from this well due to analytical results suggesting contamination with raw sewage. Since October 2007, Well No. 2 has been supplying water to the water system.

Mr. Evan also stated that old fuel lines ran under the road starting at the AVEC tank farm and going to residences on the other side of the road. The lines were discovered to have leaked on both sides of the road within the last several years; however, Mr. Evan did not know how long they had leaked. The lines were welded to prevent further leaking. One release area is along the fence line on the east side of the tank farm; the other area is across the road.

2.2. Ms. Anna Morgan

Anna Morgan, the site representative, stated that she has never seen the lined containment area fill up with water. During sampling activities, she stated to the OASIS field scientist that around 1970 the containment area filled with fuel due to overflow during fueling. As much fuel as possible was pumped into drums; the rest, presumably, infiltrated into the soil.

- Page Intentionally Left Blank -

3. SOIL SAMPLING

The following sections discuss the work performed at the AVEC tank farm site on October 1, 2008. All work was conducted in accordance with the OASIS Work Plan and QAPP that were developed in accordance with DEC's regulations set forth in 18 AAC 75 to provide site-specific guidance on the collection and analysis of environmental samples. The individual who performed the site work met the definition of a "qualified person" per 18 AAC 75.990(100).

3.1. Tank Farm Soil Sampling

Surface and subsurface soil samples were collected from locations adjacent to and between the ASTs in the tank farm and from two locations adjacent to the power plant building on the tank farm berm (Figure 3). Samples were field screened with a photoionization detector (PID) and by using visual and olfactory observation. Field-screening samples were also collected from areas of suspected or obvious contamination, such as stained areas; adjacent to and below all fill pipes; at all piping joints, elbows, and connections; and at damaged piping components. Based on field screening and other field observations, laboratory sampling locations were selected. Exact locations of field-screening samples were determined in the field using a submeter Global Positioning System.

3.2. Field Screening

Soil samples were placed in 1-quart, resealable plastic bags and screened in the field for concentrations of volatile organics using a PID equipped with a 10.6 electron volt (eV) lamp. Samples were warmed to approximately 65°F for a minimum of 15 minutes prior to screening. The headspace vapors within the sample bag were then measured. Field-screening sample locations and results were recorded in the field notebook.

3.3. Soil Sample Collection Methods

Soil samples were collected using a gloved hand or a decontaminated sampling spoon. A clean pair of gloves was used for collection of each soil sample. Observations including sample collection location and presence of odor or staining were recorded in the field notebook.

Samples collected for volatile analyses (BTEX and GRO) were collected first and obtained in a way to minimize aeration and subsequent loss of volatiles. Soil samples analyzed for BTEX and GRO required field extraction for preservation using the following field extraction method:

- Collect at least 25 grams of soil with minimum disturbance and place into pre-tared jars with a Teflon®-lined septum fused to the lid.
- Add a 25-milliliter (mL) aliquot of methanol to the soil in the jar.
- Place the lid on the jar.

Sample information such as sample number, date and time of collection, and analyses requested were written directly on the label on the pre-tared jar.

Soil samples analyzed for DRO and RRO were placed into laboratory-supplied jars in such a way that headspace was minimized.

3.4. Soil Sample Handling

All samples were placed in laboratory-supplied sample jars and placed in a cooler with sufficient gel ice to keep sample temperatures at ±4 degrees Celsius (°C) until delivery to the project laboratory under standard chain-of-custody procedures. A methanol trip blank accompanied the cooler containing volatile samples. Samples were submitted to the project laboratory for the following analyses:

- BTEX by US Environmental Protection Agency (EPA) Method 8021B
- GRO by Alaska Method AK 101
- DRO by Alaska Method AK 102
- RRO by Alaska Method AK 103

One field duplicate sample was also collected and submitted to the laboratory.

3.5. Investigation-Derived Waste (IDW)

IDW is waste generated during field investigations. The IDW from soil sampling consisted of the following waste streams:

- Decontamination water
- Personal protective equipment (PPE) and general debris

3.5.1. Decontamination Water

Decontamination water was disposed of on-site, within the bermed tank farm area.

3.5.2. PPE and General Debris

PPE and debris were placed in plastic bags and disposed of as solid waste.

4. FIELD OBSERVATIONS

This section summarizes the observations made in the field during sampling. Selected site photographs are provided in Appendix A.

The tank farm fence is kept locked, and the key is kept by AVEC employees. There are five tanks in the enclosed area. According to an aerial photograph from June 2006, there used to be ten tanks in the fenced area (Figure 2).

Soils samples collected from the tank farm generally consisted of sandy gravel to silty sand and were moist to wet. No groundwater was observed during sampling activities.

Drinking Well No 1 is located on the south side of the well house where debris is evident. An old leaking engine sits on the ground a few feet from the well. Old drums containing various volumes of fluid are scattered near the east end of the pump house. Staining is very evident in several locations. As stated in Section 2.1, the pump house operator believed this was from leaking drums that were discarded in the late 1970s by a state road contractor. He estimates that 1.5 drum volumes leaked out onto the ground from corroded fuel drums stored about 100 feet from Well No. 1.

While observing the perimeter of the tank farm, a depression in the ground was found with standing water and appeared to have staining and residue. This was located in the area where Mr. Evan stated that fuel lines that go under the road had leaked on both sides of the road until welding fixed the problem.

The power plant sits inside the fenced area and has a timber berm around the east side, but no liner is evident. A black geo-membrane liner is visible as a berm around the five tanks. At the northern third of the bermed area, the liner was found at 3 to 6 inches below the surface. In the southern two-thirds of the area, test pits were dug up to 2.5 feet deep and the liner was not found. The southern berm is reinforced with sand bags. There is extensive soil staining on the south end.

- Page Intentionally Left Blank -

5. ANALYTICAL RESULTS

Field screening and laboratory results are presented in Figure 3. Laboratory results are summarized in Table 1. Laboratory reports are provided in Appendix B along with an DEC laboratory data review checklist (DEC 2007).

5.1. Summary of Field Screening Data

Field screening results suggest that soil contamination within the bermed area is most prominent in the southern half of the area. Field screening results also suggested that, except for sample location 26, the tank farm contamination was primarily confined to southern half of the bermed area.

5.2. Summary of Analytical Data

DRO was detected above the cleanup level of 250 milligrams per kilogram (mg/kg) in all samples collected. The DRO concentrations ranged from 1,050 mg/kg in sample LKT 20 SS to 109,000 mg/kg in sample LKT 06 SS. RRO was also above the cleanup level of 11,000 mg/kg in this sample at 29,000 mg/kg. No other samples contained RRO, GRO, or BTEX concentrations that exceeded DEC cleanup levels. However, due to sample dilution because of high DRO concentrations, the method reporting limit for benzene was elevated above the cleanup level of 0.025 mg/kg.

5.3. Quality Assurance Review Summary

The DEC Environmental Laboratory Data and Quality Assurance Requirements (DEC 2006) and EPA National Functional Guidelines for Organic Data Review (EPA 1999) were followed in this site assessment. The data were reviewed to determine the data quality and to evaluate potential impact on the usability of the data. The data quality objectives for the project were established in the Work Plan QAPP (OASIS 2008) to support the nature of the investigation. The review was performed using Level II reports that were provided by the TestAmerica Incorporated laboratory in Anchorage, AK. The analytical laboratory reports, with the chain-of-custody records at the end of each respective report, along with the DEC checklist have been provided in Appendix B.

Samples were tested using the following methods for the associated analytes:

- AK101 for GRO
- AK102 for DRO
- AK103 for RRO
- SW8260B for BTEX

The following quality control parameters were reviewed:

- Holding times
- Sample handling and receiving
- Surrogate percent recovery

- Field duplicate sample comparability
- Matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD)
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) percent recoveries and RPD
- Method blanks
- Trip blanks
- Method Sensitivity–Reporting limits and practical quantitation limits (PQLs)

All reviewed quality control parameters were acceptable except as noted below:

Surrogate Percent Recoveries—Some samples failed to meet surrogate recovery limits for GRO, DRO, and RRO. Affected sample results are flagged JS on Table 1. All JS flagged DRO sample results were obtained from samples diluted either 1/10 or 1/100 due to high concentrations of target analytes (DRO). JS flagged GRO samples had surrogate recoveries below method acceptance limits for field surrogates. Matrix interference may be possible. All BTEX surrogates were well within EPA method SW 8260B recovery limits.

Method Sensitivity—DRO reporting limits were above DEC cleanup levels due to dilutions and/or presence of DRO above the cleanup level. Benzene PQLs were above the DEC cleanup levels and all samples were non-detect (ND). The PQLs were elevated due to 1/1.5 dilution and high moisture content. All samples with benzene PQLs above cleanup levels had DRO concentrations greatly exceeding DEC cleanup levels.

No MS/MSD samples were analyzed from this sample delivery group.

All sample holding times were met. The cooler was received by the laboratory in good condition. Cooler temperatures were within acceptable criteria.

6. CONCEPTUAL SITE MODEL

A human health Conceptual Site Model (CSM) has been developed for the inactive AVEC site using the procedure described by DEC (DEC 2005). The DEC CSM graphical and scoping forms are presented in Appendix C. This section provides the rationale for the completion of the DEC forms.

Soils in the site area generally consist of sandy gravel to silty sand. Groundwater flow direction is assumed to be approximately south based on surface topography and the proximity of the Kuskokwim River; however, seasonal river fluctuations may cause a variation in flow direction.

6.1. Contaminants of Concern

The contaminant of concern at the site is primarily DRO. RRO was also detected above the cleanup level at one location. Based on the DRO concentrations, polynuclear aromatic hydrocarbon (PAH) compounds may be present.

6.2. Exposure Pathways

Several potential exposure pathways are present at the site. The site investigation results show that hydrocarbon contamination is present in near-surface soil; the concentrations present suggest that soils below 1 foot bgs are likely impacted also. Both the ingestion and dermal exposure pathways for soil are complete.

While groundwater was not observed during sampling, the presence and use of relatively shallow drinking water wells near the site confirm that groundwater is present in the area that could be impacted by petroleum contaminants. The ingestion of groundwater pathway is complete for persons using groundwater. Surface water is present south of the site (Kuskokwim River), and a plume could potentially reach the river. Because the river is glacial, it is unlikely that the river would be used as a drinking water source, so the ingestion of surface water pathway is incomplete. The inhalation of fugitive dust pathway is also incomplete.

The tank farm area is fenced, keeping out both people and larger mammals. The area is generally in the middle of town. Little or no subsistence gathering activities are likely to be impacted by the tank farm that would lead to exposure. Although the river does host anadromous fish runs, DRO is not a bioaccumulative contaminant. Therefore, the ingestion of wild foods pathway is incomplete.

6.3. Receptors

The tank farm area is fenced; therefore, only site workers and site visitors may be exposed to the dermal contact pathway. However, additional contamination is present near the well house and in the area of the pipeline leaks, making this pathway complete for residents. Residents and site workers could be exposed through the inhalation pathway. Residents could also potentially be exposed to contaminants through groundwater ingestion and dermal contact.

In the future scenario, the same pathways would be complete. If the site were refurbished or developed, future construction workers could be exposed as well.

6.4. Data Gaps

The vertical extent of DRO contamination is not known at the site, nor is presence of PAH compounds. Impacts to groundwater by petroleum have not been assessed; evaluation of groundwater flow direction and potential impacts to the community well (Well No. 2) and/or the Kuskokwim River still need to be addressed.

