KOTZEBUE FORMER UST SITE GROUNDWATER CHARACTERIZATION REPORT

KOTZEBUE, ALASKA

ADEC File Number: TBD
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ACRONYMS AND ABBREVIATIONS

AAC..... Alaska Administrative Code
ADEC ..... Alaska Department of Environmental Conservation
AK101 ..... Alaska Method AK 101
AK102 ..... Alaska Method AK 102
AK103 ..... Alaska Method AK 103
AvGas ..... Aviation gasoline
bgs ..... Below ground surface
BTEX..... Benzene, toluene, ethylbenzene, and total xylenes
°C ..... Degrees Celsius
Crowley ..... Crowley Petroleum Distribution, Inc.
CSM ..... Conceptual site model
DO..... Dissolved oxygen
DQO..... Data quality objective
DRO ..... Diesel-range organics
DTW..... Depth to groundwater
EDB..... Ethylene dibromide
EDC..... Ethylene dichloride
EMCON..... EMCON Alaska, Inc.
EPA..... U.S. Environmental Protection Agency
GRO..... Gasoline-range organics
Jet-A..... Jet Fuel Class A
LCS/LCSD..... Laboratory control sample/laboratory control sample duplicate
mg/L ..... Milligrams per liter
MS/MSD..... Matrix spike/matrix spike duplicate
ND..... Non-detect
OASIS ..... OASIS Environmental, Inc.
ORP ..... Oxidation-reduction potential
PID ..... Photoionization detector
ppm ..... Parts per million
PQL..... Practical quantitation limit
PVC..... Polyvinylchloride
QA/QC..... Quality assurance/quality control
RPD..... Relative percent difference
RRO ..... Residual-range organics
S&W..... Shannon and Wilson, Inc.
UST ..... Underground storage tank

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EXECUTIVE SUMMARY

OASIS Environmental, Inc. conducted assessment and characterization of groundwater at the Crowley Petroleum Distribution, Inc. Kotzebue former UST site located in Kotzebue, Alaska, in September 2010. This assessment was conducted to evaluate the impact of petroleum hydrocarbons on groundwater at the site.

Site characterization activities included the installation and sampling of three permanent groundwater monitoring wells, identified as replacement wells MW-1R, MW-2R, and MW-3R.

Groundwater analytical results indicate gasoline-range organics (GRO), diesel-range organics (DRO), and benzene at monitoring wells MW-1R and MW-3R at concentrations above the Alaska Department of Environmental Conservation Table C groundwater cleanup levels. Additionally, the lead scavenger 1,2-dibromoethane was detected in MW-1R at a concentration exceeding its ADEC Table C groundwater cleanup level. Residual-range organics, ethylbenzene, m,p-xylenes, and total xylenes are present in MW-1R and MW-3R at levels below ADEC groundwater screening values. DRO and benzene were detected at levels below the ADEC groundwater screening values.

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1. INTRODUCTION

This groundwater characterization report presents the results of drilling, sampling, and monitoring activities conducted in September 2010 by OASIS Environmental, Inc. (OASIS) at the Crowley Petroleum Distribution, Inc. (Crowley) former underground storage tank site (UST site), located in Kotzebue, Alaska. Groundwater characterization activities were conducted in accordance with the *Kotzebue Former UST Site Groundwater Characterization Work Plan*, dated August 30, 2010, as approved by the Alaska Department of Environmental Conservation (ADEC; OASIS 2010b). An ADEC File Number and Hazard ID have not been assigned. This report was prepared in accordance with Title 18 of the Alaska Administrative Code, Chapter 75 (18 AAC 75), Article 3, entitled *Oil and Hazardous Substance Pollution Control Regulations, Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances*, revised as of October 9, 2008 (ADEC 2008a), and *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* (ADEC 2009b).

The primary objective of site assessment activities was to characterize petroleum hydrocarbon impact to groundwater at the site by replacing previously installed (in 1999) and now destroyed monitoring wells.

Between September 23 and 24, 2010, three soil borings were advanced and completed as groundwater monitoring wells.

The ADEC-qualified persons conducting the sample collection activities for OASIS were Ms. Melissa Pike and Mr. Ryan Burich. Analytical data were evaluated by Mr. Robert Beckman. Data interpretation and reporting were conducted by Ms. Pike and Mr. Daniel Frank.

This document outlines the technical and analytical approaches employed during fieldwork and characterizes actual contaminants detected. This document includes site background information (Section 2); investigation activities (Section 3); site observations and analytical results (Section 4); a discussion of analytical data quality (Section 5); a conceptual site model (Section 6); conclusions (Section 7); and references (Section 8).

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2. SITE BACKGROUND

2.1. Site Location and Description

Kotzebue is located 550 air miles northwest of Anchorage, Alaska, and 26 miles north of the Arctic Circle on the shores of the Chukchi Sea (Figure 1). Crowley's former UST facility is located at Lot 1, Block 4, Kotzebue Ralph Wien Memorial Airport, Kotzebue, Alaska.

The site is located on the south side of the main terminal apron area, north of Runway 8/26 and east of Taxiway C. The site is a gravel pad surrounded on three sides by a pond. Norton Sound is located approximately 700 feet west of the site, and Kotzebue Lagoon is located approximately 1,600 feet to the east (Figure 2).

The facility lies at approximately 66°53'24.49" north latitude and 162°36'14.96" west longitude.

2.2. Previous Investigations

2.2.1. 1998 UST Removal and Excavation

In May 1998, Crowley decommissioned and removed two 12,000-gallon-capacity USTs located at Block 4, Lot 1 of the Kotzebue Airport (Figure 3). EMCON Alaska, Inc. (EMCON) performed the removal oversight for Crowley (EMCON 1998). The northern UST formerly contained Jet Fuel Class A (Jet-A), and the southern UST contained aviation gasoline (AvGas; likely low lead). The USTs were nested in a concrete cradle, with the top of the tanks located at the ground surface. A fuel dispenser was located at the north side of the tanks, adjacent to and immediately south of the airport apron. During the tank removal, approximately 125 cubic yards of soil were temporarily stockpiled adjacent to the excavation. The concrete tank cradle was not removed. The excavated soil was placed back into the excavation after removal of the tanks and collection of field screening and confirmation samples from the excavation sidewalls. Groundwater was not encountered during the removal work.

During the removal, EMCON noted visibly stained soil with a petroleum-like odor. Field screening conducted with a photoionization detector (PID) indicated total volatile organics ranging from 34.7 parts per million (ppm) in excavated stockpiled soils to 748 ppm in soil located beneath the dispenser equipment. Because the concrete cradle was left in place, no field screening or confirmation sampling was conducted of soil below the former tank locations. Samples were collected from each of the four sidewalls. Three of the sidewall excavation samples were collected at the bottom of the sidewalls, approximately 8 feet below ground surface (bgs). The forth sidewall sample, collected on the north side, was collected at 4 feet bgs and below the former fuel dispensary. Soil samples were analyzed for gasoline-range organics (GRO), diesel-range organics (DRO), and benzene, toluene, ethylbenzene, and total xylenes (BTEX).

Analytical results indicate concentrations of GRO and BTEX above expected ADEC cleanup levels in samples collected from the north and east walls of the excavation. The

EMCON closure report concluded that impact at the site from the former USTs was confined to the area north and east of the excavated area. Additionally, the report concluded that completion of the groundwater migration pathway was not considered likely because groundwater at the site is non-potable (OASIS 2010a).

2.2.2. 1999 Release Investigation

In August 1999, IT Group/EMCON (IT/EMCON) performed additional site characterization activities at the former UST site to determine the extent of petroleum impact to soil and groundwater. Twenty-five test pits were excavated and field-screened to delineate the horizontal and vertical extent of hydrocarbon impact at the site. Soil samples were collected at five locations for BTEX, GRO, and DRO analysis. Generally, test pit soils indicated greater petroleum hydrocarbon impact north of the former UST site.

Additionally in 1999, at four test pits, pre-packed groundwater monitoring well screens were installed, and then the test pits were backfilled around the well screens. The well screens were installed from the surface to 6 or 8 feet bgs, depending on test pit depth and depth to groundwater. Groundwater was encountered at 4 to 4.5 feet bgs. Well locations and identification were as follows:

- MW-1 was located at the northwest corner of the former USTs, west of the former fuel dispensers.
- MW-2 was located 50 feet east of the former UST excavation.
- MW-3 was located 50 feet south of the former UST excavation.
- MW-4 was located 10 feet west of the southwest corner of the former UST excavation.

Each monitoring well was located at a test pit exhibiting petroleum hydrocarbon impact as indicated by field screening of test pit soils.

Groundwater was sampled for analysis at each of the four wells. Groundwater analytical results indicated low-level impact above current ADEC Table C groundwater cleanup levels for benzene at all four groundwater monitoring wells and GRO at MW-2 (IT/EMCON 2000; OASIS 2010a).

2.2.3. 2000 Groundwater Sampling

In September 2000, all four wells were sampled. GRO and DRO concentrations at MW-2 were reported above the associated ADEC Table C groundwater cleanup levels (2.2 milligrams per liter [mg/L] and 1.5 mg/L respectively). Benzene concentrations in all wells except MW-1 remained above the ADEC Table C groundwater cleanup level for benzene (0.005 mg/L). The groundwater flow appeared to be from west to east at the time of sampling (Golder Associates, Inc. 2002; OASIS 2010a).

2.2.4. 2008 ADEC Area-Wide Surface Water Evaluation

In October 2008, under contract to ADEC, Shannon and Wilson, Inc. (S&W) conducted an evaluation of pore-water to determine if petroleum hydrocarbon contamination at the

Kotzebue Airport was migrating into Kotzebue Sound to the west or Kotzebue Lagoon to the east. S&W hand-drove well points near the shoreline during low tide at four locations located west and north of the apron area along Kotzebue Sound and at three locations east and north of the apron area along Kotzebue Lagoon. Sample locations are presented in Figure 3. S&W reported the detection of DRO, residual-range organics (RRO), and benzene in pore-water samples at concentrations above ADEC's Table C cleanup levels. Additionally, trichloroethylene (TCE) was detected in sample AS01 on Kotzebue Sound (S&W 2009).

The nearest contaminated site (within 500 feet) to the western pore-water sample locations is Block 1, Lot AAA, owned and operated by the State of Alaska Department of Transportation and Public Facility. The ADEC record key for this site is 1999320001101. The nearest contaminated site (within 200 feet) to the east of the eastern pore-water sample locations is Block 2, Lot 4, owned by Northwestern Aviation. The ADEC record key for this site is 1995320003301. S&W recommended implementation of an airport-wide evaluation of groundwater along with additional pore-water analysis along Kotzebue Sound and Kotzebue Lagoon (S&W 2009; OASIS 2010a).

2.3. Geology and Hydrogeology

Kotzebue is located on a narrow spit about ½-mile wide and several miles long; it is separated from the peninsula by a brackish-water lagoon (Kotzebue Lagoon and Isaac Lake).The spit is composed of coarse-grained beach ridge deposits with lacustrine peats and silts filling the swales between ridges.

Formed by glaciers flowing westward out of the Kobuk and Selawik rivers, the 60-mile-long peninsula is comprised mainly of marine, estuarine, glaciomarine, and glacial sediments. Lying 26 miles north of the Arctic Circle, the soil is in a zone of continuous permafrost (perennially frozen ground) with near-surface soils that freeze and thaw annually. The depth of freezing and thawing of the near-surface soils is dependent on the soil type, ground cover, and snow depth. Groundwater is shallow and situated above the permafrost, with small drainages and ponds that may alter groundwater flow direction (S&W 2009).

Soils at the site are well-to-poorly graded gravel with sand underlain by a 1-foot layer of soil mixed with organics found between 3 and 5 feet bgs depending on location. Fine- to course-grained sand underlies the organic-rich layer.

2.4. Site Characterization Objectives

Site characterization and assessment activities, described in the ADEC-approved work plan, were designed to focus on evaluation of groundwater at Crowley's former UST site located in Kotzebue, Alaska.

OASIS' approach complied with ADEC criteria for implementing this objective.

The following tasks were planned to meet this objective:

- Evaluate the vertical impact to soil by installing three soil borings using direct-push technology (Geoprobe®) and a continuous sampler to log and field screen each soil boring from the ground surface to groundwater.
- Convert all soil borings to permanent groundwater monitoring wells.
- Collect groundwater samples from each groundwater monitoring well to evaluate impact to groundwater at the site.
- Evaluate analytical results against ADEC cleanup levels.
- Conduct routine groundwater monitoring to evaluate plume stability.

2.5. Regulatory Standards

Analytical results are compared to relevant State of Alaska cleanup criteria. The State of Alaska, through ADEC, has established cleanup criteria for petroleum-contaminated sites. Cleanup standards are defined in 18 AAC 75, Article 3, entitled *Oil and Hazardous Substance Pollution Control Regulations, Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances* (ADEC 2008a). Groundwater analysis results are evaluated against the cleanup levels listed in 18 AAC 75.345, Table C. The applicable ADEC groundwater cleanup levels are provided with the sample results on sample summary tables.

3. SITE ASSESSMENT ACTIVITIES

This section describes field activities conducted in support of the former UST site assessment objective. There were no deviations to the work plan.

The field effort for soil boring drilling and groundwater monitoring well installation was conducted in September 2010. All site groundwater monitoring wells were sampled in September 2010.

A summary of groundwater sample collection and analyses by date, time, location, and matrix is provided in Table 1. Well construction details are provided in Table 2. Groundwater elevation details are provided in Table 3, and groundwater analytical results are provided in Table 4. Groundwater monitoring well locations are presented in Figure 3, with survey coordinates and elevations provided in Table 3. Groundwater elevation and contours are provided in Figure 4, with groundwater analytical results presented in Figure 5. Field notes and groundwater monitoring forms are included in Appendix A. Photographic logs are included in Appendix B. The borehole monitoring well logs are included in Appendix C. The survey map generated from a land survey of existing and new wells is included in Appendix D.

3.1. Soil Borings

Three soil borings, designated as SB01 through SB03, were drilled between September 23 and 24, 2010. The soil borings were completed as monitoring wells MW-1R though MW-3R. Soil borings were drilled to a depth of 10 feet bgs. At each well/boring location, soil boring logs were recorded using a Borehole/Monitoring Well Construction Log form, and the soil was classified using the Unified Soil Classification System.

3.1.1. Field Screening

Soil borings were field screened in situ using a PID. The PID was calibrated to 100 ppm isobutylene at the beginning of each day. In situ field screening was conducted by placing the PID probe within ½-inch of the soil contained within the soil bore core casing. In situ PID results were noted on the borehole log form for each boring (Appendix B).

3.2. Monitoring Well Installation

All soil borings were converted to monitoring wells for the collection of groundwater samples on September 24, 2010. Monitoring well installation was performed in accordance with ADEC's *Monitoring Well Design and Construction for Investigation of Contaminated Sites* dated February 2008 (ADEC 2008b). The monitoring wells were completed as a 2-inch-diameter groundwater monitoring wells using schedule 40 polyvinylchloride (PVC) casing with a 5-foot screen section of a 0.010-inch slotted screen and threaded end caps centered (when possible) on the static water level found during the soil boring installation. The filterpack was 10/20 rounded silica sand. All monitoring wells were countersunk 0.5 feet bgs and completed as flush-mount style with

0.5 feet of pea gravel placed over the top as protection during winter airport plowing operations.

3.2.1. Well Development

Monitoring wells were developed on September 24 and 25, 2010, after conversion from soil borings using a surge and purge technique, beginning with a gentle surging action and increasing agitation as development proceeded. Well development included purging of ten well casing volumes. Approximately 6 to 7 gallons were purged from each well. During the well development process, as purge water became visibly less turbid, the field team recorded water quality parameters including pH, dissolved oxygen (DO), temperature, and specific conductivity. Completed monitoring well development forms are attached with the field notes in Appendix A.

3.2.2. Monitoring Well Survey

The location, measuring point elevations, and top-of-casing elevations of the new monitoring wells were surveyed by Alaska Design Inc. on September 30, 2010. The horizontal coordinates and PVC measuring point elevations are provided in Table 3.

3.3. Groundwater Monitoring

All monitoring wells were sampled on September 25, 2010. Prior to sampling, all wells were gauged for depth to groundwater (DTW). No free-phase hydrocarbons were encountered during groundwater monitoring. Table 1 summarizes the water samples collected, sample locations, and requested analyses.

DTW was measured in each monitoring well prior to purging and sampling. Table 3 presents groundwater elevation calculations for this sampling event. Following the measurement of DTW, wells were purged using low-flow techniques that minimize purge volume and well draw down. The field team monitored and recorded in the field logbook (Appendix A) successive readings for pH, temperature, specific conductivity, and DO. Prior to sampling, a final set of groundwater quality parameters were recorded, additionally including values for oxidation-reduction potential (ORP). The field team monitored pH (within ± 0.1), temperature (within 0.2 degrees Celsius [°C]), conductivity (within 3%), and DO (within ± 10%) to monitor for well stability.

After purging, samples were collected for laboratory analysis. Laboratory analytical results are discussed in Section 4.

4. SITE OBSERVATIONS AND ANALYTICAL RESULTS

This section presents a discussion of field observations and the analytical results of groundwater sampling conducted in September 2010. A summary of groundwater samples collected and analyses performed is presented in Table 1. Groundwater well construction details and survey data are presented in Table 2, with groundwater elevation data presented in Table 3. Groundwater analytical sample results along with the regulatory standards used to evaluate the analytical data are summarized in Table 4.

Laboratory analytical results and completed ADEC checklists are provided in Appendix E.

4.1. Field Observations

4.1.1. Soil Lithology Observations

Soil borings were drilled on September 24, 2010, for MW-1R through MW-3R. Soil logs from each boring characterized soil at the site to generally consist of 2 feet of sandy gravel material underlain by 2.5 feet of gravel, with wet sandy gravel from 5 to 8 feet bgs. Organic matter was found in MW-3R at 5 to 5.5 feet bgs. Soil boring and well completion logs are provided in Appendix C.

4.1.2. Groundwater Table Observations

Groundwater elevation data are presented in Table 3. Groundwater was present approximately 5.4 to 5.5 feet below grade depending on locations. The flow direction of the unconfined water table aquifer appears to be to the west, with a hydraulic gradient estimated at 0.0005. Inferred groundwater contours are presented in Figure 4. No separate-phase hydrocarbons were observed at any monitoring well.

4.1.3. Water Quality Observations

Groundwater from all three wells appeared amber to clear, with no odors noted during purging and sampling. Utilizing a YSI® water quality meter with a flow-through cell, OASIS recorded pH, temperature, conductivity, DO, and ORP. The pH across the site indicated a favorable range for both aerobic and anaerobic attenuation. Conductivity was relatively consistent across the site, indicating all groundwater wells are located within the same aquifer.

4.2. Laboratory Analytical Results

4.2.1. Analytical Methods

Groundwater analytical results are summarized in Table 4. Groundwater samples were submitted to the project laboratory, TestAmerica Laboratories, Inc located in Anchorage, Alaska, in accordance with standard chain-of-custody procedures outlined in the work plan. Duplicate samples were collected at a frequency of 10% per method and matrix for quality assurance/quality control (QA/QC) purposes. All samples were preserved and

stored at a temperature of 4°C ± 2°C prior to shipment to TestAmerica for laboratory analysis. Groundwater analysis was conducted for both petroleum hydrocarbon constituents (GRO/BTEX and DRO/RRO) and the leaded fuel additives ethylene dibromide (EDB) and ethylene dichloride (EDC; also known as 1,2-dichloroethane). EDB and EDC are common synthetic organic chemicals used in leaded fuels to prevent the buildup of lead deposits within internal combustion engines. Both EDB and EDC pose potential cancer risks in humans.

Groundwater samples collected at all three wells were analyzed for the following target analytes using the methods specified:

- GRO/BTEX ((Alaska Method AK 101 [AK101]/U.S. Environmental Protection Agency [EPA] Solid Waste [SW] Method SW8260B)
- DRO/RRO (Alaska Method AK 102 [AK102]/Alaska Method AK 103 [AK103])
- EDC (EPA Method SW8260B)
- EDB (EPA Method SW8011)
- Lead (EPA Method 6020)

4.2.2. Groundwater Sampling Analytical Results

At groundwater monitoring well MW-1R, the reported concentrations for GRO, DRO, benzene, and EDB were above the associated ADEC Table C groundwater screening values. RRO, ethylbenzene, and total xylenes were detected, but at concentrations below the ADEC Table C groundwater cleanup values. Toluene, EDC, and lead were reported as non-detect at MW-1R.

At MW-2R, DRO and benzene were detected, but at concentrations below the relevant ADEC Table C groundwater cleanup values. All other analytes were reported as non-detect.

At MW-3R, GRO, DRO, benzene, and total xylenes were detected at concentrations above the ADEC Table C groundwater cleanup values. RRO, toluene, ethylbenzene, total xylenes, and EDB were detected, but at concentrations below their associated ADEC Table C groundwater cleanup values. EDC and lead were reported as non-detect.

5. QUALITY ASSURANCE/QUALITY CONTROL

Laboratory QA/QC data associated with the analysis of project samples have been reviewed to evaluate the integrity of the analytical data generated during the September 2010 groundwater investigation at the former UST site in Kotzebue, Alaska. Water samples were shipped to TestAmerica in Anchorage, Alaska, in one sample delivery group, ATI0083. Samples were collected, reported, and shipped in general accordance with the ADEC-approved work plan (OASIS 2010b).

All data were validated and reviewed in accordance with appropriate EPA procedural guidance documents (EPA 2008) and ADEC regulatory guidance documents (ADEC 2009a, 2010). This data review focuses on criteria for the following QA/QC parameters and their effect on the quality of data and usability: sample handling and chain-of-custody documentation; holding time compliance; field QA/QC (ambient blanks, trip blanks, field duplicate) results; laboratory QA/QC (method blanks, laboratory control samples, surrogates, matrix spike/matrix spike duplicate [MS/MSD]) results and analytical methods; method reporting limits; precision and accuracy; and completeness. In absence of other regulatory QC guidance, method- and/or standard operating procedure-specific QC limits were also utilized to apply qualifiers to the data.

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

- BTEX by EPA Method 8260B
- EDC by EPA Method 8260B
- EDB by EPA Method 8011B
- GRO by AK101
- DRO by AK102
- RRO by AK103
- Lead by EPA Method 6020

5.1. Sample Handling and Chain of Custody

Samples were shipped from Kotzebue to Anchorage and then hand delivered to TestAmerica in Anchorage. All sample coolers were delivered with custody seals in place, unbroken and intact. Chain-of-custody forms, laboratory sample receipt forms, and case narratives were reviewed to determine if any sample handling activities might affect the integrity of the samples and the quality of the associated data. All sample containers in the sample cooler were received at the laboratory intact and with proper documentation. A temperature blank was received by the lab within the specified range of 4°C ± 2°C (3.0°C). All samples were extracted, digested, and/or analyzed within the holding time criteria for the applicable analytical methods and in accordance with the work plan specifications.

5.2. Field QA/QC

Field QA/QC protocols are designed to monitor for possible contamination during collection and transport of samples collected in the field. Collection and analysis of field duplicates also facilitates an evaluation of precision that takes into account potential variables associated with sampling procedures and laboratory analyses. For this project, trip blanks and field duplicates were submitted for analysis.

5.2.1. Trip Blanks

A trip blank was prepared by the laboratory, shipped to the site with the empty sample bottles/containers, stored with sample containers during the field event, and transported with the collected samples back to the laboratory for analysis. The trip blank was placed in the same cooler as the other project volatile organics samples (GRO/BTEX). All trip blank analytes were reported non-detect (ND).

5.2.2. Field Duplicates

Three primary samples and one duplicate were submitted for this project. Duplicate sample MW4R-01GW was collected from primary sample MW1R-01GW. The frequency of field duplicate collection met the 10% frequency requirements specified in the work plan. When analytes were present in concentrations below the method reporting limit in one or both samples, no valid comparison could be made. The primary sample and duplicate relative percent differences (RPDs) met applicable control limits for all detected analytes.

5.3. Laboratory QA/QC

5.3.1. Method Blanks

Method blanks were analyzed concurrent with a batch of 20 or fewer primary samples for each of the analytical procedures performed for this project. Method blanks were analyzed at the required frequency, and target analytes were ND in the blanks at concentrations above the analytical reporting limit or practical quantitation limit (PQL).

5.3.2. Laboratory Control Samples/ Matrix Spikes

Analysis of laboratory control samples (LCS) and LCS duplicates (LCSD) for target analytes met laboratory and project QC goals for all target analytes.

Precision and accuracy were evaluated by comparing field duplicate, MS/MSD, and LCS/LCSD pairs for this project. Recoveries and RPDs for all reported LCS/LCSD and MS/MSD samples were within required limits. The RPD for GRO in laboratory duplicate sample 10I0211-DUP1 was above the laboratory control limit; however, RPDs for field duplicate, LCS/LCSD, and MS/MSD pairs were within prescribed limits. Data quality and usability were not affected.

5.3.3. Surrogates

System Monitoring Compounds (Surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes. These compounds are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits for all field and laboratory samples.

5.3.4. Method Reporting Limits (Sensitivity)

Method reporting limits (MRLs) and PQLs met or were below established criteria specified for all analyses in the project work plan and below the ADEC-established cleanup levels with the exception of one sample. The PQL for EDC for sample MW1R-01GW was twice the ADEC-established cleanup level of 5 micrograms per liter. This result has been flagged J in Table 4, and results are considered estimated.

5.4. Analytical Methods

The following sections summarize whether quality control criteria were met for each analytical method. Sample results below the method detection limits are flagged “U” or non-detect, “ND.” Results between the method detection limit and the method reporting limit have been flagged “J” as estimates due to the low level of quantization. Results that are estimated due to minor QA/QC deficiencies have been flagged “J” as estimated. Results with major QA/QC deficiencies have been flagged “R” as rejected.

5.4.1. BTEX and EDC by EPA Method 8260

Quality control criteria for this method were met for all BTEX constituents. EDC was not reported in laboratory LCS/LCSD and MS/MSD samples, therefore precision and accuracy cannot be confirmed for this analyte by the laboratory. These data have been flagged J in Table 4 and are considered estimated.

5.4.2. GRO by AK101

Quality control criteria for this method were met.

5.4.3. DRO/RRO by AK102/103

Quality control criteria for this method were met.

5.4.4. Total Metals (Lead) by EPA Method 6020

Quality control criteria for this method were met.

5.4.5. EDB by EPA Method 8011

Quality control criteria for this method were met.

5.5. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with “true values” established by spiking applicable samples with a

known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing LCS/LCSD, MS/MSD, and field duplicate pairs for this project. Field duplicates and MS/MSD samples were collected in accordance with work plan specifications. Field duplicate RPDs met applicable control limits. Recoveries and RPDs for all LCS/LCSD samples were within required limits. Some MS/MSD samples were outside required limits; LCS/LCSD samples were within limits, however. Data quality objectives (DQOs) of an overall 90% accuracy in QC samples were met.

5.5.1. Completeness

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

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

All requested analyses were performed in accordance with work plan specifications. Five results were qualified as unusable (i.e., “R”). Completeness for this project is 100%.

5.5.2. Representativeness

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

5.5.3. Comparability

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

5.6. Data Summary

Based upon the information provided, the data are acceptable for use. All requested analyses were performed in accordance with work plan specifications. No results were qualified as unusable (i.e., “R”). Completeness for this project is 100%. In general, the overall quality of the data was acceptable. The EPA National Functional Guidelines (EPA 2008) were used to evaluate the acceptability of the data. Overall, data quality meets DQOs established in the work plan for this project. The associated sample results are usable for the purpose of this investigation.

6. CONCEPTUAL SITE MODEL

A conceptual site model (CSM) has been developed for the site based on site characterization results. The CSM was developed in accordance with ADEC *Draft Guidance on Developing Conceptual Site Models* (ADEC 2005).

6.1. Source

The source of impact at the site was two 12,000-gallon USTs that formerly contained AvGas and Jet-A. Undocumented leaks, spills, and discharges resulted in the impact of subsurface soil and groundwater at the site.

6.2. Impacted Media

Impacted media include soil and groundwater. The analytical evidence presented in Section 4 indicates that surface/subsurface soil and site groundwater are impacted by petroleum hydrocarbons, including benzene, at concentrations that exceed ADEC cleanup criteria. The former UST site is a gravel pad surrounded on three sides by surface water. The Unified Soil Classification for the soil at the site is GM: coarse-grained gravely soil with a silt and sand mixture (EMCON 1998). Site conditions and contaminant concentrations have likely changed since the site was last visited in 2000.

6.3. Transport Mechanisms

Impact to groundwater indicates that contaminants have migrated by leaching from soil to groundwater. Other possible transport mechanisms include volatilization of contaminants and fugitive dust of site soil to the air; surface runoff to surface water; and seepage of impacted groundwater to surface water. Targets/receptors at this site include short-term workers and trespassers. No permanent workers use the site.

6.4. Exposure Media

Possible exposure media at the former UST site include air (volatilization and fugitive dust), surface water (surface runoff and groundwater seepage), and groundwater (leaching).

6.5. Human Health Exposure Routes

The identified routes of exposure include ingestion, inhalation, and absorption. The site is within the airport area, with no current facilities located on the leased lot and no possibility of areas adjacent to the site to be used on a regular basis. Possible receptors are limited to current or future site visitors and current or future construction, commercial, or industrial workers. Site trespassers are considered unlikely within the airport boundary.

A human health exposure pathway via soil media is complete for commercial/industrial, site visitors, and construction workers at the site that would be engaged in excavation activities in areas where petroleum hydrocarbons and benzene impacts are present.

This pathway includes incidental soil ingestion and inhalation of outdoor air. The contaminants of concern are not considered dermally absorptive.

A human health exposure pathway by ingestion of groundwater is not considered complete for potential future users. Groundwater at this impacted shallow aquifer is not potable for drinking water; groundwater is assumed to be subject to salt water intrusion as well as the known area-wide contamination at the airport. Kotzebue reportedly obtains drinking water from a lake located 2 miles east of the site (EMCON 1998).

A human health exposure pathway by ingestion of surface water is not considered complete as the surface water adjacent to the site is not a viable drinking water source.

Exposure to site-related contaminates through the ingestion of wild food is not considered a viable exposure pathway as site contaminants of concern are not considered bioaccumulative.

Surface water impacts were not observed during the 2009 assessments; therefore, this exposure pathway is not considered complete in the CSM. Receptors and completed pathways are presented in the ADEC CSM checklist and graphic CSM provided in Appendix F.

7. CONCLUSIONS

Site characterization activities were conducted at Crowley's former UST site in September 2010 to evaluate the nature and extent of petroleum hydrocarbon impact to subsurface soil and groundwater associated with two former 12,000-gallon USTs removed in 1998.

Three soil borings were advanced and then competed as groundwater monitoring wells to aid in the characterization of impact to groundwater.