7. CONCLUSIONS AND RECOMENDATIONS

This report summarizes the available data on the soil at the inactive AVEC tank farm in Lower Kalskag, Alaska. Soil contamination is present in excess of the DEC cleanup level for diesel for the inhalation, ingestion, and migration to groundwater pathways. It is uncertain whether a liner is present under the entire area and, if so, whether it is still intact. At this time it is not known whether there is groundwater beneath the site.

The following paragraphs summarize the findings and make recommendations for further investigation to assess exposure pathways and for evaluation of remedial alternatives.

7.1. Tank Farm Contaminated Soil

Findings: The field effort for this investigation was limited to only include sampling of shallow soils within the AVEC tank farm area. Field screening suggests that the contamination is present primarily on the southern half of the bermed area. Except for sample location 26, field screening suggests that in general, the contamination is located inside the tank farm berm. The DRO concentrations seen at and near the surface suggest that the contamination is likely present at depth in the soil beneath the tank farm. If an intact liner is assumed at an average depth of 3 feet below grade in the southern two-thirds half of the tank farm, there would be a estimated volume of 100 to 125 cubic yards that would require treatment plus the soil near sample location 26, estimated as less than 5 cubic yards. If no liner is present, the volume of contaminated subsurface soil is unknown.

Recommendation: In order to better estimate the volume of soil requiring remediation to meet DEC cleanup levels, the depth or presence of a liner in the southern two-thirds of the bermed area should be determined. If no liner is present, subsurface soil within the tank farm should be sampled to determine the vertical extent of the impacts. Due to the level of DRO detected in some samples (as high as 109,000 mg/kg) some PAH analyses should be run on soil samples to further assess possible receptor exposures.

7.2. Assessment of Other Petroleum-Impacted Areas

Additional site observations and information provided by the interview process have identified areas of soil impacts near the well house and on the east side of the tank farm at a pipeline that goes under the road.

Recommendation: In order to estimate the volume of soil requiring remediation to meet DEC cleanup levels, surface and subsurface soils near the well house and pipeline should be sampled to further assess petroleum impacts. Soils should be sampled for BTEX, GRO, DRO, RRO, and PAHs.

7.3. Groundwater

Findings: No groundwater was encountered during soil sampling. However, the presence of a groundwater well 100 feet southwest of the tank farm and the present city

water supply well (Well No. 2) approximately 200 feet northwest of the tank farm verifies the presence of groundwater beneath the site. Based on the pumping depth of Well No. 1, groundwater is likely on the order of 25 to 30 feet bgs. The Kuskokwim River is located about 650 feet southeast of the site. The groundwater flow direction is assumed to range from towards the river to parallel to the river, but it has not been established. Also unknown is whether groundwater flow varies with seasonal changes in the river level.

Recommendation: Install four to six wells to measure groundwater elevations for establishment of groundwater flow direction and to assess the presence of petroleum contaminants in groundwater. If accessible, Well No. 1 should also be sampled. The samples should be analyzed for BTEX, GRO, DRO, RRO, and PAHs.

Well No. 2 should also be sampled for the presence of volatile and semi-volatile compounds using drinking water methods.

8. REFERENCES

Alaska Community Database Community Information Summaries (CIS). 2009. http://www.commerce.state.ak.us/dca/commdb/CIS.cfm?Comm_Boro_Name=Lower%20Kalskag.

DEC. 2005. *Policy Guidance on Developing Conceptual Site Models.* November 30, 2005.

DEC. 2006. Laboratory Data and Quality Assurance Policy – Technical Memorandum, October 2006.

DEC. 2007. Laboratory Data Review Checklist, August 2007.

DEC. 2008. Oil and Other Hazardous Substances Pollution Control Regulations 18 AAC 75, October 2008.

EPA. 1999. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, USEPA October 1999.

OASIS. 2008. QAPP from Appendix A of Lower Kalskag Site Assessment Work Plan.

- Page Intentionally Left Blank -

TABLE

- Page Intentionally Left Blank -

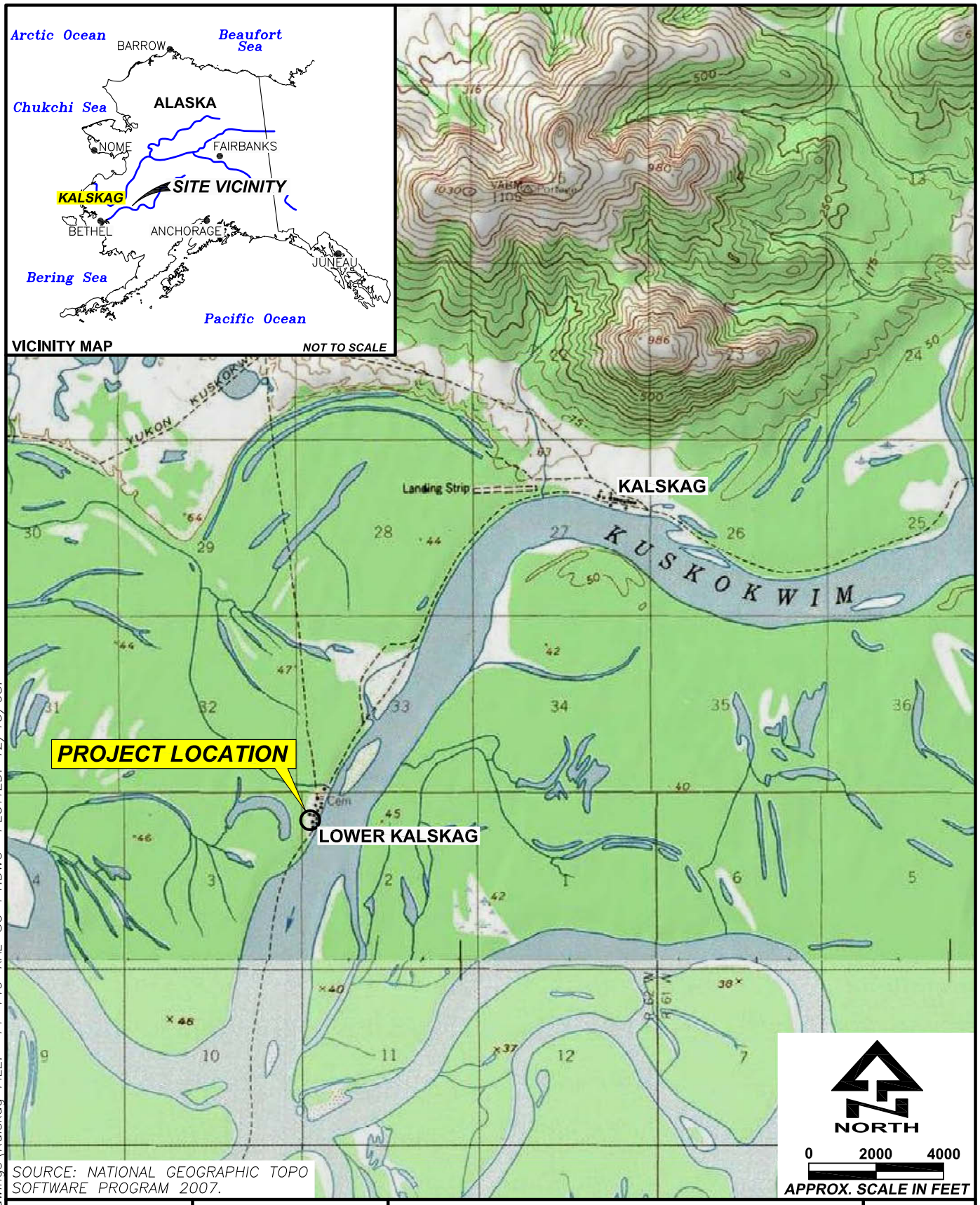
Table 1 - Soil Analytical Results
Inactive AVEC Bulk Fuel Facility
Lower Kalskag, Alaska

Sample Number	EPA 8260b				Alaska Method AK 101	Alaska Method AK 102	Alaska Method AK 103
	Benzene in mg/kg	Toluene in mg/kg	Ethylbenzene in mg/kg	Total Xylenes in mg/kg	GRO in mg/kg	DRO in mg/kg	RRO in mg/kg
LKT 05 SS	**0.0281 U**	0.0704 U	0.0704 U	0.106 U	7.04 U	**8,750**	784 U
LKT 06 SS	**0.0301 U**	0.0753 U	0.0753 U	0.113 U	7.53 U JS	**109,000 JS**	**29,000 JS**
LKT 07 SS	0.0214 U	0.0536 U	0.0536 U	0.0804 U	5.48 JS	**42,900 JS**	10,100 JS
LKT 09 SS	0.0246 U	0.0616 U	0.0616 U	0.0924 U	6.16 U	**25,300 JS**	7,230 U
LKT 18 SS	0.0249 U	0.0622 U	0.0622 U	0.0933 U	9.28 JS	**19,100**	780 U
LKT 18 SB	0.0215 U	0.0538 U	0.0538 U	0.0807 U	41.3	**10,400**	688 U
LKT 20 SS	0.0196 U	0.0489 U	0.0489 U	0.0734 U	4.89 U	**1,050**	268
LKT 21 SS	**0.0277 U**	0.0693 U	0.0693 U	0.104 U	8.52	**35,000 JS**	7,590 U
LKT FD01 *	**0.0315 U**	0.0786 U	0.0786 U	0.118 U	9.73 JS	**38,600 JS**	8,040 U
LKT 22 SS	0.0241 U	0.0602 U	0.0602 U	0.0903 U	6.02 U	**1,940**	188
LKT 26 SS	**0.0376 U**	0.0939 U	0.0939 U	0.0015 U	19.7 JS	**25,900**	992 U
LKT 26 SB	0.0219 U	0.0548	0.0548	0.0823	63.6	**10,800**	651 U
Trip Blank	0.0133 U	0.0333 U	0.0333 U	0.050	3.33 U	----------	----------
ADEC Cleanup in mg/kg [1]	***0.025***	***6.5***	***6.9***	***63***	***300***	***250***	***11,000***

Notes:
Results may be rounded.
[1] 18 AAC 75.341, Tables B1 and B2, migration to groundwater criteria (October 9, 2008); bolded concentrations in excess of ADEC Cleanup Level.
ADEC = Alaska Department of Environmental Conservation
DRO = Diesel-range organics
EPA = US Environmental Protection Agency
GRO = Gasoline-range organics
JS = Sample result is an estimate due to surrogate recoveries outside of method acceptance liimts
mg/kg = Milligrams per kilogram
RRO = Residual-range organics
U = Not detected at concentration shown
* Sample is a field duplicate of the previous sample

FIGURES

- Page Intentionally Left Blank -



SOURCE: NATIONAL GEOGRAPHIC TOPO SOFTWARE PROGRAM 2007.

PATH: V:\Project Drawings\Kalskag FILE: 14-140-KAL-SC-F1.DWG PLOTTED: 12/15/08.

oasis ENVIRONMENTAL

DATE: DEC. 2008
CHKD: C.G.S.
DRAWN: C.E.H
PROJ. No.: 14-140

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

SITE LOCATION MAP

LOWER KALSKAG
2008 BROWNFIELD SITE CHARACTERIZATION
Lower Kalskag, Alaska

FIGURE

1

NOTE: FORMER FUEL LINES WERE OVERLAYED FROM THE ALASKA COMMUNITY AND REGIONAL AFFAIRS PHOTO GALLERY DATED 1979.