7.1. Conclusions

Groundwater sample analytical results indicate groundwater is impacted at MW-1R and MW-3R. No detections were reported for contaminants of concern at MW-2R. At both MW-1R and MW-3R, GRO, DRO, benzene, and EDB were reported at concentrations exceeding ADEC Table C groundwater cleanup levels.

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8. REFERENCES

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TABLES

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TABLE 1: GROUNDWATER SAMPLE COLLECTION SUMMARY
2010 KOTZEBUE FORMER UST SITE CHARACTERIZATION REPORT
CROWLEY PETROLEUM DISTRIBUTION
KOTZEBUE, ALASKA

Location	Sample No. 10-KUST-:	Duplicate	Sample Date	Sample Time	Laboratory Analyses						
					GRO (AK 101)	DRO (AK 102)	RRO (AK 103)	BTEX (EPA 8260)	EDC (EPA 8260)	EDB (EPA 8011)	LEAD (EPA 6020)
MW-1R	MWR1-01GW	-	09/25/10	920	✓	✓	✓	✓	✓	✓	✓
MW-2R	MWR2-01GW	-	09/25/10	1045	✓	✓	✓	✓	✓	✓	✓
MW-3R	MWR3-01GW	-	09/25/10	1145	✓	✓	✓	✓	✓	✓	✓
MW-4R	MWR4-01GW	✓	09/25/10	1000	✓	✓	✓	✓	✓	✓	✓
TB	TB-01GW	-	09/25/10	800	✓	-	-	✓	✓	-	-

Key:

AK = Alaska

BTEX = Benzene, toluene, ethylbenzene, and total xylenes

DRO = Diesel-range organics

EDB = 1,2-Dibromoethane

EDC = 1,2-Dichloroethane

EPA = United States Environmental Protection Agency

GRO = Gasoline-range organics

RRO = Residual-range organics

TABLE 2: MONITORING WELL CONSTRUCTION AND SURVEY DETAILS
2010 KOTZEBUE FORMER UST SITE CHARACTERIZATION REPORT
CROWLEY PETROLEUM DISTRIBUTION
KOTZEBUE, ALASKA

Well ID	Installation Date	Well Construction Details							Land Survey Details				Initial DTW (ft. bgs)
		Casing Diameter (inches)	Depth to Top of Screen (ft. bgs)	Depth to Bottom of Screen (ft. bgs)	Screen Length (ft.)	Total Depth (ft. bgs)	Top of Screen (BTOC)	Bottom of Screen (BTOC)	Northing	Easting	Measuring Point Elevation[1,2]	Ground Surface Elevation[3]	
MW-1R	9/23/2010	2	5.00	10.00	5.00	10.00	5.00	10.00	4711872.90	1553547.42	8.89	9.60	3.45
MW-2R	9/23/2010	2	5.00	10.00	5.00	9.13	5.00	10.00	4711801.49	1553597.80	8.14	9.00	2.64
MW-3R	9/23/2010	2	5.00	10.00	5.00	9.31	5.00	10.00	4711828.48	1553491.81	8.59	9.30	0.00

Notes:

All measurements are in units of feet.

[1] NAVD88; US Feet

[2] Top of (PVC) pipe elev's are at black mark; From trig levels - accuracy is +/- 0.01'.

[3] Estimated by the surveyor from Iliamna Community Map and are approximate.

Key:

-- = None measured/not applicable

bgs = Below ground surface

BTOC = Below top of casing, a.k.a. below measuring point

DTW = Depth to water

ft. = Feet

TABLE 3: GROUNDWATER ELEVATION DATA
2010 KOTZEBUE FORMER UST SITE CHARACTERIZATION REPORT
CROWLEY PETROLEUM DISTRIBUTION
KOTZEBUE, ALASKA

Well ID	Measuring Point Elevation[1,2]	Top of Screen (BTOC)	Bottom of Screen (BTOC)	Gauge Date	Depth from Well MP		Groundwater Elevation	Groundwater Elevation within Screening Interval?
					Depth to Product	Depth to Water		
MW-1R	8.89	4.50	9.50	9/25/2010	--	3.45	5.44	Yes
MW-2R	8.14	4.10	9.10	9/25/2010	--	2.64	5.50	Yes
MW-3R	8.59	4.15	9.15	9/25/2010	--	3.15	5.44	Yes

Notes:

All measurements are in units of feet.

(1) NAVD88; US Feet

(2) Top of (PVC) pipe elev's are at black mark; From trig levels - accuracy is +/- 0.01'.

Key:

-- = None measured/not applicable

BTOC = Below top of casing, a.k.a. below measuring point

MP = Measuring point (a.k.a. PVC Elevation/TOC)

TABLE 4: GROUNDWATER SAMPLE ANALYTICAL RESULTS SUMMARY
2010 KOTZEBUE FORMER UST SITE CHARACTERIZATION REPORT
CROWLEY PETROLEUM DISTRIBUTION
KOTZEBUE, ALASKA

Location:	ADEC Groundwater Cleanup Values[(1)]	MW-1R	MW-1R (duplicate)	MW-2R	MW-3R	Trip Blank
Sample Number (10-KUST-):		MW1R-01GW	MW4R-01GW	MW2R-01GW	MW3R-01GW	TB-01GW
Sample Date:		9/25/2010	9/25/2010	9/25/2010	9/25/2010	9/25/2010
ADEC Fuels (mg/L)						
Gasoline-Range Organics	2.2	**3.35**	**3.51**	ND (0.0500)	**4.02**	ND (0.0500)
Diesel-Range Organics	1.5	**8.76**	**7.47**	0.417	**1.51**	-
Residual-Range Organics	1.1	0.595	0.528	ND (0.407)	0.550	-
VOCs (mg/L)						
Benzene	0.005	**0.351**	**0.397**	0.00111	**0.0599**	ND (0.000200)
Toluene	1	ND (0.010)	ND (0.00100)	ND (0.00100)	0.00124	ND (0.00100)
Ethylbenzene	0.7	0.189	0.211	ND (0.00100)	0.0924	ND (0.00100)
m,p-Xylenes	-	0.103	0.112	ND (0.00200)	0.0794	ND (0.00200)
o-Xylene	-	ND (0.010)	ND (0.00100)	ND (0.00100)	0.00145	ND (0.00100)
Total Xylenes	10	0.103	0.112	ND (0.00300)	0.0809	ND (0.00300)
1,2-Dichloroethane (EDC)	0.005	ND (0.010) J	ND (0.00100)	ND (0.00100)	ND (0.00100)	ND (0.00100)
1,2-Dibromoethane (EDB)	0.00005	**0.0000533**	**0.0000541**	ND (0.0000100)	0.0000121	-
Total Metals (mg/L)						
Lead	0.015	ND (0.00100)	ND (0.00100)	ND (0.00200)	ND (0.00100)	-

Notes:

Results above ADEC cleanup values are underlined and bolded.

(1) 18 AAC 75.345, Table C

Key:

ADEC = Alaska Department of Environmental Conservation

J = Estimated value due to minor QA/QC deficiencies.

mg/L = Milligrams per liter

ND = Analyte not detected above the method reporting limit

VOC = Volatile organic compound

FIGURES

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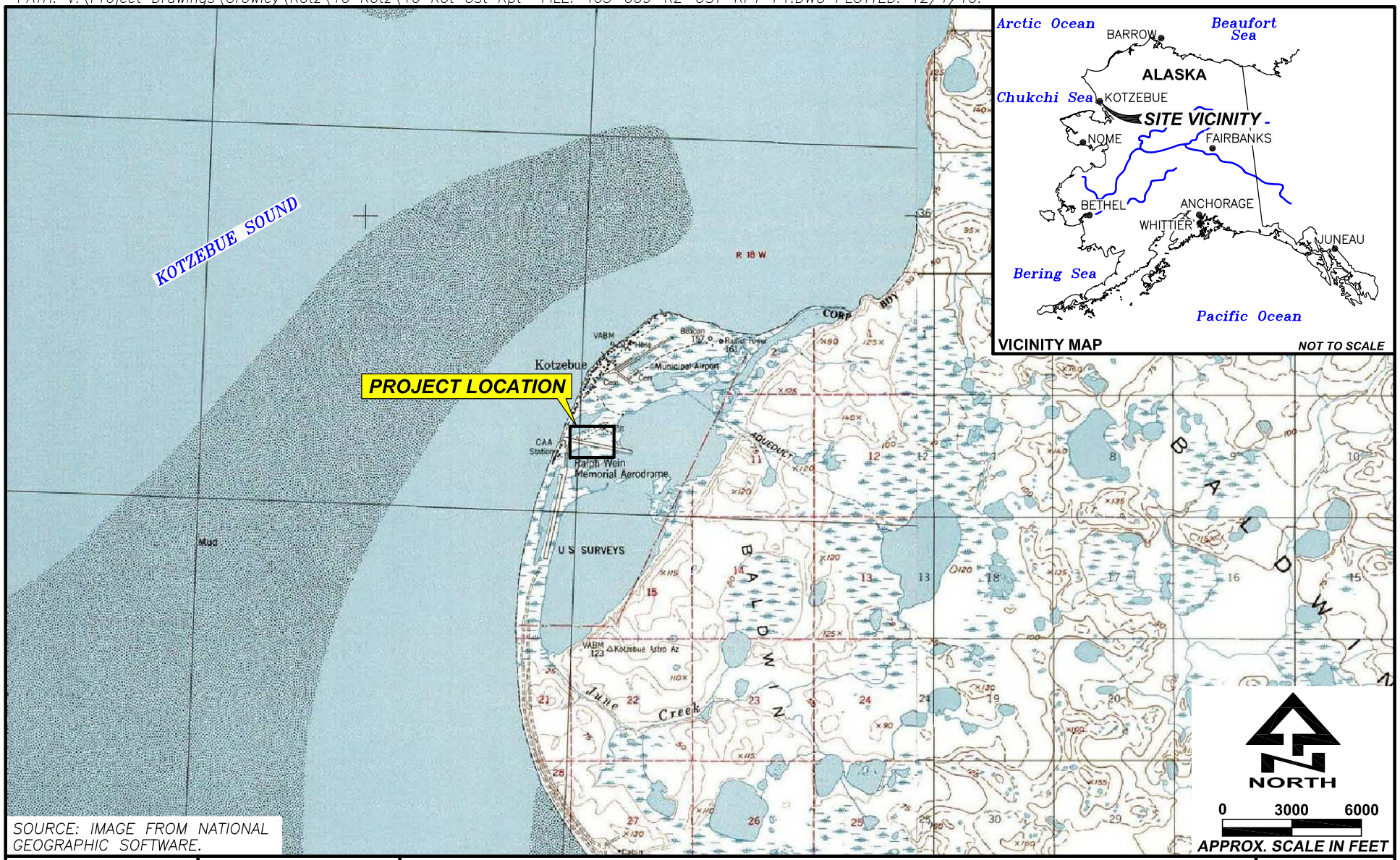

SOURCE: IMAGE FROM NATIONAL GEOGRAPHIC SOFTWARE.

oasis ENVIRONMENTAL

DATE: DEC. 2010
CHKD: M.A.P.
DRAWN: C.E.H.
PROJ. No.: 465-009

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

SITE LOCATION MAP

KOTZEBUE FORMER UST SITE
2010 GROUNDWATER CHARACTERIZATION REPORT
CROWLEY MARITIME CORPORATION
Kotzebue, Alaska

FIGURE
1

PATH: V:\Project Drawings\Crowley\Kotz\10 Kotz\10 Kot Ust Rpt FILE: 465-009-KZ-UST-RPT-F2.DWG PLOTTED: 12/1/10.

FIGURE 2

SITE PLAN

KOTZEBUE FORMER UST SITE
2010 GROUNDWATER CHARACTERIZATION REPORT
CROWLEY MARITIME CORPORATION
Kotzebue, Alaska

DATE: DEC. 2010
CHKD: M.A.P.
DRAWN: C.E.H.
PROJ. No.: 465-009

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

PATH: V:\Project Drawings\Crowley\Kotz\10 Kotz\10 Kt Ust Rpt FILE: 465-009-KZ-UST-RPT-F3.DWG PLOTTED: 12/1/10.

SOURCE: AERIAL PHOTO KOTZEBUE-7-19-03-CF196.JPG DATED 10/12/07 PROVIDED BY AERO-METRIC ANCHORAGE.

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CHKD: M.A.P.
DRAWN: C.E.H.
PROJ. No.: 465-009

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SITE DETAIL

KOTZEBUE FORMER UST SITE
2010 GROUNDWATER CHARACTERIZATION REPORT
CROWLEY MARITIME CORPORATION
Kotzebue, Alaska

FIGURE
3

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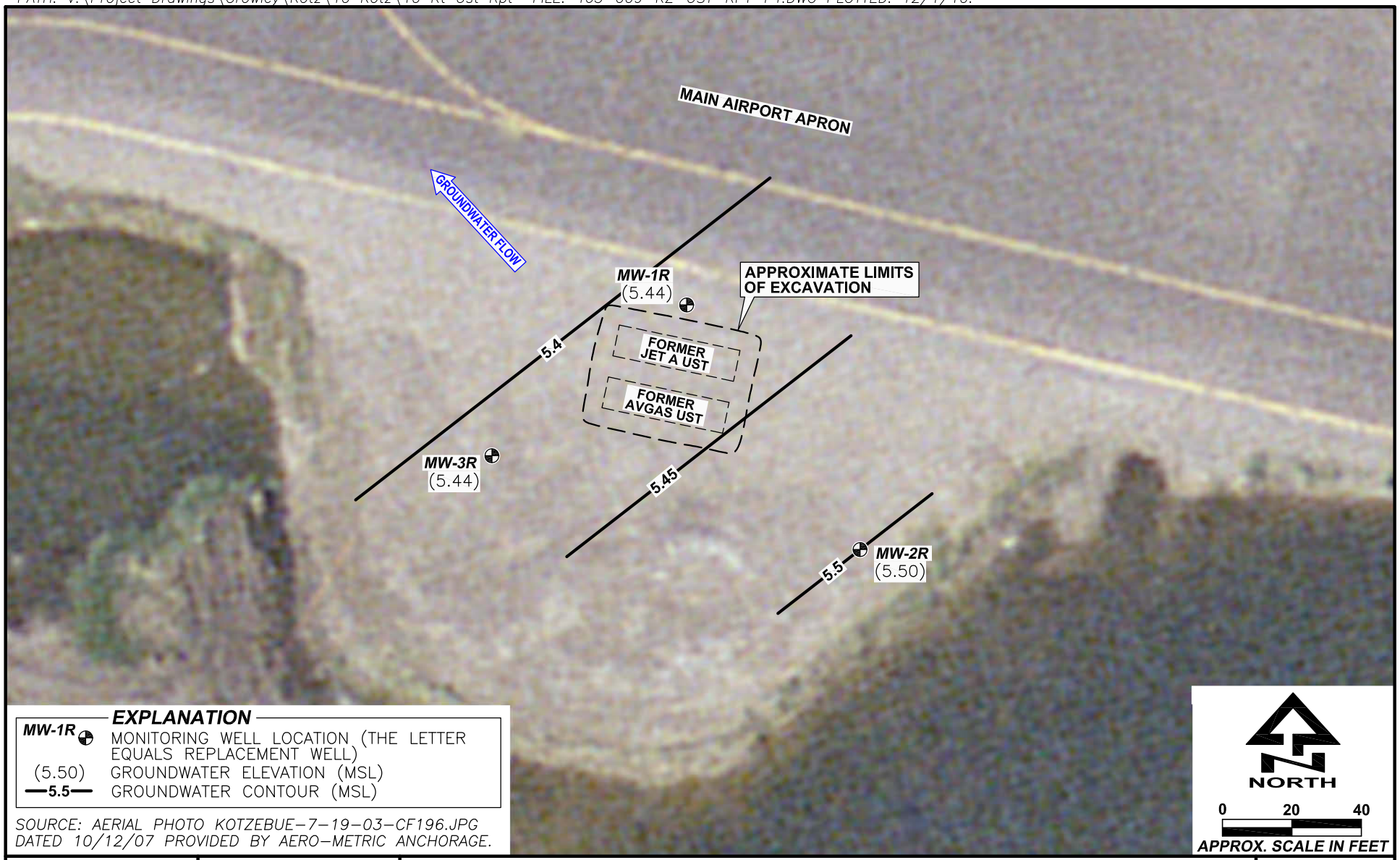