SOURCE: IMAGE FROM GOOGLE EARTH PROFESSIONAL DATED JULY 26, 2007.

NORTH

0 30 60

APPROX. SCALE IN FEET

oasis ENVIRONMENTAL

DATE: JANUARY 2009
CHKD: N.R.M.
DRAWN: C.E.H
PROJ. No.: 14-140

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

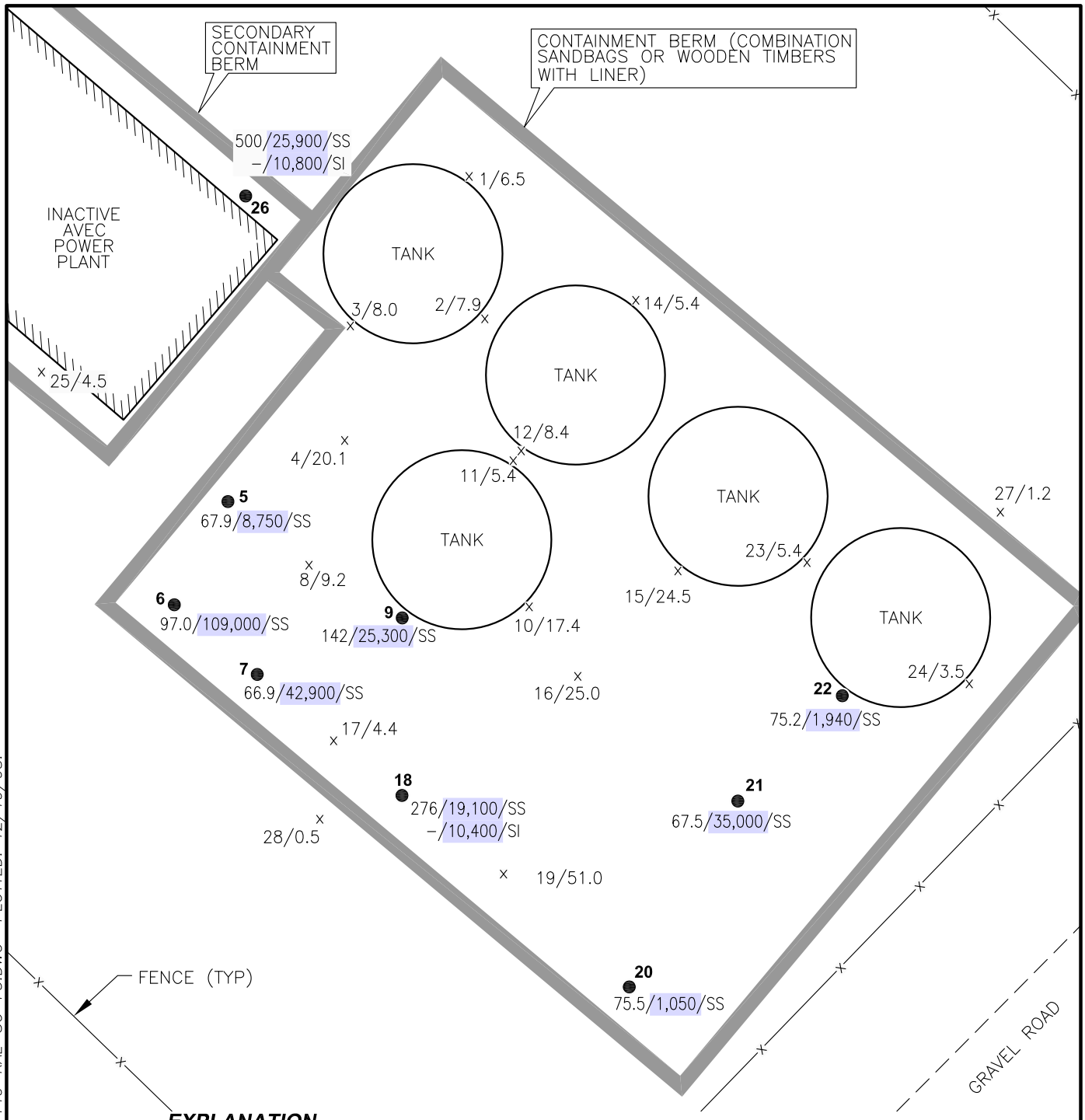
SITE PLAN

LOWER KALSKAG
2008 BROWNFIELD SITE CHARACTERIZATION
Lower Kalskag, Alaska

FIGURE

2

PATH: V:\Project Drawings\Kalskag FILE: 14-140-KAL-SC-F2.DWG PLOTTED: 1/15/09.



EXPLANATION

- x 1/6.5 ← PHOTOIONIZATION (PID) DETECTOR READING (ppmV)
- PID IDENTIFIER
- 5 ● PID AND SOIL SAMPLE LOCATION
- 67.9/8,750/SS ← DEPTH BELOW GROUND SURFACE (SS=0–6" AND SI=12+")
- DIESEL–RANGE ORGANICS (mg/kg)
- PID READING (ppmV)

NOTE:
SHADED TEXT INDICATES AN EXCEEDANCE OF SOIL CLEANUP LEVELS.

NORTH

0 5 10

APPROX. SCALE IN FEET

PATH: V:\Project Drawings\Kalskag FILE: 14-140-KAL-SC-F3.DWG PLOTTED: 12/19/08.

oasis ENVIRONMENTAL

DATE: DEC. 2008
CHKD: C.G.S.
DRAWN: C.E.H
PROJ. No.: 14-140

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

SITE DETAIL

LOWER KALSKAG
2008 BROWNFIELD SITE CHARACTERIZATION
Lower Kalskag, Alaska

FIGURE

3

APPENDIX A

Selected Site Photographs

- Page Intentionally Left Blank -

PHOTOGRAPH 1. LOOKING SOUTHWEST TOWARDS TANK FARM AND WELL PUMP HOUSE.

PHOTOGRAPH 2. LOOKING SOUTH AT REMAINING TANKS ON AVEC FACILITY PROPERTY.

PHOTOGRAPH 3. LOOKING WEST AT AVEC TANK FARM AND WELL PUMP HOUSE. DRINKING WELL LOCATED ON SOUTH SIDE ADJACENT TO PUMP HOUSE.

PHOTOGRAPH 4. LOOKING NORTHWEST AT PUMP HOUSE AND DRUMS.

PHOTOGRAPH 5. DRINKING WELL #1. NOTICE DISCARDED ENGINE IN BACKGROUND. EVIDENCE OF LEAKING.

PHOTOGRAPH 6. DEPRESSION WITH STANDING WATER AND WHAT APPEARS TO BE OIL RESIDUE AND STAINING AND SOUTH FENCE OF TANK FARM.

PHOTOGRAPH 7. LOOKING EAST BETWEEN TANK FARM PROPERTY AND WELL PUMP HOUSE.

PHOTOGRAPH 8. LOOKING SOUTH AT DRUMS IN FRONT OF WELL PUMP HOUSE EAST SIDE.

PHOTOGRAPH 9. STAINING BETWEEN DRUMS WHERE PUMP HOUSE OPERATOR SPECULATED THAT A SPILL OCCURRED.

PHOTOGRAPH 10. LOOKING NORTH AT AVEC TANK LABEL.

PHOTOGRAPH 11. DRUMS WITH VARIOUS VOLUMES OF FLUIDS.

PHOTOGRAPH 12. LOOKING NORTHEAST AT CORNER OF GENERATOR HOUSE, SECONDARY CONTAINMENT, AND TANKS.

PHOTOGRAPH 13. LOOKING NORTHEAST AT CORNER OF GENERATOR HOUSE, SECONDARY CONTAINMENT, AND TANKS.

PHOTOGRAPH 14. CLOSE UP OF EAST BERM.

PHOTOGRAPH 15. SAMPLE LOCATION LKT01SS ON NORTH SIDE OF TANK #1.

PHOTOGRAPH 16. SAMPLE LOCATION LKT21SS.

APPENDIX B

DEC Laboratory Data Review Checklist and Laboratory Reports

- Page Intentionally Left Blank -

Laboratory Data Review Checklist

Completed by:	Marty Hannah
Title:	Environmental Scientist
Date:	December 04, 2008
CS Report Name:	Report for Site Characterization Inactive AVEC Tank Farm, Lower Kalskag, AK
Report Date:	12-19-08
Consultant Firm:	OASIS Environmental Inc.
Laboratory Name:	TestAmerica Inc.-Anchorage, AK
Laboratory Report Number:	ARJ0017
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 Comments:

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

   ☐ Yes ☐ No Comments:

   Not applicable

2. Chain of Custody (COC)

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

   ☑ Yes ☐ No Comments:

b. Correct analyses requested?

☑ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

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

☑ Yes ☐ No Comments:

Samples were received at 3.9 degrees C.

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

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

All samples were received in good condition.

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

☐ Yes ☐ No Comments:

No discrepancies were noted.

e. Data quality or usability affected? Explain.

Comments:

Sample results are usable for project purposes.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No Comments:

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

Some samples had surrogates outside of acceptance limits, mostly due to high dilutions. High DRO was present in most samples. All lab QC was acceptable.

☒ Yes ☐ No Comments:

c. Were all corrective actions documented?

☐ Yes ☐ No Comments:

No corrective actions were required.

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

Comments:

Sample results are usable for project purposes. Some results are estimates due to surrogate recoveries outside of method acceptance limits.

5. Samples Results

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

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☒ Yes ☐ No Comments:

c. All soils reported on a dry weight basis?

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

Benzene PQLs were slightly above ADEC clean up levels

e. Data quality or usability affected? Explain.

Comments:

Data quality objectives were met for timely analyses, the PQL for benzene was above site clean up levels even though the samples were non-detect. In all cases of non-detect benzene PQLs above the clean up levels DRO was detected well above ADEC clean up levels. BTEX samples were diluted 1.5x due to presence of DRO in the BTEX sample.

6. QC Samples

a. Method Blank

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

☑ Yes ☐ No Comments:

ii. All method blank results less than PQL?

☑ Yes ☐ No Comments:

iii. If above PQL, what samples are affected?

Comments:

Not applicable

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

☐ Yes ☐ No Comments:

Not applicable

v. Data quality or usability affected? Explain.

Comments:

Data quality objectives were met for method blank analyses.

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

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

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

☑ Yes ☐ No Comments:

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

Comments:

Not applicable

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

☐ Yes ☐ No Comments:

Not applicable

vii. Data quality or usability affected? Explain.

Comments:

Data quality objectives were met for lab QC. No MS/MSDs or lab duplicates for any analyses were from this project.

c. Surrogates – Organics Only

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

☑ Yes ☐ No Comments:

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

☐ Yes ☑ No Comments:

All DRO samples with surrogates outside of method acceptance limits were diluted either 1/0 or 1/100 due to presence of target analytes. Several GRO samples that correspond to the high DRO samples had the field surrogate recoveries below method acceptance limits. All BTEX surrogates (8260 surrogates and internal standards) were well within method acceptance limits.

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

☒ Yes ☐ No Comments:

Sample results with surrogate recoveries outside of method acceptance limits were flagged JS and are considered estimates.

iv. Data quality or usability affected? Explain.