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oasis ENVIRONMENTAL

DATE: DEC. 2010
CHKD: M.A.P.
DRAWN: C.E.H.
PROJ. No.: 465-009

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2010 GROUNDWATER ELEVATIONS AND CONTOURS

KOTZEBUE FORMER UST SITE
2010 GROUNDWATER CHARACTERIZATION REPORT
CROWLEY MARITIME CORPORATION
Kotzebue, Alaska

FIGURE

4

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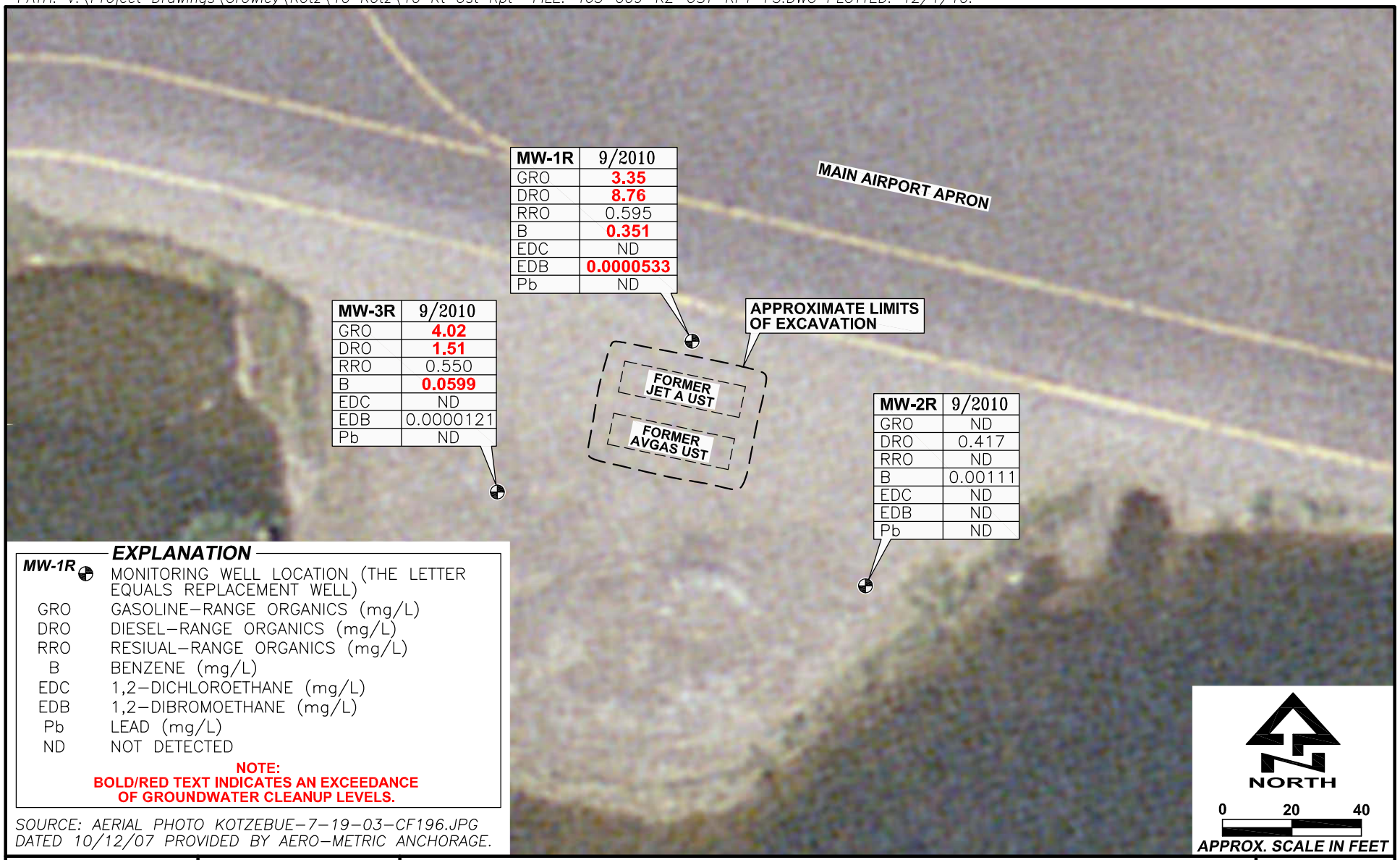

EXPLANATION

MW-1R ⊕	MONITORING WELL LOCATION (THE LETTER EQUALS REPLACEMENT WELL)
GRO	GASOLINE-RANGE ORGANICS (mg/L)
DRO	DIESEL-RANGE ORGANICS (mg/L)
RRO	RESIUAL-RANGE ORGANICS (mg/L)
B	BENZENE (mg/L)
EDC	1,2-DICHLOROETHANE (mg/L)
EDB	1,2-DIBROMOETHANE (mg/L)
Pb	LEAD (mg/L)
ND	NOT DETECTED

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

SOURCE: AERIAL PHOTO KOTZEBUE-7-19-03-CF196.JPG DATED 10/12/07 PROVIDED BY AERO-METRIC ANCHORAGE.

NORTH

0 20 40

APPROX. SCALE IN FEET

oasis ENVIRONMENTAL

DATE: DEC. 2010
CHKD: M.A.P.
DRAWN: C.E.H.
PROJ. No.: 465-009

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2010 GROUNDWATER ANALYTICAL RESULTS

KOTZEBUE FORMER UST SITE
2010 GROUNDWATER CHARACTERIZATION REPORT
CROWLEY MARITIME CORPORATION
Kotzebue, Alaska

FIGURE

5

APPENDIX A

Field Notes

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

M. PIKE / R. BURICH
Kotzebue UST site

Name

Address

Phone

Project 465-009 Phase 2 Task 2

"Rite in the Rain" - a unique all-weather writing surface created to shed water and to enhance the written image. Makes it possible to write sharp, legible field data in any kind of weather.

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J. L. DARLING CORPORATION
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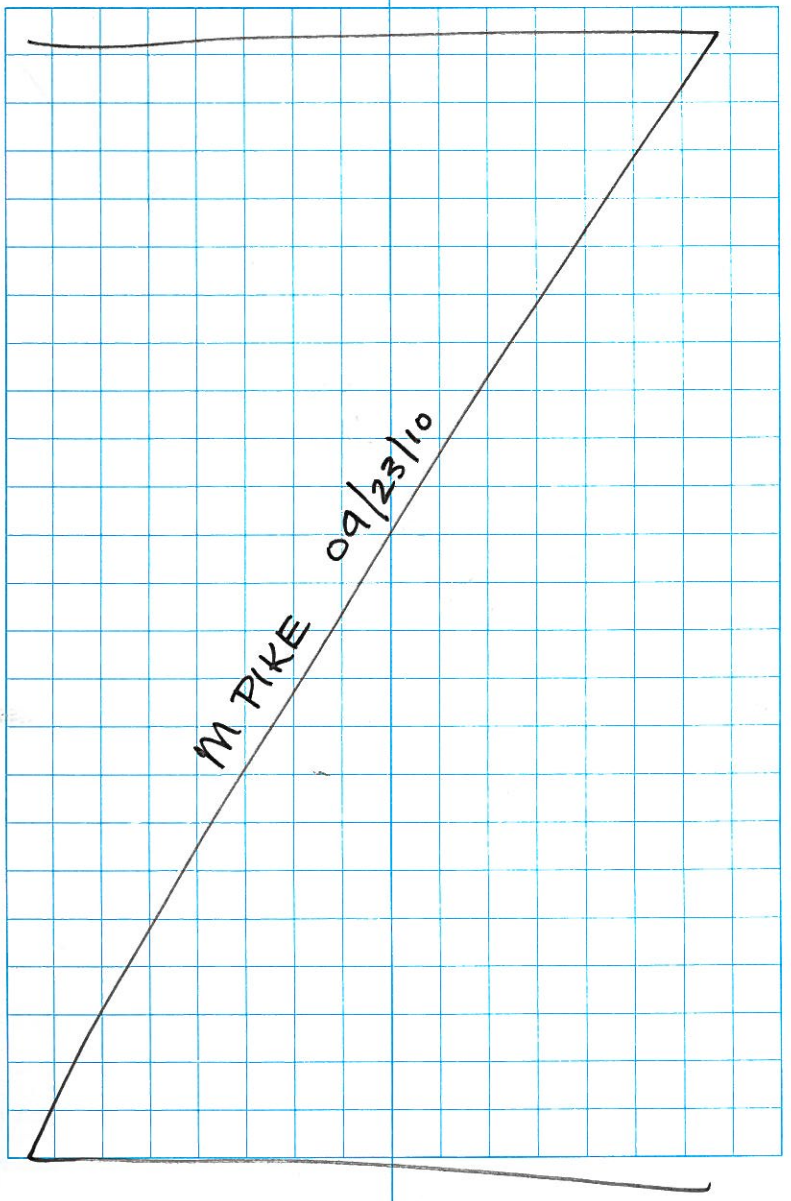
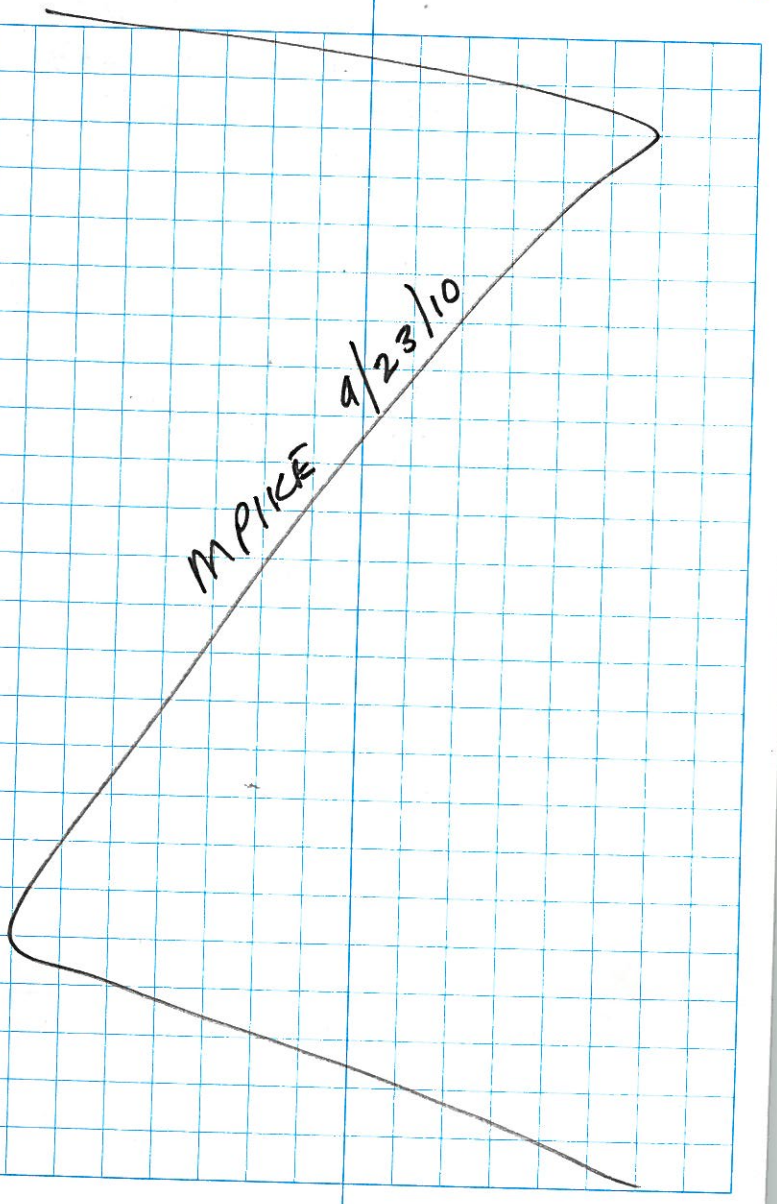
CONTENTS

PAGE	REFERENCE	DATE




M. PIKE 04/23/10


M PIKE 9/23/10

OASIS 465-009 MPIKE

PHOTO LOG 09/23/2010 R BURICH

IMGP	1712	10:48	MW-1R	Installation
	1713	10:48	MW-1R	Installation
	1714	10:48	"	
	1715	11:20	"	Complete
	1716	11:21	"	
	1717	11:21	"	Looking N
	1718	13:06	MW-2R	Core
	1719	13:28	"	Installation
	1720	13:29	"	
	1721	13:29	"	
	1722	13:42	MW3R	Installation
	1723	13:43	"	
	1724	13:43	"	

MP 9/23/10

23 SEPT 2010 OASIS 465-009 | 40F/WINDY 10 mph R.BURICH/MPIKE

1050: Met w/ AIRPORT MANAGER. SITE WALKTHRU

1124: SAFETY TAILGATE MTG. BEGIN@ MW-1R. PID READINGS/CORE SAMPLE 0-5'. Ft.

1157: Core 5-9 ft - PID READINGS

1205: Core 9-11 ft - PID READINGS Well MW-1R Completed. screen@ 5-10' Photos taken of well - see photo log pg 4

1215: Break for lunch.

1330: Return to site. Start to drill at MW-2R. Well development at MW-1R. Photos - see photo log pg 4

1420: MW-2R completed. screen 5-10'. Move drill rig to MW-3R.

1430: Drilling started at MW-3R.

1500: Finished logging soil bores. Started well development at MW-1R.

1600: Well development at MW-1R.

1700: Finished at site. Depart.

MPIKE 9/23/10

465-009 RBURICH 40F/sunny/light wind
09/24/10 M PIKE OASIS

0800: Tailgate safety mtg.
0930: Arrived on site. Begin development on MW-2R.
1100: Begin development of MW-3R.
1150: Finished well development of MW3R. Break for lunch.
1325: Return to site for gear. MOB to LOT M HANGAR.

M PIKE 09/24/10

09/25/10 RBURICH M PIKE 30F sunny/wind 9MPH 465-009 OASIS

0800: Tailgate safety mtg. Calibrate YSI.
0900: Begin at UST for ground water sampling
1205: Depart site. Refer to Low Flow groundwater collection forms.