Comments:

Data quality objectives were met for surrogate recoveries though the accuracy of some results are limited due to the high dilutions and failed surrogates. The DRO sample results greatly exceeded ADEC clean up levels in all samples so the data is useful for project purposes.

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

i. One trip blank reported per matrix, analysis and cooler?

☒ Yes ☐ No Comments:

ii. All results less than PQL?

☒ Yes ☐ No Comments:

iii. If above PQL, what samples are affected?

Comments:

Not applicable

iv. Data quality or usability affected? Explain.

Comments:

Data quality objectives were met for trip blanks.

e. Field Duplicate

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

☒ Yes ☐ No Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☒ Yes ☐ No Comments:

iv. Data quality or usability affected? Explain.

Comments:

Data quality objectives were met for field duplicates.

f. Decontamination or Equipment Blank (if applicable)

☐ Yes ☐ No ☒ Not Applicable

i. All results less than PQL?

☐ Yes ☐ No Comments:

Not applicable

ii. If above PQL, what samples are affected?

Comments:

Not applicable

iii. Data quality or usability affected? Explain.

Comments:

Not applicable

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

a. Defined and appropriate?

☐ Yes ☐ No Comments:

Not applicable

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

October 15, 2008

Nino Muniz
Oasis Environmental, Inc.
825 W 8th Ave, ste 200
Anchorage, AK/USA 99501-4427

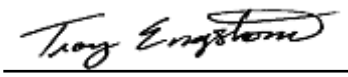
RE: ADEC - Lower Kalskag

Enclosed are the results of analyses for samples received by the laboratory on 10/03/08 11:40. The following list is a summary of the Work Orders contained in this report, generated on 10/15/08 21:06.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
ARJ0017	ADEC - Lower Kalskag	14-140

TestAmerica Anchorage



Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

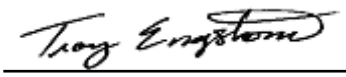
ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
LKT 26 SS	ARJ0017-01	Soil	10/01/08 16:30	10/03/08 11:40
LKT 26 SB	ARJ0017-02	Soil	10/01/08 16:36	10/03/08 11:40
LKT 18 SS	ARJ0017-03	Soil	10/01/08 16:55	10/03/08 11:40
LKT 18 SB	ARJ0017-04	Soil	10/01/08 17:00	10/03/08 11:40
LKT 05 SS	ARJ0017-05	Soil	10/01/08 17:10	10/03/08 11:40
LKT 07 SS	ARJ0017-06	Soil	10/01/08 17:20	10/03/08 11:40
LKT 09 SS	ARJ0017-07	Soil	10/01/08 17:25	10/03/08 11:40
LKT 20 SS	ARJ0017-08	Soil	10/01/08 17:35	10/03/08 11:40
LKT 21 SS	ARJ0017-09	Soil	10/01/08 17:40	10/03/08 11:40
LKT 22 SS	ARJ0017-10	Soil	10/01/08 17:45	10/03/08 11:40
LKT FD01	ARJ0017-11	Soil	10/01/08 08:00	10/03/08 11:40
TB	ARJ0017-12	Soil	10/01/08 08:00	10/03/08 11:40
LKT 06 SS	ARJ0017-13	Soil	10/01/08 17:15	10/03/08 11:40

TestAmerica Anchorage



Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-01 (LKT 26 SS)		**Soil**				**Sampled: 10/01/08 16:30**					
Diesel Range Organics	AK102/103	**25900**	-----	397	mg/kg dry	10x	8100018	10/08/08 14:31	10/09/08 19:02	JN	**RL7**
Residual Range Organics	"	ND	-----	992	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*134%*		*50 - 150 %*	"			"		
Triacontane			*112%*		*50 - 150 %*	"			"		
ARJ0017-02 (LKT 26 SB)		**Soil**				**Sampled: 10/01/08 16:36**					
Diesel Range Organics	AK102/103	**10800**	-----	260	mg/kg dry	10x	8100018	10/08/08 14:31	10/09/08 19:02	JN	**RL7**
Residual Range Organics	"	ND	-----	651	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*106%*		*50 - 150 %*	"			"		
Triacontane			*84.6%*		*50 - 150 %*	"			"		
ARJ0017-03 (LKT 18 SS)		**Soil**				**Sampled: 10/01/08 16:55**					
Diesel Range Organics	AK102/103	**19100**	-----	312	mg/kg dry	10x	8100018	10/08/08 14:31	10/09/08 19:33	JN	**RL7**
Residual Range Organics	"	ND	-----	780	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*143%*		*50 - 150 %*	"			"		
Triacontane			*115%*		*50 - 150 %*	"			"		
ARJ0017-04 (LKT 18 SB)		**Soil**				**Sampled: 10/01/08 17:00**					
Diesel Range Organics	AK102/103	**10400**	-----	275	mg/kg dry	10x	8100018	10/08/08 14:31	10/09/08 19:33	JN	**RL7**
Residual Range Organics	"	ND	-----	688	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*110%*		*50 - 150 %*	"			"		
Triacontane			*82.9%*		*50 - 150 %*	"			"		
ARJ0017-05 (LKT 05 SS)		**Soil**				**Sampled: 10/01/08 17:10**					
Diesel Range Organics	AK102/103	**8750**	-----	314	mg/kg dry	10x	8100018	10/08/08 14:31	10/09/08 20:05	JN	**RL7**
Residual Range Organics	"	ND	-----	784	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*149%*		*50 - 150 %*	"			"		
Triacontane			*117%*		*50 - 150 %*	"			"		
ARJ0017-06 (LKT 07 SS)		**Soil**				**Sampled: 10/01/08 17:20**					
Diesel Range Organics	AK102/103	**42900**	-----	2650	mg/kg dry	100x	8100018	10/08/08 14:31	10/09/08 20:05	JN	**RL7**
Residual Range Organics	"	**10100**	-----	6630	"	"	"	"	"	JN	**RL7**

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

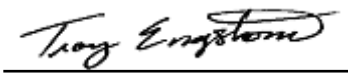
Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-06 (LKT 07 SS)			**Soil**			**Sampled: 10/01/08 17:20**					
Surrogate(s): 1-Chlorooctadecane			*714%*		*50 - 150 %*	*100x*			*10/09/08 20:05*		***Z3, ZX***
Triacontane			*149%*		*50 - 150 %*	*"*			*"*		***Z3***
ARJ0017-07 (LKT 09 SS)			**Soil**			**Sampled: 10/01/08 17:25**					
Diesel Range Organics	AK102/103	**25300**	-----	2890	mg/kg dry	100x	8100018	10/08/08 14:31	10/09/08 20:36	JN	**RL7**
Residual Range Organics	"	ND	-----	7230	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*180%*		*50 - 150 %*	*"*			*"*		***Z3***
Triacontane			*124%*		*50 - 150 %*	*"*			*"*		***Z3***
ARJ0017-08 (LKT 20 SS)			**Soil**			**Sampled: 10/01/08 17:35**					
Diesel Range Organics	AK102/103	**1050**	-----	27.9	mg/kg dry	1x	8100018	10/08/08 14:31	10/09/08 16:23	JN	
Residual Range Organics	"	**268**	-----	69.8	"	"	"	"	"	JN	
Surrogate(s): 1-Chlorooctadecane			*100%*		*50 - 150 %*	*"*			*"*		
Triacontane			*87.0%*		*50 - 150 %*	*"*			*"*		
ARJ0017-09 (LKT 21 SS)			**Soil**			**Sampled: 10/01/08 17:40**					
Diesel Range Organics	AK102/103	**35000**	-----	3040	mg/kg dry	100x	8100018	10/08/08 14:31	10/09/08 20:36	JN	**RL7**
Residual Range Organics	"	ND	-----	7590	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*571%*		*50 - 150 %*	*"*			*"*		***Z3, ZX***
Triacontane			*107%*		*50 - 150 %*	*"*			*"*		***Z3***
ARJ0017-10 (LKT 22 SS)			**Soil**			**Sampled: 10/01/08 17:45**					
Diesel Range Organics	AK102/103	**1940**	-----	29.0	mg/kg dry	1x	8100018	10/08/08 14:31	10/09/08 16:54	JN	
Residual Range Organics	"	**188**	-----	72.4	"	"	"	"	"	JN	
Surrogate(s): 1-Chlorooctadecane			*97.1%*		*50 - 150 %*	*"*			*"*		
Triacontane			*87.7%*		*50 - 150 %*	*"*			*"*		
ARJ0017-11 (LKT FD01)			**Soil**			**Sampled: 10/01/08 08:00**					
Diesel Range Organics	AK102/103	**38600**	-----	3220	mg/kg dry	100x	8100018	10/08/08 14:31	10/09/08 21:08	JN	**RL7**
Residual Range Organics	"	ND	-----	8040	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*181%*		*50 - 150 %*	*"*			*"*		***Z3***
Triacontane			*123%*		*50 - 150 %*	*"*			*"*		***Z3***

TestAmerica Anchorage



Troy J. Engstrom, Lab Director

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-13 (LKT 06 SS)		**Soil**				**Sampled: 10/01/08 17:15**					
Diesel Range Organics	AK102/103	**109000**	-----	3820	mg/kg dry	100x	8100018	10/08/08 14:31	10/09/08 21:08	JN	**RL7**
Residual Range Organics	"	**29000**	-----	9540	"	"	"	"	"	JN	**RL7**
Surrogate(s): 1-Chlorooctadecane			*1200%*		*50 - 150 %*	"			"		***Z3, ZX***
Triacontane			*191%*		*50 - 150 %*	"			"		***Z3***

TestAmerica Anchorage

Troy Engstrom

Troy J. Engstrom, Lab Director

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-01 (LKT 26 SS)		**Soil**				**Sampled: 10/01/08 16:30**					
Benzene	EPA 8260B	ND	-----	0.0376	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 01:48	ds	
Toluene	"	ND	-----	0.0939	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0939	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.141	"	"	"	"	"	ds	
Gasoline Range Organics	"	**19.7**	-----	9.39	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*98.8%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*105%*		*80 - 120 %*	"			"		
a,a,a-TFT			*47.3%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*99.4%*		*80 - 120 %*	"			"		
ARJ0017-02 (LKT 26 SB)		**Soil**				**Sampled: 10/01/08 16:36**					
Benzene	EPA 8260B	ND	-----	0.0219	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 02:21	ds	
Toluene	"	ND	-----	0.0548	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0548	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0823	"	"	"	"	"	ds	
Gasoline Range Organics	"	**63.6**	-----	5.48	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*99.5%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*99.4%*		*80 - 120 %*	"			"		
a,a,a-TFT			*77.0%*		*50 - 150 %*	"			"		
Toluene-d8			*100%*		*80 - 120 %*	"			"		
ARJ0017-03 (LKT 18 SS)		**Soil**				**Sampled: 10/01/08 16:55**					
Benzene	EPA 8260B	ND	-----	0.0249	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 02:55	ds	
Toluene	"	ND	-----	0.0622	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0622	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0933	"	"	"	"	"	ds	
Gasoline Range Organics	"	**9.28**	-----	6.22	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*101%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*99.2%*		*80 - 120 %*	"			"		
a,a,a-TFT			*34.8%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*100%*		*80 - 120 %*	"			"		