M. PIKE 09/25/10

Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Project Name: KOTZEBUE UST
Sample Location (ie. MW1): MW-1R
Client: CROWLEY
Date: 09/25/10
Sampler: MPIKE / R BURICH
Purge Start Time: 0858
Weather Conditions: 28F / SUNNY / WIND 7MPH

Sample ID: 10-KUST-MW1R-01GW Time: 0920 (primary) dup split ms/msd
Sample ID: 10-KUST-MW4R-01GW Time: 1000 primary (dup) split ms/msd
Sample ID: _____ Time: _____ primary dup split ms/msd

Analyses	Number/type of Bottles	Comments/ preservation:	Analyses	Number/type of Bottles	Comments/ preservation:
GRO/BTEX X		HCl	~~Nitrate/Nitrite~~ Pb Lead		HNO3
DRO X		HCl	~~Sulfate~~ EDB		NONE
RRO X			Total Metals (Fe & Mg)		
DRO w/silica			Dissolved Metals (Fe & Mg)		
RRO w/silica			Alkalinity		
PAHs			Methane		

Well Information / Purge Volume Calculation

Well Casing Diameter (in): 2
Product Present? (y/n/sheen) ND
Depth to Top of Product (ft BTOC): _____
Depth to Oil/Water Interface (ft BTOC): _____
(BTOC = below top of casing)

Total Well Depth (ft BTOC): 9.5' (depth to bottom)
Depth to Water (ft BTOC): 3.45'
Water Column (ft) _____
One Purge Volume (gal): _____
purge calcluation formula on back

Sensory Observations

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

DTW@end 3.65'

Instrument Observations

Round	Time	Volume (gal)	Temp °C	pH	Conductivity (mS/cm)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down (ft)
1	0859	0.1	3.82	7.12	~~229.3~~ 3.913	—	20.9	-98	Olive	NONE	3.65	
2	0904	0.5	2.45	7.19	3.952	—	6.9	-132.7	LT OLIVE	NONE	3.65	
3	0909	0.75	2.25	7.19	3.979	—	6.9	-130.4	Olive	NONE	3.65	
4	0915	1.0	2.12	7.21	3.982	—	6.6	-105.8	Olive	NONE	3.65	
5	0917	1.	2.12	7.22	3.975	—	6.9	-100.6	Olive	NONE	3.65	
6												
7												
8												
9												
10												
11												
12												

see back for additional entry lines if needed

Purge Rate (low flow): _____ L/min Total Volume Purged: _____ Measured Drawdown (ft): _____

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

Purge Method (disposable bailer, teflon bailer, submersible pump, etc.):
Sample Method (disposable bailer, teflon bailer, submersible pump, etc.):

Well Integrity (condition of casing, flush mount sealing properly, cement seal intact, etc.):

Remarks (well recovery, unusual conditions/observations):

Signed: _____ Date: _____

Signed/Reviewer: _____ Date: _____

Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Project Name: KOTZEBUE UST
Sample Location (ie. MW1): MW-2R
Client: CROWLEY
Date: 09/25/10
Sampler: MPIKE / R. BURICH
Purge Start Time: 1014
Weather Conditions: 28F SUNNY WIND 7MPH

Sample ID: 10-KUST-MW2R-01GW Time: 1045 (primary) dup split (ms/msd)
Sample ID: _____ Time: _____ primary dup split ms/msd
Sample ID: _____ Time: _____ primary dup split ms/msd

Analyses	Number/type of Bottles	Comments/ preservation:	Analyses	Number/type of Bottles	Comments/ preservation:
GRO/BTEX X		HCl	~~Nitrate/Nitrite~~ LEAD		HNO3
DRO X		HCl	~~Sulfate~~ EDB		NONE
RRO X		HCl	Total Metals (Fe & Mg)		
DRO w/silica			Dissolved Metals (Fe & Mg)		
RRO w/silica			Alkalinity		
PAHs			Methane		

Well Information / Purge Volume Calculation

Well Casing Diameter (in): 2"
Product Present? (y/n/sheen) _____
Depth to Top of Product (ft BTOC): _____
Depth to Oil/Water Interface (ft BTOC): _____
(BTOC = below top of casing)

Total Well Depth (ft BTOC): 9.10 (depth to bottom)
Depth to Water (ft BTOC): 2.64
Water Column (ft) _____
One Purge Volume (gal): _____
purge calcluation formula on back

Sensory Observations

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

Instrument Observations

Round	Time	Volume (gal)	Temp °C	pH	Conductivity (ms/cm3)	Turbidity (NTUs)	DO (mg/L)	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down (ft)
1	1016	0.1	1.62	8.19	8.024	—	32.1	-166.3	Amber	NONE	2.66	
2	1024	0.25	1.83	7.84	8.047	—	3.5	-152.2	Amber	none	2.65	
3	1029	0.75	1.85	7.88	8.029	—	3.5	-123.8	Amber	NONE	2.65	
4	1034	1.0	1.89	7.90	8.019	—	5.4	-128.9	Amber	none	2.65	
5	1037 ~~1035~~	1.25	1.82	7.76	8.022	—	6.8	-120.9	Amber	none	2.65	
6	1042	1.5	1.80	7.75	7.983	—	6.0	-132.7	Amber	none		
7												
8												
9												
10												
11												
12												

see back for additional entry lines if needed

Purge Rate (low flow): _____ L/min Total Volume Purged: _____ Measured Drawdown (ft): _____

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

Purge Method (disposable bailer, teflon bailer, submersible pump, etc.):
Sample Method (disposable bailer, teflon bailer, submersible pump, etc.):

Well Integrity (condition of casing, flush mount sealing properly, cement seal intact, etc.):

Remarks (well recovery, unusual conditions/observations):

Signed: _____ Date: _____

Signed/Reviewer: _____ Date: _____

Low-Flow Groundwater Sampling with Minimal Drawdown Worksheet

Project Name: KOTZEBUE UST
Sample Location (ie. MW1): MW3R
Client: CROWLEY
Date: 9/25/10
Sampler: MPIKE / R BURICH
Purge Start Time: 1125
Weather Conditions: 28F / SUNNY / 8MPH WIND

Sample ID: 10-KUST-MW3R-016W Time: 1145 (primary) dup split ms/msd
Sample ID: _____ Time: _____ primary dup split ms/msd
Sample ID: _____ Time: _____ primary dup split ms/msd

Analyses	Number/type of Bottles	Comments/ preservation:	Analyses	Number/type of Bottles	Comments/ preservation:
GRO/BTEX X		HCl	~~Nitrate/Nitrite~~ EBB		NONE
DRO X		HCl	~~Sulfate~~ LEAD (Pb)		HNO3
RRO X		HCl	Total Metals (Fe & Mg)		
DRO w/silica			Dissolved Metals (Fe & Mg)		
RRO w/silica			Alkalinity		
PAHs			Methane		

Well Information / Purge Volume Calculation

Well Casing Diameter (in): 2"
Product Present? (y/n/sheen) N
Depth to Top of Product (ft BTOC): NA
Depth to Oil/Water Interface (ft BTOC): NA
(BTOC = below top of casing)

Total Well Depth (ft BTOC): 9.15 (depth to bottom)
Depth to Water (ft BTOC): 3.15
Water Column (ft) _____
One Purge Volume (gal): _____
purge calculation formula on back

Sensory Observations

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

Instrument Observations

Round	Time	Volume (gal)	Temp °C	pH	Conductivity mS/cm3	Turbidity (NTUs)	DO (mg/L)	ORP (mV)	Color	Odor	Water Level (ft BTOC)	Draw-down (ft)
1	1126	0.1	2.89	7.67	5.095	—	48.3	-129.9	AMBER	NONE	3.15	
2	1131	0.25	3.06	7.62	4.780	—	3.8	-167.3	AMBER	NONE	3.15	
3	1137	0.5	3.65	7.60	4.493	—	3.0	-170.8	AMBER	NONE	3.15	
4	1142	0.75	3.79	7.60	4.238	—	3.0	-170.5	AMBER	NONE	3.15	
5												
6												
7												
8												
9												
10												
11												
12												

see back for additional entry lines if needed

Purge Rate (low flow): _____ L/min Total Volume Purged: _____ Measured Drawdown (ft): _____

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

Purge Method (disposable bailer, teflon bailer, submersible pump, etc.):
Sample Method (disposable bailer, teflon bailer, submersible pump, etc.):

Well Integrity (condition of casing, flush mount sealing properly, cement seal intact, etc.):

Remarks (well recovery, unusual conditions/observations):

Signed: _____ Date: _____

Signed/Reviewer: _____ Date: _____

APPENDIX B

Photographic Log

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PHOTOGRAPH 1: KOTZEBUE UST SITE, VIEW NORTH. DRILLING MW-1R WELL. 23 SEPTEMBER 2010. 10:48

PHOTOGRAPH 2: KOTZEBUE UST SITE, VIEW SOUTHEAST. FINISHING DRILLING MW-2R 23 SEPTEMBER 2010. 13:28.

PHOTOGRAPH 3: KOTZEBUE UST SITE, VIEW NORTH. DRILLING MW-3R. 23 SEPTEMBER 2010.

APPENDIX C

Borehole and Monitoring Well Installation Logs

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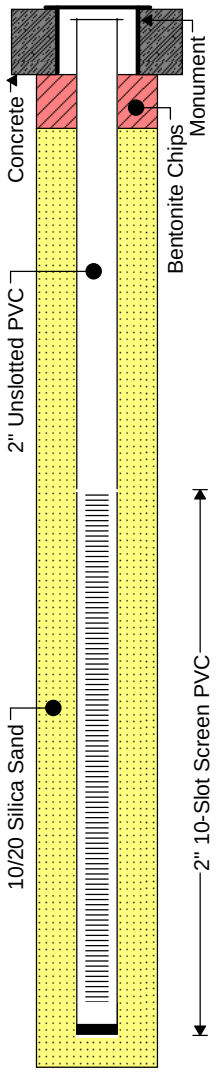
LOG OF EXPLORATORY BOREHOLE

BOREHOLE / WELL DESIGNATION: MW-1R

PROJECT NAME: Kotzebue UST Site
LOCATION: Kotzebue, Alaska
PROJECT MANAGER: Dan Frank
LOGGED BY: Melissa Pike
PROJECT NUMBER: 465-009
DATUM ELEVATION: 9.6

START TIME / END TIME: 1140/1205
DATE COMPLETED: 9/23/10
TOTAL BOREHOLE DEPTH: 11 feet
DRILLING CONTRACTOR: Hammer Environmental
DRILL RIG TYPE: Geoprobe
SAMPLING METHOD: Direct Push

Recovered/Driven (feet)	In Situ PID (ppm)	GW Depth (feet)	Depth (feet)	USCS Class	Lithologic Description
3.5/5	0.0 0.0 0.0 4.3 10.5		1.0 2.0 3.0 4.0 5.0	SP GP	**Gravelly Sand** Dry, brown, gravelly sand. **Gravel** Moist, grey, fine Gravel.
2.75/4	5.5 0.4 0.1		6.0 7.0 8.0	GP GP/PT SP	**Sandy Gravel** Wet, grey. **Sandy Gravel** Saturated with some organics. **Sand** Saturated sand with some gravel.
2.25/2	0.0 0.0		9.0 10.0 11.0 12.0 13.0	SP/SW GP	**Sand** Top 3" - fine grained sand. Bottom 9" - moist, coarse grained sand. **Sandy Gravel** Fine grained sandy gravel.



DATE: 10/26/10
DRAWN BY: Ashley Hanen
CHECKED BY: Dan Frank
PROJECT NUMBER: 465-009

COMMENTS:

oasis ENVIRONMENTAL

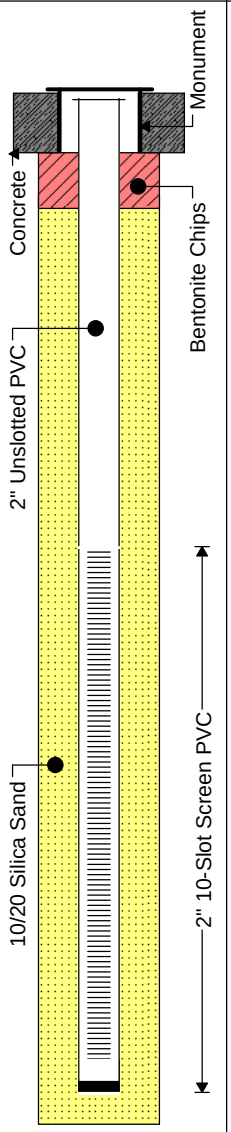
LOG OF EXPLORATORY BOREHOLE

BOREHOLE / WELL DESIGNATION: MW-2R

PROJECT NAME: Kotzebue UST Site
LOCATION: Kotzebue, Alaska
PROJECT MANAGER: Dan Frank
LOGGED BY: Ryan Burich
PROJECT NUMBER: 465-009
DATUM ELEVATION: 9.0 feet

START TIME / END TIME: 1345/1425
DATE COMPLETED: 9/23/10
TOTAL BOREHOLE DEPTH: 13 feet
DRILLING CONTRACTOR: Hammer Environmental
DRILL RIG TYPE: Geoprobe
SAMPLING METHOD: Direct Push

Recovered/Driven (feet)	In Situ PID (ppm)	GW Depth (feet)	Depth (feet)	USCS Class	Lithologic Column	Lithologic Description
3.5/5.0	0.0		1.0	GP		**Sandy Gravel** Moist, brown.
	0.0		2.0			
	0.0		3.0	GP/PT		**Sandy Gravel** Saturated, grey, sandy gravel with some organics. At 4 feet, lense of organic matter ~ 2" thick.
	0.0		4.0			
2.5/4.0	0.0		5.0	GP		**Sandy Gravel** Saturated, grey.
	0.0		6.0	SP		**Gravelly Sand** Saturated, grey, gravelly coarse grained sand.
	0.0		7.0			
	0.0		8.0	GM		**Gravelly Sand** Saturated, grey, gravelly fine grained sand.
4.0/4.0	0.0		9.0	SW		**Sand** Saturated, grey, coarse grained sand.
	0.0		10.0	SP/PT		**Gravelly Sand** Saturated, grey, gravelly sand with lense of orgainc material at the bottom 2".
	0.0		11.0			
			12.0	SM/PT		**Sand** Frozen, grey, fine grained sand with 2" orgainc layer at 12 feet.
			13.0			



DATE: 10/26/10
DRAWN BY: Ashley Hansen
CHECKED BY: Dan Frank
PROJECT NUMBER: 465-009

COMMENTS:

oasis ENVIRONMENTAL

LOG OF EXPLORATORY BOREHOLE

BOREHOLE / WELL DESIGNATION: MW-3R

PROJECT NAME: Kotzebue UST Site
LOCATION: Kotzebue, Alaska
PROJECT MANAGER: Dan Frank
LOGGED BY: Melissa Pike
PROJECT NUMBER: 465-009
DATUM ELEVATION: 9.3 feet

START TIME / END TIME: 1430/1452
DATE COMPLETED: 9/23/10
TOTAL BOREHOLE DEPTH: 12 feet
DRILLING CONTRACTOR: Hammer Environmental
DRILL RIG TYPE: Geoprobe
SAMPLING METHOD: Direct Push

Recovered/Driven (feet)	In Situ PID (ppm)	GW Depth (feet)	Depth (feet)	USCS Class	Lithologic Column	Lithologic Description
3.5/5.0	0.0		1.0	GP		**Sandy Gravel** Damp, brown.
	0.0		2.0			
	0.0		3.0			
	0.0		4.0	GP/PT		**Gravel** Damp, dark brown, gravel with organics and mineral soil.
3.0/4.0	0.3		5.0	PT		**Organic Matter** Wet, dark brown.
	0.0		6.0	SP		**Gravelly Sand** Saturated, grey.
	0.0		7.0			
	0.0		8.0			
4.0/4.0	0.0		9.0			
	0.0		10.0			
	0.0		11.0			
	0.0		12.0	PT		**Organic Matter** Wet, dark brown.
			13.0	SM		**Sand** Frozen, grey, fine grained.