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-04 (LKT 18 SB)		**Soil**				**Sampled: 10/01/08 17:00**					
Benzene	EPA 8260B	ND	-----	0.0215	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 03:28	ds	
Toluene	"	ND	-----	0.0538	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0538	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0807	"	"	"	"	"	ds	
Gasoline Range Organics	"	**41.3**	-----	5.38	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*100%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*98.6%*		*80 - 120 %*	"			"		
a,a,a-TFT			*80.9%*		*50 - 150 %*	"			"		
Toluene-d8			*97.6%*		*80 - 120 %*	"			"		
ARJ0017-05 (LKT 05 SS)		**Soil**				**Sampled: 10/01/08 17:10**					
Benzene	EPA 8260B	ND	-----	0.0281	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 04:02	ds	
Toluene	"	ND	-----	0.0704	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0704	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.106	"	"	"	"	"	ds	
Gasoline Range Organics	"	ND	-----	7.04	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*102%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*97.2%*		*80 - 120 %*	"			"		
a,a,a-TFT			*55.2%*		*50 - 150 %*	"			"		
Toluene-d8			*98.9%*		*80 - 120 %*	"			"		
ARJ0017-06 (LKT 07 SS)		**Soil**				**Sampled: 10/01/08 17:20**					
Benzene	EPA 8260B	ND	-----	0.0214	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 04:36	ds	
Toluene	"	ND	-----	0.0536	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0536	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0804	"	"	"	"	"	ds	
Gasoline Range Organics	"	**5.48**	-----	5.36	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*105%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*98.7%*		*80 - 120 %*	"			"		
a,a,a-TFT			*37.6%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*100%*		*80 - 120 %*	"			"		

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-07 (LKT 09 SS)		**Soil**				**Sampled: 10/01/08 17:25**					
Benzene	EPA 8260B	ND	-----	0.0246	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 17:23	ds	
Toluene	"	ND	-----	0.0616	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0616	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0924	"	"	"	"	"	ds	
Gasoline Range Organics	"	ND	-----	6.16	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*101%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*99.8%*		*80 - 120 %*	"			"		
a,a,a-TFT			*69.6%*		*50 - 150 %*	"			"		
Toluene-d8			*99.6%*		*80 - 120 %*	"			"		
ARJ0017-08 (LKT 20 SS)		**Soil**				**Sampled: 10/01/08 17:35**					
Benzene	EPA 8260B	ND	-----	0.0196	mg/kg dry	1.5x	8100011	10/06/08 08:40	10/08/08 17:58	ds	
Toluene	"	ND	-----	0.0489	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0489	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0734	"	"	"	"	"	ds	
Gasoline Range Organics	"	ND	-----	4.89	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*100%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*103%*		*80 - 120 %*	"			"		
a,a,a-TFT			*34.4%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*100%*		*80 - 120 %*	"			"		
ARJ0017-09 (LKT 21 SS)		**Soil**				**Sampled: 10/01/08 17:40**					
Benzene	EPA 8260B	ND	-----	0.0277	mg/kg dry	1.5x	8100023	10/10/08 08:56	10/10/08 23:24	ds	
Toluene	"	ND	-----	0.0693	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0693	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.104	"	"	"	"	"	ds	
Gasoline Range Organics	"	**8.52**	-----	6.93	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*100%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*102%*		*80 - 120 %*	"			"		
a,a,a-TFT			*36.4%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*100%*		*80 - 120 %*	"			"		

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-10 (LKT 22 SS)		**Soil**				**Sampled: 10/01/08 17:45**					
Benzene	EPA 8260B	ND	-----	0.0241	mg/kg dry	1.5x	8100023	10/10/08 08:56	10/10/08 23:58	ds	
Toluene	"	ND	-----	0.0602	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0602	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0903	"	"	"	"	"	ds	
Gasoline Range Organics	"	ND	-----	6.02	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*101%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*101%*		*80 - 120 %*	"			"		
a,a,a-TFT			*100%*		*50 - 150 %*	"			"		
Toluene-d8			*98.6%*		*80 - 120 %*	"			"		
ARJ0017-11 (LKT FD01)		**Soil**				**Sampled: 10/01/08 08:00**					
Benzene	EPA 8260B	ND	-----	0.0315	mg/kg dry	1.5x	8100023	10/10/08 08:56	10/11/08 00:31	ds	
Toluene	"	ND	-----	0.0786	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0786	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.118	"	"	"	"	"	ds	
Gasoline Range Organics	"	**9.73**	-----	7.86	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*101%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*101%*		*80 - 120 %*	"			"		
a,a,a-TFT			*30.3%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*101%*		*80 - 120 %*	"			"		
ARJ0017-12 (TB)		**Soil**				**Sampled: 10/01/08 08:00**					
Benzene	EPA 8260B	ND	-----	0.0133	mg/kg wet	1x	8100023	10/10/08 08:56	10/11/08 15:11	ds	
Toluene	"	ND	-----	0.0333	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0333	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.0500	"	"	"	"	"	ds	
Gasoline Range Organics	"	ND	-----	3.33	"	"	"	"	"	ds	
Surrogate(s): 4-BFB			*100%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*102%*		*80 - 120 %*	"			"		
a,a,a-TFT			*99.2%*		*50 - 150 %*	"			"		
Toluene-d8			*96.6%*		*80 - 120 %*	"			"		

TestAmerica Anchorage

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

Troy Engstrom

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-13 (LKT 06 SS)		**Soil**				**Sampled: 10/01/08 17:15**					
Benzene	EPA 8260B	ND	-----	0.0301	mg/kg dry	1x	8100023	10/10/08 08:56	10/11/08 15:45	ds	
Toluene	"	ND	-----	0.0753	"	"	"	"	"	ds	
Ethylbenzene	"	ND	-----	0.0753	"	"	"	"	"	ds	
Xylenes (total)	"	ND	-----	0.113	"	"	"	"	"	ds	
Gasoline Range Organics	"	ND	-----	7.53	"	"	"	"	"	ds	
Surrogate(s): *4-BFB*			*101%*		*80 - 120 %*	"			"		
Dibromofluoromethane			*101%*		*80 - 120 %*	"			"		
a,a,a-TFT			*36.2%*		*50 - 150 %*	"			"		***Z6***
Toluene-d8			*100%*		*80 - 120 %*	"			"		

TestAmerica Anchorage

Troy Engstrom

Troy J. Engstrom, Lab Director

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

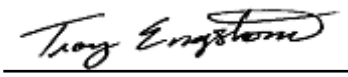
Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Physical Parameters by APHA/ASTM/EPA Methods

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-01 (LKT 26 SS)		**Soil**				**Sampled: 10/01/08 16:30**					
Dry Weight	TA-SOP	**49.6**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-02 (LKT 26 SB)		**Soil**				**Sampled: 10/01/08 16:36**					
Dry Weight	TA-SOP	**69.3**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-03 (LKT 18 SS)		**Soil**				**Sampled: 10/01/08 16:55**					
Dry Weight	TA-SOP	**64.0**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-04 (LKT 18 SB)		**Soil**				**Sampled: 10/01/08 17:00**					
Dry Weight	TA-SOP	**70.3**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-05 (LKT 05 SS)		**Soil**				**Sampled: 10/01/08 17:10**					
Dry Weight	TA-SOP	**62.8**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-06 (LKT 07 SS)		**Soil**				**Sampled: 10/01/08 17:20**					
Dry Weight	TA-SOP	**70.4**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-07 (LKT 09 SS)		**Soil**				**Sampled: 10/01/08 17:25**					
Dry Weight	TA-SOP	**67.7**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-08 (LKT 20 SS)		**Soil**				**Sampled: 10/01/08 17:35**					
Dry Weight	TA-SOP	**70.5**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-09 (LKT 21 SS)		**Soil**				**Sampled: 10/01/08 17:40**					
Dry Weight	TA-SOP	**62.7**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-10 (LKT 22 SS)		**Soil**				**Sampled: 10/01/08 17:45**					
Dry Weight	TA-SOP	**67.4**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	
ARJ0017-11 (LKT FD01)		**Soil**				**Sampled: 10/01/08 08:00**					
Dry Weight	TA-SOP	**57.7**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	

TestAmerica Anchorage



Troy J. Engstrom, Lab Director

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Physical Parameters by APHA/ASTM/EPA Methods

TestAmerica Anchorage

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Analyst	Notes
ARJ0017-13 (LKT 06 SS)		**Soil**				**Sampled: 10/01/08 17:15**					
Dry Weight	TA-SOP	**51.2**	-----	1.00	%	1x	8100019	10/08/08 14:32	10/09/08 09:25	JN	

TestAmerica Anchorage

Troy Engstrom

Troy J. Engstrom, Lab Director

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO - Laboratory Quality Control Results

TestAmerica Anchorage

QC Batch: 8100018 **Soil Preparation Method: EPA 3545**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (8100018-BLK1)									**Extracted: 10/08/08 14:31**					
Diesel Range Organics	AK102/103	ND	---	20.0	mg/kg wet	1x	--	--	--	--	--	--	10/09/08 12:10	
Residual Range Organics	"	ND	---	50.0	"	"	--	--	--	--	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 99.3%*			*Limits: 50-150%*	"							*10/09/08 12:10*	
Triacontane		*89.9%*			*50-150%*	"							"	
LCS (8100018-BS1)									**Extracted: 10/08/08 14:31**					
Diesel Range Organics	AK102/103	143	---	20.0	mg/kg wet	1x	--	129	111%	(75-125)	--	--	10/09/08 12:42	
Residual Range Organics	"	128	---	50.0	"	"	--	"	99.6%	(60-120)	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 105%*			*Limits: 60-120%*	"							*10/09/08 12:42*	
Triacontane		*90.0%*			*60-120%*	"							"	
LCS Dup (8100018-BSD1)									**Extracted: 10/08/08 14:31**					
Diesel Range Organics	AK102/103	145	---	20.0	mg/kg wet	1x	--	129	112%	(75-125)	0.853%	(20)	10/09/08 13:13	
Residual Range Organics	"	128	---	50.0	"	"	--	"	99.0%	(60-120)	0.566%	"	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 103%*			*Limits: 60-120%*	"							*10/09/08 13:13*	
Triacontane		*89.3%*			*60-120%*	"							"	
Duplicate (8100018-DUP1)							**QC Source: ARJ0015-11**		**Extracted: 10/08/08 14:31**					
Diesel Range Organics	AK102/103	42.2	---	20.9	mg/kg dry	1x	42.5	--	--	--	0.686%	(20)	10/09/08 12:10	
Residual Range Organics	"	86.5	---	52.2	"	"	95.4	--	--	--	9.82%	"	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 123%*			*Limits: 50-150%*	"							*10/09/08 12:10*	
Triacontane		*113%*			*50-150%*	"							"	
Matrix Spike (8100018-MS1)							**QC Source: ARJ0015-11**		**Extracted: 10/08/08 14:31**					
Diesel Range Organics	AK102/103	208	---	21.3	mg/kg dry	1x	42.5	137	121%	(75-125)	--	--	10/09/08 13:13	
Residual Range Organics	"	239	---	53.3	"	"	95.4	"	105%	(60-150)	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 127%*			*Limits: 50-150%*	"							*10/09/08 13:13*	
Triacontane		*118%*			*50-150%*	"							"	
Matrix Spike Dup (8100018-MSD1)							**QC Source: ARJ0015-11**		**Extracted: 10/08/08 14:31**					
Diesel Range Organics	AK102/103	211	---	21.1	mg/kg dry	1x	42.5	136	124%	(75-125)	1.48%	(25)	10/09/08 13:45	
Residual Range Organics	"	244	---	52.8	"	"	95.4	"	110%	(60-150)	2.02%	"	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 129%*			*Limits: 50-150%*	"							*10/09/08 13:45*	
Triacontane		*116%*			*50-150%*	"							"	

TestAmerica Anchorage

Troy Engstrom

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**
825 W 8th Ave, ste 200	Project Number:	14-140
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz
		Report Created: 10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

TestAmerica Anchorage

QC Batch: 8100011 **Soil Preparation Method: AK101 Field Prep**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (8100011-BLK1)							**Extracted: 10/06/08 08:40**							
Benzene	EPA 8260B	ND	---	0.0133	mg/kg wet	1x	--	--	--	--	--	--	10/07/08 14:24	
Toluene	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	0.0500	"	"	--	--	--	--	--	--	"	
Gasoline Range Organics	"	ND	---	3.33	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 102%*			*Limits: 80-120%*	"							*10/07/08 14:24*	
Dibromofluoromethane		*103%*			*80-120%*	"							"	
a,a,a-TFT		*102%*			*50-150%*	"							"	
Toluene-d8		*98.3%*			*80-120%*	"							"	
LCS (8100011-BS1)							**Extracted: 10/06/08 08:40**							
Benzene	EPA 8260B	0.246	---	0.0133	mg/kg wet	1x	--	0.304	81.1%	(73.6-125)	--	--	10/07/08 13:15	
Toluene	"	1.75	---	0.0333	"	"	--	1.98	88.3%	(80-120)	--	--	"	
Ethylbenzene	"	0.353	---	0.0333	"	"	--	0.428	82.5%	(77.1-120)	--	--	"	
Xylenes (total)	"	2.01	---	0.0500	"	"	--	2.03	98.8%	(78.5-120)	--	--	"	
Gasoline Range Organics	"	21.2	---	3.33	"	"	--	22.0	96.2%	(60-120)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 98.6%*			*Limits: 80-120%*	"							*10/07/08 13:15*	
Dibromofluoromethane		*106%*			*80-120%*	"							"	
Toluene-d8		*99.0%*			*80-120%*	"							"	
a,a,a-TFT		*95.2%*			*80-120%*	"							"	
LCS Dup (8100011-BSD1)							**Extracted: 10/06/08 08:40**							
Benzene	EPA 8260B	0.259	---	0.0133	mg/kg wet	1x	--	0.304	85.3%	(73.6-125)	5.13%	(10.3)	10/07/08 13:50	
Toluene	"	1.87	---	0.0333	"	"	--	1.98	94.2%	(80-120)	6.49%	(11)	"	
Ethylbenzene	"	0.376	---	0.0333	"	"	--	0.428	87.9%	(77.1-120)	6.30%	(10.4)	"	
Xylenes (total)	"	2.14	---	0.0500	"	"	--	2.03	106%	(78.5-120)	6.64%	(10.7)	"	
Gasoline Range Organics	"	22.7	---	3.33	"	"	--	22.0	103%	(60-120)	7.08%	(20)	"	
Surrogate(s): 4-BFB		*Recovery: 101%*			*Limits: 80-120%*	"							*10/07/08 13:50*	
Dibromofluoromethane		*105%*			*80-120%*	"							"	
a,a,a-TFT		*100%*			*80-120%*	"							"	
Toluene-d8		*97.7%*			*80-120%*	"							"	

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

TestAmerica Anchorage

QC Batch: 8100011 **Soil Preparation Method: AK101 Field Prep**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (8100011-DUP1)					**QC Source: ARI0118-01**				**Extracted: 10/06/08 08:40**					
Gasoline Range Organics	EPA 8260B	ND	---	5.97	mg/kg dry	3x	ND	--	--	--	53.6%	(35.8)	10/07/08 15:34	R4
Surrogate(s): 4-BFB		*Recovery: 101%*			*Limits: 80-120%*	"							*10/07/08 15:34*	
Dibromofluoromethane		*101%*			*80-120%*	"							"	
Toluene-d8		*99.4%*			*80-120%*	"							"	
a,a,a-TFT		*132%*			*50-150%*	"							"	
Matrix Spike (8100011-MS1)					**QC Source: ARI0118-01**				**Extracted: 10/06/08 08:40**					
Benzene	EPA 8260B	1.05	---	0.0239	mg/kg dry	3x	ND	0.746	141%	(69.3-190)	--	--	10/07/08 16:08	
Toluene	"	1.21	---	0.0597	"	"	0.0245	0.713	167%	(79.9-196)	--	--	"	
Ethylbenzene	"	1.28	---	0.0597	"	"	ND	0.717	179%	(79.1-192)	--	--	"	
Xylenes (total)	"	3.75	---	0.0895	"	"	ND	2.16	174%	(80-204)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 100%*			*Limits: 80-120%*	"							*10/07/08 16:08*	
Dibromofluoromethane		*103%*			*80-120%*	"							"	
a,a,a-TFT		*133%*			*50-150%*	"							"	
Toluene-d8		*99.2%*			*80-120%*	"							"	
Matrix Spike Dup (8100011-MSD1)					**QC Source: ARI0118-01**				**Extracted: 10/06/08 08:40**					
Benzene	EPA 8260B	1.04	---	0.0239	mg/kg dry	3x	ND	0.746	140%	(69.3-190)	0.855%	(40)	10/07/08 16:43	
Toluene	"	1.23	---	0.0597	"	"	0.0245	0.713	169%	(79.9-196)	1.27%	"	"	
Ethylbenzene	"	1.29	---	0.0597	"	"	ND	0.717	180%	(79.1-192)	0.279%	"	"	
Xylenes (total)	"	3.81	---	0.0895	"	"	ND	2.16	176%	(80-204)	1.42%	"	"	
Surrogate(s): 4-BFB		*Recovery: 100%*			*Limits: 80-120%*	"							*10/07/08 16:43*	
Dibromofluoromethane		*102%*			*80-120%*	"							"	
Toluene-d8		*99.8%*			*80-120%*	"							"	
a,a,a-TFT		*130%*			*50-150%*	"							"	

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**
825 W 8th Ave, ste 200	Project Number:	14-140
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz
		Report Created: 10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

TestAmerica Anchorage

QC Batch: 8100023 **Soil Preparation Method: AK101 Field Prep**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (8100023-BLK1)							**Extracted: 10/10/08 08:56**							
Benzene	EPA 8260B	ND	---	0.0133	mg/kg wet	1x	--	--	--	--	--	--	10/10/08 17:47	
Toluene	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.0333	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	0.0500	"	"	--	--	--	--	--	--	"	
Gasoline Range Organics	"	ND	---	3.33	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 99.9%*			*Limits: 80-120%*	"							*10/10/08 17:47*	
Dibromofluoromethane		*102%*			*80-120%*	"							"	
a,a,a-TFT		*103%*			*50-150%*	"							"	
Toluene-d8		*96.8%*			*80-120%*	"							"	
LCS (8100023-BS1)							**Extracted: 10/10/08 08:56**							
Benzene	EPA 8260B	0.257	---	0.0133	mg/kg wet	1x	--	0.304	84.6%	(73.6-125)	--	--	10/10/08 16:39	
Toluene	"	1.80	---	0.0333	"	"	--	1.98	90.7%	(80-120)	--	--	"	
Ethylbenzene	"	0.368	---	0.0333	"	"	--	0.428	86.0%	(77.1-120)	--	--	"	
Xylenes (total)	"	2.06	---	0.0500	"	"	--	2.03	101%	(78.5-120)	--	--	"	
Gasoline Range Organics	"	21.4	---	3.33	"	"	--	22.0	97.4%	(60-120)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 98.2%*			*Limits: 80-120%*	"							*10/10/08 16:39*	
Dibromofluoromethane		*105%*			*80-120%*	"							"	
Toluene-d8		*96.8%*			*80-120%*	"							"	
a,a,a-TFT		*101%*			*80-120%*	"							"	
LCS Dup (8100023-BSD1)							**Extracted: 10/10/08 08:56**							
Benzene	EPA 8260B	0.259	---	0.0133	mg/kg wet	1x	--	0.304	85.2%	(73.6-125)	0.774%	(10.3)	10/10/08 17:13	
Toluene	"	1.86	---	0.0333	"	"	--	1.98	93.8%	(80-120)	3.37%	(11)	"	
Ethylbenzene	"	0.377	---	0.0333	"	"	--	0.428	88.2%	(77.1-120)	2.50%	(10.4)	"	
Xylenes (total)	"	2.15	---	0.0500	"	"	--	2.03	106%	(78.5-120)	4.17%	(10.7)	"	
Gasoline Range Organics	"	22.1	---	3.33	"	"	--	22.0	100%	(60-120)	3.04%	(20)	"	
Surrogate(s): 4-BFB		*Recovery: 99.5%*			*Limits: 80-120%*	"							*10/10/08 17:13*	
Dibromofluoromethane		*104%*			*80-120%*	"							"	
a,a,a-TFT		*103%*			*80-120%*	"							"	
Toluene-d8		*98.4%*			*80-120%*	"							"	

TestAmerica Anchorage

Troy Engstrom

Troy J. Engstrom, Lab Director

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**
825 W 8th Ave, ste 200	Project Number:	14-140
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz
		Report Created: 10/15/08 21:06

Selected Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

TestAmerica Anchorage

QC Batch: 8100023 **Soil Preparation Method: AK101 Field Prep**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (8100023-DUP1)					**QC Source: ARJ0025-02**				**Extracted: 10/10/08 08:56**					
Gasoline Range Organics	EPA 8260B	ND	---	3.62	mg/kg dry	3x	ND	--	--	--		(35.8)	10/10/08 18:21	
Surrogate(s): 4-BFB		*Recovery: 99.4%*			*Limits: 80-120%*	"							*10/10/08 18:21*	
Dibromofluoromethane		*102%*			*80-120%*	"							"	
a,a,a-TFT		*123%*			*50-150%*	"							"	
Toluene-d8		*98.1%*			*80-120%*	"							"	
Matrix Spike (8100023-MS1)					**QC Source: ARJ0025-02**				**Extracted: 10/10/08 08:56**					
Benzene	EPA 8260B	0.582	---	0.0145	mg/kg dry	3x	ND	0.555	105%	(69.3-190)	--	--	10/10/08 18:55	
Toluene	"	0.665	---	0.0362	"	"	ND	0.531	125%	(79.9-196)	--	--	"	
Ethylbenzene	"	0.730	---	0.0362	"	"	ND	0.534	137%	(79.1-192)	--	--	"	
Xylenes (total)	"	2.13	---	0.0543	"	"	ND	1.61	133%	(80-204)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 101%*			*Limits: 80-120%*	"							*10/10/08 18:55*	
Dibromofluoromethane		*100%*			*80-120%*	"							"	
a,a,a-TFT		*121%*			*50-150%*	"							"	
Toluene-d8		*99.2%*			*80-120%*	"							"	
Matrix Spike Dup (8100023-MSD1)					**QC Source: ARJ0025-02**				**Extracted: 10/10/08 08:56**					
Benzene	EPA 8260B	0.633	---	0.0145	mg/kg dry	3x	ND	0.555	114%	(69.3-190)	8.52%	(40)	10/10/08 19:28	
Toluene	"	0.741	---	0.0362	"	"	ND	0.531	139%	(79.9-196)	10.8%	"	"	
Ethylbenzene	"	0.806	---	0.0362	"	"	ND	0.534	151%	(79.1-192)	9.85%	"	"	
Xylenes (total)	"	2.38	---	0.0543	"	"	ND	1.61	148%	(80-204)	10.9%	"	"	
Surrogate(s): 4-BFB		*Recovery: 99.9%*			*Limits: 80-120%*	"							*10/10/08 19:28*	
Dibromofluoromethane		*102%*			*80-120%*	"							"	
Toluene-d8		*100%*			*80-120%*	"							"	
a,a,a-TFT		*118%*			*50-150%*	"							"	