Well Detail: Concrete; Monument; Bentonite Chips; 2" Unslotted PVC; 10/20 Silica Sand; 2" 10-Slot Screen PVC

DATE: 10/26/10
DRAWN BY: Ashley Hansen
CHECKED BY: Dan Frank
PROJECT NUMBER: 465-009

COMMENTS:

oasis ENVIRONMENTAL

APPENDIX D

Survey Data/Map

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MONITOR WELL SURVEY

Kotzebue Airport
Kotzebue, AK

	ALASKA STATE PLANE ZONE 7, NAD83		NAVD88 ELEVATION	
WELL ID	**NORTHING**	**EASTING**	**PVC PIPE**	**GROUND**
UST-NORTH	4711872.90	1553547.42	8.89	9.6
UST-WEST	4711828.48	1553491.81	8.59	9.3
UST-EAST	4711801.49	1553597.80	8.14	9.0
LOT M-EAST	4712028.19	1554381.15	14.10	11.3
LOT M-NORTH	4712090.97	1554372.42	13.21	10.7
LOT M-WEST	4712045.52	1554346.11	13.30	10.7

Coordinates and elevations are in US Survey feet

Surveyed September 30, 2010
Prepared For
Oasis Environmental, Inc.

Design Alaska Inc. Architects • Engineers • Surveyors
601 College Road Fairbanks Alaska 99701 907 452 1241
Fax 907 456 6883 E-Mail mail@designalaska.com

APPENDIX E

TestAmerica Analytical Results
ADEC Data Review Checklists

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Laboratory Data Review Checklist

Completed by:	Robert Beckman		
Title:	Environmental Scientist	Date:	Nov 4, 2010
CS Report Name:	KOTZEBUE FORMER UST SITE GROUNDWATER CHARACTERIZATION REPORT	Report Date:	Oct 12, 2010
Consultant Firm:	Oasis Environmental, Inc.		
Laboratory Name:	TestAmerican Laboratories, Inc.	Laboratory Report Number:	ATI0083
ADEC File Number:	TBD	ADEC RecKey Number:	TBD

1. Laboratory

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

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

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

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

2. Chain of Custody (COC)

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

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

b. Correct analyses requested?

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

3. Laboratory Sample Receipt Documentation

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

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

Cooler temperature documented at 3.0°C

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

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

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

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

Samples received in good condition.

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

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

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

Comments:

Data quality and usability not affected.

4. Case Narrative

a. Present and understandable?

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

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

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

c. Were all corrective actions documented?

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

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

Comments:

Data quality and usability not affected.

5. Samples Results

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

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

b. All applicable holding times met?

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

c. All soils reported on a dry weight basis?

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

No soil analyses requested.

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

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

PQL for 1,2-Dichloroethane reported 2x above cleanup level for sample 10-KUST-MW1R-01GW.

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

Comments:

1,2-Dichloroethane result from sample MW1R-01GW has been flagged "J" and considered estimated.

6. QC Samples

a. Method Blank

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

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

Yes

ii. All method blank results less than PQL?

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

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

NA

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

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

No affected samples to flag.

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

Data quality and usability not affected.

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

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

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

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

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

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

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

RPD above limit for GRO in sample 10I0211-DUP1. Field Duplicate within limits.

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

Comments:

No affected samples

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

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

No affected samples.

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

Data quality and usability not affected. See QAR for details.

c. Surrogates - Organics Only

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

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

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

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

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

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

No sample results with failed surrogate recoveries.

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

Comments:

Data quality and usability not affected.

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

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

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

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

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

Only one cooler received by laboratory for all samples.

iii. All results less than PQL?

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

iv. If above PQL, what samples are affected?

Comments:

NA

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

Comments:

Data quality and usability not affected.

e. Field Duplicate

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

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

ii. Submitted blind to lab?

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

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

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

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

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

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

All analyte RPDs were below the recommended 30% (for water) difference.

f. Decontamination or Equipment Blank (if applicable)

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

NA- No equipment was used which would require decontamination.

i. All results less than PQL?

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

See above

ii. If above PQL, what samples are affected?

Comments:

NA

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

Comments:

Data quality and usability not affected.

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

a. Defined and appropriate?

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

No other data flags were required.

Reset Form

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: ATI0083
TestAmerica Sample Delivery Group: ATI0083
Client Project/Site: 465-009
Client Project Description: Kotzebue UST Site

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

Attn: Dan Frank

Johanna Dreher

Authorized for release by:
10/12/2010 2:50 PM

Johanna L Dreher
Client Services Manager
johanna.dreher@testamericainc.com

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

Table of Contents

Qualifier Definition/Glossary

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Qualifiers

GC Volatiles

Qualifier	Qualifier Description
R4	Due to the low levels of analyte in the sample, the duplicate RPD calculation does not provide useful information.

Metals

Qualifier	Qualifier Description
RL1	Reporting limit raised due to sample matrix effects.

Fuels

Qualifier	Qualifier Description
Q11	Detected hydrocarbons in the diesel range do not have a distinct diesel pattern and may be due to heavily weathered diesel.
Q4	The hydrocarbons present are a complex mixture of diesel range and heavy oil range organics.
QP	Hydrocarbon result partly due to individual peak(s) in quantitation range.

Glossary

Glossary	Glossary Description
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis.

Detection Summary

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Client Sample ID: 10-KUST-MW1R-01GW — Lab Sample ID: ATI0083-01

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Diesel Range Organics	8.76	Q11	0.397		mg/l	1		AK102/103	total
Residual Range Organics	0.595		0.397		mg/l	1		AK102/103	total
1,2-Dibromoethane	0.0533		0.0100		ug/l	1		EPA 8011	total
Benzene	351		2.00		ug/l	10		EPA 8260B	total
Ethylbenzene	189		10.0		ug/l	10		EPA 8260B	total
m,p-Xylene	103		20.0		ug/l	10		EPA 8260B	total
Gasoline Range Hydrocarbons	3350		50.0		ug/l	1		AK 101	total

Client Sample ID: 10-KUST-MW2R-01GW — Lab Sample ID: ATI0083-02

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Diesel Range Organics	0.417	Q4	0.407		mg/l	1		AK102/103	total
Benzene	1.11		0.200		ug/l	1		EPA 8260B	total

Client Sample ID: 10-KUST-MW3R-01GW — Lab Sample ID: ATI0083-03

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Diesel Range Organics	1.51	QP	0.407		mg/l	1		AK102/103	total
Residual Range Organics	0.550		0.407		mg/l	1		AK102/103	total
1,2-Dibromoethane	0.0121		0.0100		ug/l	1		EPA 8011	total
Benzene	59.9		2.00		ug/l	10		EPA 8260B	total
Ethylbenzene	92.4		10.0		ug/l	10		EPA 8260B	total
m,p-Xylene	79.4		2.00		ug/l	1		EPA 8260B	total
o-Xylene	1.45		1.00		ug/l	1		EPA 8260B	total
Toluene	1.24		1.00		ug/l	1		EPA 8260B	total
Gasoline Range Hydrocarbons	4020		50.0		ug/l	1		AK 101	total

Client Sample ID: 10-KUST-MW4R-01GW — Lab Sample ID: ATI0083-04

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Diesel Range Organics	7.47	Q11	0.439		mg/l	1		AK102/103	total
Residual Range Organics	0.528		0.439		mg/l	1		AK102/103	total
1,2-Dibromoethane	0.0541		0.0100		ug/l	1		EPA 8011	total
Benzene	397		2.00		ug/l	10		EPA 8260B	total
Ethylbenzene	211		10.0		ug/l	10		EPA 8260B	total
m,p-Xylene	112		20.0		ug/l	10		EPA 8260B	total
Gasoline Range Hydrocarbons	3510		50.0		ug/l	1		AK 101	total

Client Sample ID: 10-KOTZ-TB-01GW — Lab Sample ID: ATI0083-05

No Detections.

Client Sample ID: 10-KUST-MW1R-01GW

Lab Sample ID: ATI0083-01

Date Collected: 09/25/10 09:20

Matrix: Water

Date Received: 09/27/10 12:00

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**351**		2.00		ug/l		09/30/10 08:44	09/30/10 14:35	10
1,2-Dichloroethane (EDC)	ND		10.0		ug/l		09/30/10 08:44	09/30/10 14:35	10
Toluene	ND		10.0		ug/l		09/30/10 08:44	09/30/10 14:35	10
Ethylbenzene	**189**		10.0		ug/l		09/30/10 08:44	09/30/10 14:35	10
m,p-Xylene	**103**		20.0		ug/l		09/30/10 08:44	09/30/10 14:35	10
o-Xylene	ND		10.0		ug/l		09/30/10 08:44	09/30/10 14:35	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane	*86.6*		*80 - 120*	*09/30/10 08:44*	*09/30/10 14:35*	*10*
Toluene-d8	*89.2*		*74.2 - 120*	*09/30/10 08:44*	*09/30/10 14:35*	*10*
4-bromofluorobenzene	*89.0*		*70 - 120*	*09/30/10 08:44*	*09/30/10 14:35*	*10*

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Hydrocarbons	**3350**		50.0		ug/l		09/30/10 13:49	09/30/10 19:47	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a - Trifluorotoluene (FID)	*114*		*50 - 150*	*09/30/10 13:49*	*09/30/10 19:47*	*1*

Method: EPA 8011 - EDB by EPA Method 8011

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	**0.0533**		0.0100		ug/l		09/29/10 11:49	09/30/10 10:16	1

Method: EPA 6020 - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.00100		mg/l		10/01/10 10:03	10/02/10 19:20	1

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics	**8.76**	**Q11**	0.397		mg/l		10/06/10 14:31	10/09/10 16:29	1
Residual Range Organics	**0.595**		0.397		mg/l		10/06/10 14:31	10/09/10 16:29	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*99.6*	*Q11*	*50 - 150*	*10/06/10 14:31*	*10/09/10 16:29*	*1*
Triacontane	*97.5*		*50 - 150*	*10/06/10 14:31*	*10/09/10 16:29*	*1*

Client Sample ID: 10-KUST-MW2R-01GW

Lab Sample ID: ATI0083-02

Date Collected: 09/25/10 10:45

Matrix: Water

Date Received: 09/27/10 12:00

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**1.11**		0.200		ug/l		09/30/10 08:44	09/30/10 15:03	1
1,2-Dichloroethane (EDC)	ND		1.00		ug/l		09/30/10 08:44	09/30/10 15:03	1
Toluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 15:03	1
Ethylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 15:03	1
m,p-Xylene	ND		2.00		ug/l		09/30/10 08:44	09/30/10 15:03	1
o-Xylene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 15:03	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane	*82.6*		*80 - 120*	*09/30/10 08:44*	*09/30/10 15:03*	*1*
Toluene-d8	*88.0*		*74.2 - 120*	*09/30/10 08:44*	*09/30/10 15:03*	*1*
4-bromofluorobenzene	*88.8*		*70 - 120*	*09/30/10 08:44*	*09/30/10 15:03*	*1*

Client Sample ID: 10-KUST-MW2R-01GW

Lab Sample ID: ATI0083-02

Date Collected: 09/25/10 10:45

Matrix: Water

Date Received: 09/27/10 12:00

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Hydrocarbons	ND		50.0		ug/l		09/30/10 13:49	09/30/10 20:12	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a - Trifluorotoluene (FID)	*122*		*50 - 150*	*09/30/10 13:49*	*09/30/10 20:12*	*1*

Method: EPA 8011 - EDB by EPA Method 8011

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.0100		ug/l		09/29/10 11:49	09/30/10 10:40	1

Method: EPA 6020 - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	RL1	0.00200		mg/l		10/05/10 21:07	10/06/10 14:57	2

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics	**0.417**	**Q4**	0.407		mg/l		10/06/10 14:31	10/09/10 17:01	1
Residual Range Organics	ND		0.407		mg/l		10/06/10 14:31	10/09/10 17:01	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*86.1*		*50 - 150*	*10/06/10 14:31*	*10/09/10 17:01*	*1*
Triacontane	*81.7*		*50 - 150*	*10/06/10 14:31*	*10/09/10 17:01*	*1*

Client Sample ID: 10-KUST-MW3R-01GW

Lab Sample ID: ATI0083-03

Date Collected: 09/25/10 11:45

Matrix: Water

Date Received: 09/27/10 12:00

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**59.9**		2.00		ug/l		09/30/10 08:44	10/01/10 12:02	10
1,2-Dichloroethane (EDC)	ND		1.00		ug/l		09/30/10 08:44	09/30/10 17:24	1
Toluene	**1.24**		1.00		ug/l		09/30/10 08:44	09/30/10 17:24	1
Ethylbenzene	**92.4**		10.0		ug/l		09/30/10 08:44	10/01/10 12:02	10
m,p-Xylene	**79.4**		2.00		ug/l		09/30/10 08:44	09/30/10 17:24	1
o-Xylene	**1.45**		1.00		ug/l		09/30/10 08:44	09/30/10 17:24	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane	*81.4*		*80 - 120*	*09/30/10 08:44*	*09/30/10 17:24*	*1*
Toluene-d8	*93.6*		*74.2 - 120*	*09/30/10 08:44*	*09/30/10 17:24*	*1*
4-bromofluorobenzene	*91.8*		*70 - 120*	*09/30/10 08:44*	*09/30/10 17:24*	*1*

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Hydrocarbons	**4020**		50.0		ug/l		09/30/10 13:49	09/30/10 21:51	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a - Trifluorotoluene (FID)	*97.3*		*50 - 150*	*09/30/10 13:49*	*09/30/10 21:51*	*1*

Method: EPA 8011 - EDB by EPA Method 8011

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	**0.0121**		0.0100		ug/l		09/29/10 11:49	09/30/10 11:53	1

Client Sample ID: 10-KUST-MW3R-01GW

Lab Sample ID: ATI0083-03

Date Collected: 09/25/10 11:45

Matrix: Water

Date Received: 09/27/10 12:00

Method: EPA 6020 - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.00100		mg/l		10/01/10 10:03	10/02/10 19:24	1

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics	**1.51**	**QP**	0.407		mg/l		10/06/10 14:31	10/11/10 12:06	1
Residual Range Organics	**0.550**		0.407		mg/l		10/06/10 14:31	10/11/10 12:06	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*116*		*50 - 150*	*10/06/10 14:31*	*10/11/10 12:06*	*1*
Triacontane	*118*		*50 - 150*	*10/06/10 14:31*	*10/11/10 12:06*	*1*

Client Sample ID: 10-KUST-MW4R-01GW

Lab Sample ID: ATI0083-04

Date Collected: 09/25/10 10:00

Matrix: Water

Date Received: 09/27/10 12:00

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**397**		2.00		ug/l		09/30/10 08:44	09/30/10 18:21	10
1,2-Dichloroethane (EDC)	ND		1.00		ug/l		09/30/10 08:44	09/30/10 17:52	1
Toluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 17:52	1
Ethylbenzene	**211**		10.0		ug/l		09/30/10 08:44	09/30/10 18:21	10
m,p-Xylene	**112**		20.0		ug/l		09/30/10 08:44	09/30/10 18:21	10
o-Xylene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 17:52	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane	*82.0*		*80 - 120*	*09/30/10 08:44*	*09/30/10 17:52*	*1*
Toluene-d8	*100*		*74.2 - 120*	*09/30/10 08:44*	*09/30/10 17:52*	*1*
4-bromofluorobenzene	*119*		*70 - 120*	*09/30/10 08:44*	*09/30/10 17:52*	*1*

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Hydrocarbons	**3510**		50.0		ug/l		09/30/10 13:49	09/30/10 22:16	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a - Trifluorotoluene (FID)	*127*		*50 - 150*	*09/30/10 13:49*	*09/30/10 22:16*	*1*