TestAmerica Anchorage

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

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Physical Parameters by APHA/ASTM/EPA Methods - Laboratory Quality Control Results

TestAmerica Anchorage

QC Batch: 8100019 **Soil Preparation Method: *** DEFAULT PREP**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Duplicate (8100019-DUP1)				**QC Source: ARJ0017-04**				**Extracted: 10/08/08 14:32**						
Dry Weight	TA-SOP	70.4	---	1.00	%	1x	70.3	--	--	--	0.201%	(25)	10/09/08 09:25	

TestAmerica Anchorage

Troy Engstrom

Troy J. Engstrom, Lab Director

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANCHORAGE, AK 2000 W. INTERNATIONAL AIRPORT ROAD, SUITE A-10
ANCHORAGE, AK 99502-1119
ph: (907) 563.9200 fax: (907) 563.9210
CS Approval Number: UST-067

Oasis Environmental, Inc.	Project Name:	**ADEC - Lower Kalskag**	
825 W 8th Ave, ste 200	Project Number:	14-140	Report Created:
Anchorage, AK/USA 99501-4427	Project Manager:	Nino Muniz	10/15/08 21:06

Notes and Definitions

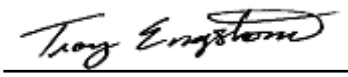
Report Specific Notes:

R4	-	Due to the low levels of analyte in the sample, the duplicate RPD calculation does not provide useful information.
RL7	-	Sample required dilution due to high concentrations of target analyte.
Z3	-	The sample required a dilution due to the nature of the sample matrix. Because of this dilution, the surrogate spike concentration in the sample was reduced to a level where the recovery calculation does not provide useful information.
Z6	-	Surrogate recovery was below acceptance limits.
ZX	-	Due to sample matrix effects, the surrogate recovery was outside the acceptance limits.

Laboratory Reporting Conventions:

DET	-	Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.
ND	-	Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).
NR/NA	-	Not Reported / Not Available
dry	-	Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight.
wet	-	Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis.
RPD	-	RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).
MRL	-	METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.
MDL*	-	METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.
Dil	-	Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.
Reporting Limits	-	Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.
Electronic Signature	-	Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy.* Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

TestAmerica Anchorage



Troy J. Engstrom, Lab Director

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

11720 North Creek Pkwy N Suite 400, Bothell, WA 98011-8244 425-420-9200 FAX 420-9210
11922 E. First Ave, Spokane, WA 99206-5302 509-924-9200 FAX 924-9290
9405 SW Nimbus Ave,Beaverton, OR 97008-7145 503-906-9200 FAX 906-9210
2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #: AR30017

CLIENT: ADEC

REPORT TO: NINO MUNIZ - OASIS ENVIRONMENTAL
ADDRESS: 825 W. 8TH AVE.
ANCHORAGE, AK 99501
PHONE: 907-258-4880 FAX:

INVOICE TO: OASIS ENVIRONMENTAL
825 W. 8TH AVE.
ANCHORAGE, AK. 99501

P.O. NUMBER:

PROJECT NAME: ADEC LOWER KALSKAG
PROJECT NUMBER: 14-140
SAMPLED BY: CHANDLER SHORT

TURNAROUND REQUEST
in Business Days *
Organic & Inorganic Analyses: [X] 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.

PRESERVATIVE: Mecl

REQUESTED ANALYSES: GRO/BTEX; DRO/RRO

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
1	LKT 26 SS	100108 1630	S	2		01
2	LKT 26 SB	100108- 1636				02
3	LKT 18 SS	100108- 1655				03
4	LKT 18 SB	100108- 1700				04
5	LKT 05 SS	100108- 1710				05
6	LKT 07 SS	100108- 1720				06
7	LKT 09 SS	100108- 1725				07
8	LKT 20 SS	100108- 1735				08
9	LKT 21 SS	100108- 1740				09
10	LKT 22 SS	100108- 1745				10

RELEASED BY: PRINT NAME: CHANDLER SHORT FIRM: OASIS DATE: 100308 TIME: 1140
RECEIVED BY: PRINT NAME: Johanna Drecher FIRM: Anchorage DATE: 10/03/08 TIME: 1140

RELEASED BY: PRINT NAME: FIRM: DATE: TIME:
RECEIVED BY: PRINT NAME: FIRM: DATE: TIME:

ADDITIONAL REMARKS:

TEMP: 3.8°C

TAL-1000(0408)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

11720 North Creek Pkwy N Suite 400, Bothell, WA 98011-8244 425-420-9200 FAX 420-9210
11922 E. First Ave, Spokane, WA 99206-5302 509-924-9200 FAX 924-9290
9405 SW Nimbus Ave,Beaverton, OR 97008-7145 503-906-9200 FAX 906-9210
2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #: ARJ0017

CLIENT: ADEC

INVOICE TO: OASIS ENVIRONMENTAL
825 W. 8TH AVE.
ANCHORAGE, AK. 99501

REPORT TO: NINO IMUNIZ - OASIS ENVIRONMENTAL
ADDRESS: 825 W. 8TH AVE.
ANCHORAGE, AK. 99501

PHONE: 907-258-4880 FAX:

P.O. NUMBER:

PROJECT NAME: ADEC - LOWER KALSKAG

PROJECT NUMBER: 14-140

SAMPLED BY: CHANDLER SHORT

TURNAROUND REQUEST
in Business Days *

Organic & Inorganic Analyses: [X] 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.

PRESERVATIVE: Meoh

REQUESTED ANALYSES: 8260 BTEX / 8021 GRO

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	8260 BTEX	8021 GRO	MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
1	LKT FD01	0800 - 100108	X	X	S	2		11
2	TB	100108	X			1		12
3								
4								
5								
6								
7								
8								
9								
10								

RELEASED BY: CHANDLER SHORT	DATE: 10 03 08	RECEIVED BY:	DATE: 10/03/08
PRINT NAME: CHANDLER SHORT FIRM: OASIS	TIME: 1140	PRINT NAME: JO Runne Drew FIRM: Anchorage	TIME: 1140
RELEASED BY:	DATE:	RECEIVED BY:	DATE:
PRINT NAME: FIRM:	TIME:	PRINT NAME: FIRM:	TIME:

ADDITIONAL REMARKS:

TEMP: 3.8°C

PAGE 2 OF 2

TAL-1000(0408)

Test America Anchorage Cooler Receipt Form

(Army Corps. Compliant)

WORK ORDER # ARJ0017 CLIENT: Oasis PROJECT: Lower Kalskag

Date /Time Cooler Arrived 10 / 03 / 08 11 : 40 Cooler signed for by: Johanna Drecher (Print name)

Preliminary Examination Phase:

Date cooler opened: ☒ same as date received or ___/___/___

Cooler opened by (print) Johanna Drecher (sign) Johanna Drecher

1. Delivered by ☐ALASKA AIRLINES ☐Fed-Ex ☐UPS ☐NAC ☐LYNDEN ☒CLIENT ☐Other

Shipment Tracking # if applicable — (include copy of shipping papers in file)

2. Number of Custody Seals 0 Signed by NA Date ___/___/___

Were custody seals unbroken and intact on arrival? ↓ ☐Yes ☐No

3. Were custody papers sealed in a plastic bag? ☒Yes ☐No

4. Were custody papers filled out properly (ink, signed, etc.)? ☒Yes ☐No

5. Did you sign the custody papers in the appropriate place? ☒Yes ☐No

6. Was ice used? ☒Yes ☐No Type of ice: ☐blue ice ☒gel ice ☐real ice ☐dry ice Condition of Ice: Solid

Temperature by Digi-Thermo Probe 3.8 °C Thermometer # rec#3

Acceptance Criteria: 0 - 6°C

7. Packing in Cooler: ☒bubble wrap ☐styrofoam ☒cardboard ☐Other:

8. Did samples arrive in plastic bags? ☒Yes ☐No

9. Did all bottles arrive unbroken, and with labels in good condition? ☒Yes ☐No

10. Are all bottle labels complete (ID, date, time, etc.) ☒Yes ☐No

11. Do bottle labels and Chain of Custody agree? ☐Yes ☒No

12. Are the containers and preservatives correct for the tests indicated? ☒Yes ☐No

13. Conoco Phillips, Alyeska, BP H2O samples only: pH < 2? ☐Yes ☐No ☒N/A

14. Is there adequate volume for the tests requested? ☒Yes ☐No

15. Were VOA vials free of bubbles? ☒N/A ☐Yes ☐No

If "NO" which containers contained "head space" or bubbles? ___

Log-in Phase:

Date of sample log-in 10 / 06 / 08

Samples logged in by (print) Kyle Burrows (sign) [signature]

1. Was project identifiable from custody papers? ☒Yes ☐No
2. Do Turn Around Times and Due Dates agree? ☒Yes ☐No
3. Was the Project Manager notified of status? ☒Yes ☐No
4. Was the Lab notified of status? ☒Yes ☐No
5. Was the COC scanned and copied? ☒Yes ☐No

APPENDIX C

Conceptual Site Model Scoping Forms

- Page Intentionally Left Blank -

Human Health Conceptual Site Model
Scoping Form

Site Name: AVEC Tank Farm Lower Kalksag

File Number:

Completed by: H.R. Muniz, C.P.G.

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, a CSM graphic and text must be submitted with the site characterization work plan.

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
- ☑ Groundwater
- ☐ Surface water
- ☐ 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

Is soil contaminated anywhere between 0 and 15 feet bgs? ☑

Do people use the site or is there a chance they will use the site in the future? ☑

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

2 Dermal Absorption of Contaminants from Soil

Is soil contaminated anywhere between 0 and 15 feet bgs? ☑

Do people use the site or is there a chance they will use the site in the future? ☑

Can the soil contaminants permeate the skin? (Contaminants listed below, or within the groups listed below, should be evaluated for dermal absorption). ☑

Arsenic	Lindane
Cadmium	PAHs
Chlordane	Pentachlorophenol
2,4-dichlorophenoxyacetic acid	PCBs
Dioxins	SVOCs
DDT	

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

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 ADEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350.* ☑

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

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: _____

3 Ingestion of Wild Foods

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

Do the site contaminants have the potential to bioaccumulate (*see* Appendix A)? ☑

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. the top 6 feet of soil, in groundwater that **could be** connected to surface water, etc.) ☐

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

c) Inhalation

1 Inhalation of Outdoor Air

Is soil contaminated anywhere between 0 and 15 feet bgs? ☑

Do people use the site or is there a chance they will use the site in the future? ☑

Are the contaminants in soil volatile (*See Appendix B*)? ☑

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

2 Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be placed on the site in an area that could be affected by contaminant vapors? (i.e., within 100 feet, horizontally or vertically, of the contaminated soil or groundwater, <u>or</u> subject to "preferential pathways" that promote easy airflow, like utility conduits or rock fractures) ☑

Are volatile compounds present in soil or groundwater (*See Appendix C*)? ☑

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

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

Exposure from this pathway may need to be assessed only in cases where DEC water-quality or drinking-water standards are not being applied as cleanup levels. Examples of conditions that may warrant further investigation include:

- Climate permits recreational use of waters for swimming,
- Climate permits exposure to groundwater during activities, such as construction, without protective clothing, or
- Groundwater or surface water is used for household purposes.

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

Comments:

Inhalation of Volatile Compounds in Household Water

Exposure from this pathway may need to be assessed only in cases where DEC water-quality or drinking-water standards are not being applied as cleanup levels. Examples of conditions that may warrant further investigation include:

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

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

Comments:

Inhalation of Fugitive Dust

Generally DEC soil ingestion cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway, although this is not true in the case of chromium. Examples of conditions that may warrant further investigation include:

- 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. This size can be inhaled and would be of concern for determining if this pathway is complete.

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

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during recreational or some types of subsistence activities. People then incidentally **ingest** sediment from normal hand-to-mouth activities. In addition, **dermal absorption of contaminants** may be of concern if people come in contact with sediment and the contaminants are able to permeate the skin (see dermal exposure to soil section). This type of exposure is rare but it should be investigated if:

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

ADEC soil ingestion cleanup levels are protective of direct contact with sediment. If they are determined to be over-protective for sediment exposure at a particular site, other screening levels could be adopted or developed.

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

Comments:

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

APPENDIX A

BIOACCUMULATIVE COMPOUNDS

Table A-1: List of Compounds of Potential Concern for Bioaccumulation

Organic compounds are identified as bioaccumulative if they have a BCF equal to or greater than 1,000 or a log K_{ow} greater than 3.5. Inorganic compounds are identified as bioaccumulative if they are listed as such by EPA (2000). Those compounds in Table X of 18 AAC 75.345 that are bioaccumulative, based on the definition above, are listed below.

Aldrin	DDT	Lead
Arsenic	Dibenzo(a,h)anthracene	Mercury
Benzo(a)anthracene	Dieldrin	Methoxychlor
Benzo(a)pyrene	Dioxin	Nickel
Benzo(b)fluoranthene	Endrin	PCBs
Benzo(k)fluoranthene	Fluoranthene	
Cadmium	Heptachlor	Pyrene
Chlordane	Heptachlor epoxide	Selenium
Chrysene	Hexachlorobenzene	Silver
Copper	Hexachlorocyclopentadiene	Toxaphene
DDD	Indeno(1,2,3-c,d)pyrene	Zinc
DDE		

Because BCF values can relatively easily be measured or estimated, the BCF is frequently used to determine the potential for a chemical to bioaccumulate. A compound with a BCF greater than 1,000 is considered to bioaccumulate in tissue (EPA 2004b).

For inorganic compounds, the BCF approach has not been shown to be effective in estimating the compound's ability to bioaccumulate. Information available, either through scientific literature or site-specific data, regarding the bioaccumulative potential of an inorganic site contaminant should be used to determine if the pathway is complete.

The list was developed by including organic compounds that either have a BCF equal to or greater than 1,000 or a log K_{ow} greater than 3.5 and inorganic compounds that are listed by the United States Environmental Protection Agency (EPA) as being bioaccumulative (EPA 2000). The BCF can also be estimated from a chemical's physical and chemical properties. A chemical's octanol-water partitioning coefficient (K_{ow}) along with defined regression equations can be used to estimate the BCF. EPA's Persistent, Bioaccumulative, and Toxic (PBT) Profiler (EPA 2004) can be used to estimate the BCF using the K_{ow} and linear regressions presented by Meylan et al. (1996). The PBT Profiler is located at http://www.pbtprofiler.net/. For compounds not found in the PBT Profiler, DEC recommends using a log K_{ow} greater than 3.5 to determine if a compound is bioaccumulative.

APPENDIX B

VOLATILE COMPOUNDS

Table B-1: List of Volatile Compounds of Potential Concern
Common volatile contaminants of concern at contaminated sites. A chemical is defined as volatile if the Henry's Law constant is 1 x 10^{-5} atm-m^3/mol or greater and the molecular weight less than 200 g/mole (g/mole; EPA 2004a). Those compounds in Table X of 18 AAC 75.345 that are volatile, based on the definition above, are listed below.

Acenaphthene	1,4-dichlorobenzene	Pyrene
Acetone	1,1-dichloroethane	Styrene
Anthracene	1,2-dichloroethane	1,1,2,2-tetrachloroethane
Benzene	1,1-dichloroethylene	Tetrachloroethylene
Bis(2-chlorethyl)ether	Cis-1,2-dichloroethylene	Toluene
Bromodichloromethane	Trans-1,2-dichloroethylene	1,2,4-trichlorobenzene
Carbon disulfide	1,2-dichloropropane	1,1,1-trichloroethane
Carbon tetrachloride	1,3-dichloropropane	1,1,2-trichloroethane
Chlorobenzene	Ethylbenzene	Trichloroethylene
Chlorodibromomethane	Fluorene	Vinyl acetate
Chloroform	Methyl bromide	Vinyl chloride
2-chlorophenol	Methylene chloride	Xylenes
Cyanide	Naphthalene	GRO
1,2-dichlorobenzene	Nitrobenzene	DRO

APPENDIX C

COMPOUNDS OF CONCERN FOR VAPOR MIGRATION

Table C-1: List of Compounds of Potential Concern for the Vapor Migration

A chemical is considered sufficiently toxic if the vapor concentration of the pure component poses an incremental lifetime cancer risk greater than 10-6 or a non-cancer hazard index greater than 1. A chemical is considered sufficiently volatile if it's Henry's Law constant is 1 x 10^{-5} atm-m^3/mol or greater.

Acenaphthene	Dibenzofuran	Hexachlorobenzene
Acetaldehyde	1,2-Dibromo-3-chloropropane	Hexachlorocyclopentadiene
Acetone	1,2-Dibromoethane (EDB)	Hexachloroethane
Acetonitrile	1,3-Dichlorobenzene	Hexane
Acetophenone	1,2-Dichlorobenzene	Hydrogen cyanide
Acrolein	1,4-Dichlorobenzene	Isobutanol
Acrylonitrile	2-Nitropropane	Mercury (elemental)
Aldrin	N-Nitroso-di-n-butylamine	Methacrylonitrile
alpha-HCH (alpha-BHC)	n-Propylbenzene	Methoxychlor
Benzaldehyde	o-Nitrotoluene	Methyl acetate
Benzene	o-Xylene	Methyl acrylate
Benzo(b)fluoranthene	p-Xylene	Methyl bromide
Benzylchloride	Pyrene	Methyl chloride chloromethane)
beta-Chloronaphthalene	sec-Butylbenzene	Methylcyclohexane
Biphenyl	Styrene	Methylene bromide
Bis(2-chloroethyl)ether	tert-Butylbenzene	Methylene chloride
Bis(2-chloroisopropyl)ether	1,1,1,2-Tetrachloroethane	Methylethylketone (2-butanone)
Bis(chloromethyl)ether	1,1,2,2-Tetrachloroethane	Methylisobutylketone
Bromodichloromethane	Tetrachloroethylene	Methylmethacrylate
Bromoform	Dichlorodifluoromethane	2-Methylnaphthalene
1,3-Butadiene	1,1-Dichloroethane	MTBE
Carbon disulfide	1,2-Dichloroethane	m-Xylene
Carbon tetrachloride	1,1-Dichloroethylene	Naphthalene
Chlordane	1,2-Dichloropropane	n-Butylbenzene
2-Chloro-1,3-butadiene (chloroprene)	1,3-Dichloropropene	Nitrobenzene
Chlorobenzene	Dieldrin	Toluene
1-Chlorobutane	Endosulfan	trans-1,2-Dichloroethylene
Chlorodibromomethane	Epichlorohydrin	1,1,2-Trichloro-1,2,2-trifluoroethane
Chlorodifluoromethane	Ethyl ether	1,2,4-Trichlorobenzene
Chloroethane (ethyl chloride)	Ethylacetate	1,1,2-Trichloroethane
Chloroform	Ethylbenzene	1,1,1-Trichloroethane
2-Chlorophenol	Ethylene oxide	Trichloroethylene
2-Chloropropane	Ethylmethacrylate	Trichlorofluoromethane
Chrysene	Fluorene	1,2,3-Trichloropropane
cis-1,2-Dichloroethylene	Furan	1,2,4-Trimethylbenzene
Crotonaldehyde (2-butenal)	Gamma-HCH (Lindane)	1,3,5-Trimethylbenzene
Cumene	Heptachlor	Vinyl acetate
DDE	Hexachloro-1,3-butadiene	Vinyl chloride (chloroethene)

Source: EPA 2002.

HUMAN HEALTH CONCEPTUAL SITE MODEL

Site: AVEC Tank Farm
Lower Kalskag

Completed By: H.R. Muniz, C.P.G.
Date Completed: December 4, 2008

Follow the directions below. Do not consider engineering or 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. Briefly list other mechanisms or reference the report for details.

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

(4)
Check exposure pathways that are complete or need further evaluation. The pathways identified must agree with Sections 2 and 3 of the CSM Scoping Form.

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

Media	Transport Mechanisms	Exposure Media	Exposure Pathways	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil → *check soil*	☑ soil	☑ Incidental Soil Ingestion	C/F		C/F	C/F			
	☑ Migration or leaching to subsurface → *check soil*		☑ Dermal Absorption of Contaminants from Soil	C/F		C/F	C/F			
	☑ Migration or leaching 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*	☑ groundwater	☑ Ingestion of Groundwater	C/F		C/F				
	☑ *Migration to groundwater* → *check groundwater*		☑ Dermal Absorption of Contaminants in Groundwater	C/F		C/F	C/F			
	☑ *Volatilization* → *check air*		☑ Inhalation of Volatile Compounds in Tap Water	C/F		C/F				
	☐ *Other (list):*									
☑ Ground-water	☑ Direct release to groundwater → *check groundwater*	☑ air	☑ Inhalation of Outdoor Air	C/F	C/F	C/F	C/F			
	☑ *Volatilization* → *check air*		☑ Inhalation of Indoor Air	C/F	C/F					
	☑ *Flow to surface water body* → *check surface water*		☐ Inhalation of Fugitive Dust							
	☐ *Flow to sediment* → *check sediment*									
	☐ *Uptake by plants or animals* → *check biota*									
	☐ *Other (list):*									
☑ Surface Water	☑ Direct release to surface water → *check surface water*	☑ surface water	☐ Ingestion of Surface Water							
	☑ *Volatilization* → *check air*		☑ Dermal Absorption of Contaminants in Surface Water	C/F		C/F				
	☐ *Sedimentation* → *check sediment*		☐ Inhalation of Volatile Compounds in Tap Water							
	☑ *Uptake by plants or animals* → *check biota*									
	☐ *Other (list):*									
☐ Sediment	☐ Direct release to sediment → *check sediment*	☐ sediment	☐ Direct Contact with Sediment							
	☐ *Resuspension, runoff, or erosion* → *check surface water*									
	☐ *Uptake by plants or animals* → *check biota*	☐ biota	☐ Ingestion of Wild Foods							
	☐ *Other (list):*									

Revised 3/21/06