Method: EPA 8011 - EDB by EPA Method 8011

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	**0.0541**		0.0100		ug/l		09/29/10 11:49	09/30/10 12:17	1

Method: EPA 6020 - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.00100		mg/l		10/01/10 10:03	10/02/10 19:28	1

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics	**7.47**	**Q11**	0.439		mg/l		10/06/10 14:31	10/09/10 17:33	1
Residual Range Organics	**0.528**		0.439		mg/l		10/06/10 14:31	10/09/10 17:33	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*89.4*		*50 - 150*	*10/06/10 14:31*	*10/09/10 17:33*	*1*
Triacontane	*82.6*		*50 - 150*	*10/06/10 14:31*	*10/09/10 17:33*	*1*

Client Sample ID: 10-KOTZ-TB-01GW
Date Collected: 09/25/10 08:00
Date Received: 09/27/10 12:00

Lab Sample ID: ATI0083-05
Matrix: Water

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.200		ug/l		09/30/10 08:44	09/30/10 18:49	1
1,2-Dichloroethane (EDC)	ND		1.00		ug/l		09/30/10 08:44	09/30/10 18:49	1
Toluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 18:49	1
Ethylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 18:49	1
m,p-Xylene	ND		2.00		ug/l		09/30/10 08:44	09/30/10 18:49	1
o-Xylene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 18:49	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane	*85.2*		*80 - 120*	*09/30/10 08:44*	*09/30/10 18:49*	*1*
Toluene-d8	*90.2*		*74.2 - 120*	*09/30/10 08:44*	*09/30/10 18:49*	*1*
4-bromofluorobenzene	*89.6*		*70 - 120*	*09/30/10 08:44*	*09/30/10 18:49*	*1*

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Hydrocarbons	ND		50.0		ug/l		09/30/10 13:49	09/30/10 22:41	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a - Trifluorotoluene (FID)	*112*		*50 - 150*	*09/30/10 13:49*	*09/30/10 22:41*	*1*

Surrogate Summary

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Matrix: Water **Prep Type: total**

		Percent Surrogate Recovery (Acceptance Limits)		
		DBFM	TOL	BFB
Lab Sample ID	Client Sample ID	(80-120)	(74.2-120)	(70-120)
10I0203-BLK1	10I0203-BLK1	83.0	86.0	87.2
10I0203-BS1	10I0203-BS1	84.2	88.4	89.2
10I0203-BS2	10I0203-BS2	86.4	87.0	87.6
10I0203-MS1	10-KUST-MW2R-01GW	83.4	89.0	87.8
10I0203-MS2	10-KUST-MW2R-01GW	85.4	89.6	89.8
10I0203-MSD1	10-KUST-MW2R-01GW	83.4	89.0	88.0
10I0203-MSD2	10-KUST-MW2R-01GW	83.8	88.6	87.8
ATI0083-01	10-KUST-MW1R-01GW	86.6	89.2	89.0
ATI0083-02	10-KUST-MW2R-01GW	82.6	88.0	88.8
ATI0083-03	10-KUST-MW3R-01GW	81.4	93.6	91.8
ATI0083-04	10-KUST-MW4R-01GW	82.0	100	119
ATI0083-05	10-KOTZ-TB-01GW	85.2	90.2	89.6

Surrogate Legend

DBFM = Dibromofluoromethane

TOL = Toluene-d8

BFB = 4-bromofluorobenzene

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Matrix: Water **Prep Type: total**

		Percent Surrogate Recovery (Acceptance Limits)
		ifluorotolue
Lab Sample ID	Client Sample ID	(50-150)
10I0211-BLK1	10I0211-BLK1	119
10I0211-BS1	10I0211-BS1	62.3
10I0211-DUP1	10-KUST-MW2R-01GW	115
10I0211-MS1	10-KUST-MW2R-01GW	118
10I0211-MSD1	10-KUST-MW2R-01GW	108
ATI0083-01	10-KUST-MW1R-01GW	114
ATI0083-02	10-KUST-MW2R-01GW	122
ATI0083-03	10-KUST-MW3R-01GW	97.3
ATI0083-04	10-KUST-MW4R-01GW	127
ATI0083-05	10-KOTZ-TB-01GW	112

Surrogate Legend

a,a,a - Trifluorotoluene (FID) = a,a,a - Trifluorotoluene (FID)

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Matrix: Water **Prep Type: total**

		Percent Surrogate Recovery (Acceptance Limits)	
		1COD	TC
Lab Sample ID	Client Sample ID	(50-150)	(50-150)
10J0028-BLK1	10J0028-BLK1	84.0	77.1
10J0028-DUP1	ATI0082-02	98.7	94.0
10J0028-MS1	ATI0082-02	104	91.3
10J0028-MS2	10-KUST-MW2R-01GW	99.9	92.1
10J0028-MSD1	ATI0082-02	105	89.1
10J0028-MSD2	10-KUST-MW2R-01GW	90.5	83.4

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO (Continued)

Matrix: Water **Prep Type: total**

		Percent Surrogate Recovery (Acceptance Limits)											
Lab Sample ID	Client Sample ID	1COD (50-150)	TC (50-150)										
ATI0083-01	10-KUST-MW1R-01GW	99.6 Q11	97.5										
ATI0083-02	10-KUST-MW2R-01GW	86.1	81.7										
ATI0083-03	10-KUST-MW3R-01GW	116	118										
ATI0083-04	10-KUST-MW4R-01GW	89.4	82.6										

Surrogate Legend

1COD = 1-Chlorooctadecane

TC = Triacontane

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Matrix: Water **Prep Type: total**

		Percent Surrogate Recovery (Acceptance Limits)											
Lab Sample ID	Client Sample ID	1COD (60-120)	TC (60-120)										
10J0028-BS1	10J0028-BS1	88.2	77.3										
10J0028-BSD1	10J0028-BSD1	90.3	82.3										

Surrogate Legend

1COD = 1-Chlorooctadecane

TC = Triacontane

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B

Lab Sample ID: 10I0203-BLK1
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10I0203-BLK1
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Chloromethane	ND		5.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Vinyl chloride	ND		0.200		ug/l		09/30/10 08:44	09/30/10 10:17	1
Bromomethane	ND		5.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Chloroethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Trichlorofluoromethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1-Dichloroethene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Carbon disulfide	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Methylene chloride	ND		10.0		ug/l		09/30/10 08:44	09/30/10 10:17	1
Acetone	ND		25.0		ug/l		09/30/10 08:44	09/30/10 10:17	1
trans-1,2-Dichloroethene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Methyl tert-butyl ether	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1-Dichloroethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
cis-1,2-Dichloroethene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
2,2-Dichloropropane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Bromochloromethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Chloroform	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Carbon tetrachloride	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1,1-Trichloroethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
2-Butanone	ND		10.0		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1-Dichloropropene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Benzene	ND		0.200		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2-Dichloroethane (EDC)	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Trichloroethene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Dibromomethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2-Dichloropropane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Bromodichloromethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
cis-1,3-Dichloropropene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Toluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
4-Methyl-2-pentanone	ND		10.0		ug/l		09/30/10 08:44	09/30/10 10:17	1
trans-1,3-Dichloropropene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Tetrachloroethene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1,2-Trichloroethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Dibromochloromethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,3-Dichloropropane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2-Dibromoethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
2-Hexanone	ND		10.0		ug/l		09/30/10 08:44	09/30/10 10:17	1
Ethylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Chlorobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1,1,2-Tetrachloroethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
m,p-Xylene	ND		2.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
o-Xylene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Styrene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Bromoform	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Isopropylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
n-Propylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,1,2,2-Tetrachloroethane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Bromobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,3,5-Trimethylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B (Continued)

Lab Sample ID: 10I0203-BLK1
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10I0203-BLK1
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2,3-Trichloropropane	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
4-Chlorotoluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
tert-Butylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2,4-Trimethylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
sec-Butylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
p-Isopropyltoluene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,3-Dichlorobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,4-Dichlorobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
n-Butylbenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2-Dichlorobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2-Dibromo-3-chloropropane	ND		5.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Hexachlorobutadiene	ND		2.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2,4-Trichlorobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
Naphthalene	ND		2.00		ug/l		09/30/10 08:44	09/30/10 10:17	1
1,2,3-Trichlorobenzene	ND		1.00		ug/l		09/30/10 08:44	09/30/10 10:17	1

Surrogate	*Blank % Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane	*83.0*		*80 - 120*	*09/30/10 08:44*	*09/30/10 10:17*	*1*
Toluene-d8	*86.0*		*74.2 - 120*	*09/30/10 08:44*	*09/30/10 10:17*	*1*
4-bromofluorobenzene	*87.2*		*70 - 120*	*09/30/10 08:44*	*09/30/10 10:17*	*1*

Lab Sample ID: 10I0203-BS1
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10I0203-BS1
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,1-Dichloroethene	10.0	8.98		ug/l		89.8	60.4 - 140
Benzene	10.0	10.7		ug/l		107	72.9 - 120
Trichloroethene	10.0	10.2		ug/l		102	73.7 - 120
Toluene	10.0	9.83		ug/l		98.3	72.4 - 132
Chlorobenzene	10.0	9.95		ug/l		99.5	80 - 120

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
Dibromofluoromethane	*84.2*		*80 - 120*
Toluene-d8	*88.4*		*74.2 - 120*
4-bromofluorobenzene	*89.2*		*70 - 120*

Lab Sample ID: 10I0203-BS2
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10I0203-BS2
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Methyl tert-butyl ether	10.0	10.0		ug/l		100	47.6 - 150
Benzene	10.0	9.52		ug/l		95.2	72.9 - 120
Toluene	10.0	9.19		ug/l		91.9	72.4 - 132
Ethylbenzene	10.0	9.40		ug/l		94.0	0 - 200
m,p-Xylene	20.0	19.6		ug/l		97.9	70 - 130
o-Xylene	10.0	10.1		ug/l		101	70 - 130
Naphthalene	10.0	9.44		ug/l		94.4	70 - 130

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B (Continued)

Lab Sample ID: 10I0203-BS2
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10I0203-BS2
Prep Type: total
Prep Batch: 10I0203_P

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
Dibromofluoromethane	*86.4*		*80 - 120*
Toluene-d8	*87.0*		*74.2 - 120*
4-bromofluorobenzene	*87.6*		*70 - 120*

Lab Sample ID: 10I0203-MS1
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10-KUST-MW2R-01GW
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
1,1-Dichloroethene			10.0	9.82		ug/l		98.2	52.5 - 135
Benzene	1.11		10.0	12.5		ug/l		114	72.3 - 120
Trichloroethene			10.0	11.0		ug/l		110	80 - 120
Toluene	ND		10.0	10.7		ug/l		106	62.7 - 137
Chlorobenzene			10.0	10.6		ug/l		106	78.9 - 120

Surrogate	*Matrix Spike % Recovery*	*Matrix Spike Qualifier*	*Limits*
Dibromofluoromethane	*83.4*		*80 - 120*
Toluene-d8	*89.0*		*74.2 - 120*
4-bromofluorobenzene	*87.8*		*70 - 120*

Lab Sample ID: 10I0203-MS2
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10-KUST-MW2R-01GW
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Methyl tert-butyl ether			10.0	8.26		ug/l		82.6	44.3 - 150
Benzene	1.11		10.0	9.89		ug/l		87.8	72.3 - 120
Toluene	ND		10.0	8.65		ug/l		85.5	62.7 - 137
Ethylbenzene	ND		10.0	8.79		ug/l		86.8	0 - 200
m,p-Xylene	ND		20.0	18.7		ug/l		92.5	70 - 130
o-Xylene	ND		10.0	9.54		ug/l		95.4	70 - 130
Naphthalene			10.0	7.98		ug/l		79.8	70 - 130

Surrogate	*Matrix Spike % Recovery*	*Matrix Spike Qualifier*	*Limits*
Dibromofluoromethane	*85.4*		*80 - 120*
Toluene-d8	*89.6*		*74.2 - 120*
4-bromofluorobenzene	*89.8*		*70 - 120*

Lab Sample ID: 10I0203-MSD1
Matrix: Water
Analysis Batch: 10I0203

Client Sample ID: 10-KUST-MW2R-01GW
Prep Type: total
Prep Batch: 10I0203_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene			10.0	9.32		ug/l		93.2	52.5 - 135	5.22	10.5
Benzene	1.11		10.0	12.1		ug/l		110	72.3 - 120	3.01	10.7
Trichloroethene			10.0	10.6		ug/l		106	80 - 120	3.99	10
Toluene	ND		10.0	10.0		ug/l		99.5	62.7 - 137	6.27	13
Chlorobenzene			10.0	10.0		ug/l		100	78.9 - 120	5.44	11.2

Method: EPA 8260B - Volatile Organic Compounds by EPA Method 8260B (Continued)

Lab Sample ID: 10I0203-MSD1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0203 — **Prep Batch: 10I0203_P**

Surrogate	*Matrix Spike Dup % Recovery*	*Matrix Spike Dup Qualifier*	*Limits*
Dibromofluoromethane	*83.4*		*80 - 120*
Toluene-d8	*89.0*		*74.2 - 120*
4-bromofluorobenzene	*88.0*		*70 - 120*

Lab Sample ID: 10I0203-MSD2 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0203 — **Prep Batch: 10I0203_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Methyl tert-butyl ether			10.0	8.97		ug/l		89.7	44.3 - 150	8.24	15.7
Benzene	1.11		10.0	10.3		ug/l		92.1	72.3 - 120	4.26	10.7
Toluene	ND		10.0	9.12		ug/l		90.2	62.7 - 137	5.29	13
Ethylbenzene	ND		10.0	9.31		ug/l		92.0	0 - 200	5.75	200
m,p-Xylene	ND		20.0	19.6		ug/l		97.0	70 - 130	4.66	12
o-Xylene	ND		10.0	10.0		ug/l		100	70 - 130	5.21	12
Naphthalene			10.0	8.80		ug/l		88.0	70 - 130	9.77	12

Surrogate	*Matrix Spike Dup % Recovery*	*Matrix Spike Dup Qualifier*	*Limits*
Dibromofluoromethane	*83.8*		*80 - 120*
Toluene-d8	*88.6*		*74.2 - 120*
4-bromofluorobenzene	*87.8*		*70 - 120*

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101

Lab Sample ID: 10I0211-BLK1 — **Client Sample ID: 10I0211-BLK1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0211 — **Prep Batch: 10I0211_P**

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Hydrocarbons	ND		50.0		ug/l		09/30/10 13:49	10/01/10 14:12	1

Surrogate	*Blank % Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a - Trifluorotoluene (FID)	*119*		*50 - 150*	*09/30/10 13:49*	*10/01/10 14:12*	*1*

Lab Sample ID: 10I0211-BS1 — **Client Sample ID: 10I0211-BS1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0211 — **Prep Batch: 10I0211_P**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Gasoline Range Hydrocarbons	1000	1070		ug/l		107	60 - 120

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
a,a,a - Trifluorotoluene (FID)	*62.3*		*50 - 150*

Lab Sample ID: 10I0211-MS1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0211 — **Prep Batch: 10I0211_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Gasoline Range Hydrocarbons	ND		1000	966		ug/l		93.7	70 - 130

Method: AK 101 - Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101 (Continued)

Lab Sample ID: 10I0211-MS1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0211 — **Prep Batch: 10I0211_P**

Surrogate	Matrix Spike % Recovery	Matrix Spike Qualifier	Limits
a,a,a - Trifluorotoluene (FID)	*118*		*50 - 150*

Lab Sample ID: 10I0211-MSD1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0211 — **Prep Batch: 10I0211_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Gasoline Range Hydrocarbons	ND		1000	997		ug/l		96.8	70 - 130	3.12	20

Surrogate	Matrix Spike Dup % Recovery	Matrix Spike Dup Qualifier	Limits
a,a,a - Trifluorotoluene (FID)	*108*		*50 - 150*

Lab Sample ID: 10I0211-DUP1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0211 — **Prep Batch: 10I0211_P**

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD Limit
Gasoline Range Hydrocarbons	ND		21.8	R4	ug/l		28.4	20

Surrogate	Duplicate % Recovery	Duplicate Qualifier	Limits
a,a,a - Trifluorotoluene (FID)	*115*		*50 - 150*

Method: EPA 8011 - EDB by EPA Method 8011

Lab Sample ID: 10I0194-BLK1 — **Client Sample ID: 10I0194-BLK1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0194 — **Prep Batch: 10I0194_P**

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	ND		0.0100		ug/l		09/29/10 11:49	09/30/10 09:28	1

Lab Sample ID: 10I0194-BS1 — **Client Sample ID: 10I0194-BS1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0194 — **Prep Batch: 10I0194_P**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,2-Dibromoethane	0.125	0.138		ug/l		110	60 - 140

Lab Sample ID: 10I0194-BS2 — **Client Sample ID: 10I0194-BS2**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0194 — **Prep Batch: 10I0194_P**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,2-Dibromoethane	0.125	0.125		ug/l		99.6	60 - 140

Method: EPA 8011 - EDB by EPA Method 8011 (Continued)

Lab Sample ID: 10I0194-MS1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0194 — **Prep Batch: 10I0194_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
1,2-Dibromoethane	ND		0.125	0.134		ug/l		107	60 - 140

Lab Sample ID: 10I0194-MSD1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10I0194 — **Prep Batch: 10I0194_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
1,2-Dibromoethane	ND		0.125	0.129		ug/l		103	60 - 140	3.62	20

Method: EPA 6020 - Total Metals per EPA 6000/7000 Series Methods

Lab Sample ID: 10J0013-BLK1 — **Client Sample ID: 10J0013-BLK1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0013 — **Prep Batch: 10J0013_P**

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.00100		mg/l		10/01/10 10:03	10/02/10 18:33	1

Lab Sample ID: 10J0013-BS1 — **Client Sample ID: 10J0013-BS1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0013 — **Prep Batch: 10J0013_P**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Lead	0.100	0.0895		mg/l		89.5	80 - 120

Lab Sample ID: 10J0013-MS1 — **Client Sample ID: PTI0922-02**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0013 — **Prep Batch: 10J0013_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Lead	ND		0.100	0.0860		mg/l		86.0	75 - 125

Lab Sample ID: 10J0013-MS2 — **Client Sample ID: PTI0969-01**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0013 — **Prep Batch: 10J0013_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Lead	0.00610		0.100	0.0950		mg/l		88.9	75 - 125

Lab Sample ID: 10J0013-DUP1 — **Client Sample ID: PTI0922-01**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0013 — **Prep Batch: 10J0013_P**

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD Limit
Lead	0.0189		0.0190		mg/l		0.528	20

Method: EPA 6020 - Total Metals per EPA 6000/7000 Series Methods (Continued)

Lab Sample ID: 10J0144-BLK1 — **Client Sample ID: 10J0144-BLK1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0144 — **Prep Batch: 10J0144_P**

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.00100		mg/l		10/05/10 21:07	10/06/10 14:35	1

Lab Sample ID: 10J0144-BS1 — **Client Sample ID: 10J0144-BS1**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0144 — **Prep Batch: 10J0144_P**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Lead			0.100	0.0999		mg/l		99.9	80 - 120		

Lab Sample ID: 10J0144-MS1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0144 — **Prep Batch: 10J0144_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits		
Lead	ND	RL1	0.100	0.0973		mg/l		95.9	75 - 125		

Lab Sample ID: 10J0144-MSD1 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: 10J0144 — **Prep Batch: 10J0144_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Lead	ND	RL1	0.100	0.0961		mg/l		94.7	75 - 125	1.24	20

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO

Lab Sample ID: 10J0028-BLK1 — **Client Sample ID: 10J0028-BLK1**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000555 — **Prep Batch: 10J0028_P**

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics	ND		0.500		mg/l		10/06/10 14:31	10/09/10 20:45	1
Residual Range Organics	ND		0.500		mg/l		10/06/10 14:31	10/09/10 20:45	1

Surrogate	*Blank % Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctadecane	*84.0*		*50 - 150*	*10/06/10 14:31*	*10/09/10 20:45*	*1*
Triacontane	*77.1*		*50 - 150*	*10/06/10 14:31*	*10/09/10 20:45*	*1*

Lab Sample ID: 10J0028-BS1 — **Client Sample ID: 10J0028-BS1**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000555 — **Prep Batch: 10J0028_P**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Diesel Range Organics			11.1	10.5		mg/l		94.5	75 - 125		
Residual Range Organics			10.3	10.1		mg/l		98.2	60 - 120		

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1-Chlorooctadecane	*88.2*		*60 - 120*
Triacontane	*77.3*		*60 - 120*

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO (Continued)

Lab Sample ID: 10J0028-BSD1 — **Client Sample ID: 10J0028-BSD1**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000555 — **Prep Batch: 10J0028_P**

Analyte			Spike Added	LCS Dup Result	LCS Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Diesel Range Organics			11.1	11.3		mg/l		102	75 - 125	7.54	20
Residual Range Organics			10.3	10.9		mg/l		106	60 - 120	7.64	20

Surrogate	*LCS Dup % Recovery*	*LCS Dup Qualifier*	*Limits*
1-Chlorooctadecane	*90.3*		*60 - 120*
Triacontane	*82.3*		*60 - 120*

Lab Sample ID: 10J0028-MS1 — **Client Sample ID: ATI0082-02**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000556 — **Prep Batch: 10J0028_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Diesel Range Organics	15.7		8.95	24.9		mg/l		102	75 - 125
Residual Range Organics	0.827		8.31	10.0		mg/l		111	60 - 120

Surrogate	*Matrix Spike % Recovery*	*Matrix Spike Qualifier*	*Limits*
1-Chlorooctadecane	*104*		*50 - 150*
Triacontane	*91.3*		*50 - 150*

Lab Sample ID: 10J0028-MS2 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000556 — **Prep Batch: 10J0028_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Diesel Range Organics	0.417	Q4	9.49	10.8		mg/l		110	75 - 125
Residual Range Organics	ND		8.80	9.92		mg/l		111	60 - 120

Surrogate	*Matrix Spike % Recovery*	*Matrix Spike Qualifier*	*Limits*
1-Chlorooctadecane	*99.9*		*50 - 150*
Triacontane	*92.1*		*50 - 150*

Lab Sample ID: 10J0028-MSD1 — **Client Sample ID: ATI0082-02**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000556 — **Prep Batch: 10J0028_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Diesel Range Organics	15.7		8.95	24.2		mg/l		95.1	75 - 125	2.67	25
Residual Range Organics	0.827		8.31	9.76		mg/l		108	60 - 120	2.52	25

Surrogate	*Matrix Spike Dup % Recovery*	*Matrix Spike Dup Qualifier*	*Limits*
1-Chlorooctadecane	*105*		*50 - 150*
Triacontane	*89.1*		*50 - 150*

Lab Sample ID: 10J0028-MSD2 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000556 — **Prep Batch: 10J0028_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Diesel Range Organics	0.417	Q4	8.95	9.46		mg/l		101	75 - 125	13.4	25

Method: AK102/103 - Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO (Continued)

Lab Sample ID: 10J0028-MSD2 — **Client Sample ID: 10-KUST-MW2R-01GW**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000556 — **Prep Batch: 10J0028_P**

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Residual Range Organics	ND		8.31	8.44		mg/l		99.9	60 - 120	16.0	25

Surrogate	*Matrix Spike Dup % Recovery*	*Matrix Spike Dup Qualifier*	*Limits*
1-Chlorooctadecane	*90.5*		*50 - 150*
Triacontane	*83.4*		*50 - 150*

Lab Sample ID: 10J0028-DUP1 — **Client Sample ID: ATI0082-02**
Matrix: Water — **Prep Type: total**
Analysis Batch: T000556 — **Prep Batch: 10J0028_P**

Analyte	Sample Result	Sample Qualifier		Duplicate Result	Duplicate Qualifier	Unit	D			RPD	RPD Limit
Diesel Range Organics	15.7			15.7		mg/l				0.20	20
										5	
Residual Range Organics	0.827			0.781		mg/l				5.75	50

Surrogate	*Duplicate % Recovery*	*Duplicate Qualifier*	*Limits*
1-Chlorooctadecane	*98.7*		*50 - 150*
Triacontane	*94.0*		*50 - 150*

GCMS Volatiles

Analysis Batch: 10I0203

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10I0203-BLK1	10I0203-BLK1	total	Water	EPA 8260B	10I0203_P
10I0203-BS1	10I0203-BS1	total	Water	EPA 8260B	10I0203_P
10I0203-BS2	10I0203-BS2	total	Water	EPA 8260B	10I0203_P
ATI0083-01	10-KUST-MW1R-01GW	total	Water	EPA 8260B	10I0203_P
ATI0083-02	10-KUST-MW2R-01GW	total	Water	EPA 8260B	10I0203_P
10I0203-MS1	10-KUST-MW2R-01GW	total	Water	EPA 8260B	10I0203_P
10I0203-MSD1	10-KUST-MW2R-01GW	total	Water	EPA 8260B	10I0203_P
10I0203-MS2	10-KUST-MW2R-01GW	total	Water	EPA 8260B	10I0203_P
10I0203-MSD2	10-KUST-MW2R-01GW	total	Water	EPA 8260B	10I0203_P
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 8260B	10I0203_P
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 8260B	10I0203_P
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 8260B	10I0203_P
ATI0083-05	10-KOTZ-TB-01GW	total	Water	EPA 8260B	10I0203_P
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 8260B	10I0203_P

Prep Batch: 10I0203_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10I0203-BLK1	10I0203-BLK1	total	Water	GC/MS Volatiles	
10I0203-BS1	10I0203-BS1	total	Water	GC/MS Volatiles	
10I0203-BS2	10I0203-BS2	total	Water	GC/MS Volatiles	
ATI0083-01	10-KUST-MW1R-01GW	total	Water	GC/MS Volatiles	
ATI0083-02	10-KUST-MW2R-01GW	total	Water	GC/MS Volatiles	
10I0203-MS1	10-KUST-MW2R-01GW	total	Water	GC/MS Volatiles	
10I0203-MSD1	10-KUST-MW2R-01GW	total	Water	GC/MS Volatiles	
10I0203-MS2	10-KUST-MW2R-01GW	total	Water	GC/MS Volatiles	
10I0203-MSD2	10-KUST-MW2R-01GW	total	Water	GC/MS Volatiles	
ATI0083-03	10-KUST-MW3R-01GW	total	Water	GC/MS Volatiles	
ATI0083-04	10-KUST-MW4R-01GW	total	Water	GC/MS Volatiles	
ATI0083-04	10-KUST-MW4R-01GW	total	Water	GC/MS Volatiles	
ATI0083-05	10-KOTZ-TB-01GW	total	Water	GC/MS Volatiles	
ATI0083-03	10-KUST-MW3R-01GW	total	Water	GC/MS Volatiles	

GC Volatiles

Analysis Batch: 10I0211

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
ATI0083-01	10-KUST-MW1R-01GW	total	Water	AK 101	10I0211_P
ATI0083-02	10-KUST-MW2R-01GW	total	Water	AK 101	10I0211_P
10I0211-DUP1	10-KUST-MW2R-01GW	total	Water	AK 101	10I0211_P
10I0211-MS1	10-KUST-MW2R-01GW	total	Water	AK 101	10I0211_P
10I0211-MSD1	10-KUST-MW2R-01GW	total	Water	AK 101	10I0211_P
ATI0083-03	10-KUST-MW3R-01GW	total	Water	AK 101	10I0211_P
ATI0083-04	10-KUST-MW4R-01GW	total	Water	AK 101	10I0211_P
ATI0083-05	10-KOTZ-TB-01GW	total	Water	AK 101	10I0211_P
10I0211-BS1	10I0211-BS1	total	Water	AK 101	10I0211_P
10I0211-BLK1	10I0211-BLK1	total	Water	AK 101	10I0211_P

Prep Batch: 10I0211_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
ATI0083-01	10-KUST-MW1R-01GW	total	Water	GC Volatiles	
ATI0083-02	10-KUST-MW2R-01GW	total	Water	GC Volatiles	
10I0211-DUP1	10-KUST-MW2R-01GW	total	Water	GC Volatiles	

GC Volatiles (Continued)

Prep Batch: 10I0211_P (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10I0211-MS1	10-KUST-MW2R-01GW	total	Water	GC Volatiles	
10I0211-MSD1	10-KUST-MW2R-01GW	total	Water	GC Volatiles	
ATI0083-03	10-KUST-MW3R-01GW	total	Water	GC Volatiles	
ATI0083-04	10-KUST-MW4R-01GW	total	Water	GC Volatiles	
ATI0083-05	10-KOTZ-TB-01GW	total	Water	GC Volatiles	
10I0211-BS1	10I0211-BS1	total	Water	GC Volatiles	
10I0211-BLK1	10I0211-BLK1	total	Water	GC Volatiles	

Semivolatiles

Analysis Batch: 10I0194

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10I0194-BS2	10I0194-BS2	total	Water	EPA 8011	10I0194_P
10I0194-BLK1	10I0194-BLK1	total	Water	EPA 8011	10I0194_P
10I0194-BS1	10I0194-BS1	total	Water	EPA 8011	10I0194_P
ATI0083-01	10-KUST-MW1R-01GW	total	Water	EPA 8011	10I0194_P
ATI0083-02	10-KUST-MW2R-01GW	total	Water	EPA 8011	10I0194_P
10I0194-MS1	10-KUST-MW2R-01GW	total	Water	EPA 8011	10I0194_P
10I0194-MSD1	10-KUST-MW2R-01GW	total	Water	EPA 8011	10I0194_P
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 8011	10I0194_P
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 8011	10I0194_P

Prep Batch: 10I0194_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10I0194-BS2	10I0194-BS2	total	Water	EPA 3510/600 Series	
10I0194-BLK1	10I0194-BLK1	total	Water	EPA 3510/600 Series	
10I0194-BS1	10I0194-BS1	total	Water	EPA 3510/600 Series	
ATI0083-01	10-KUST-MW1R-01GW	total	Water	EPA 3510/600 Series	
ATI0083-02	10-KUST-MW2R-01GW	total	Water	EPA 3510/600 Series	
10I0194-MS1	10-KUST-MW2R-01GW	total	Water	EPA 3510/600 Series	
10I0194-MSD1	10-KUST-MW2R-01GW	total	Water	EPA 3510/600 Series	
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 3510/600 Series	
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 3510/600 Series	

Metals

Analysis Batch: 10J0013

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10J0013-BLK1	10J0013-BLK1	total	Water	EPA 6020	10J0013_P
10J0013-BS1	10J0013-BS1	total	Water	EPA 6020	10J0013_P
10J0013-MS1	PTI0922-02	total	Water	EPA 6020	10J0013_P
ATI0083-01	10-KUST-MW1R-01GW	total	Water	EPA 6020	10J0013_P
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 6020	10J0013_P
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 6020	10J0013_P
10J0013-MS2	PTI0969-01	total	Water	EPA 6020	10J0013_P
10J0013-DUP1	PTI0922-01	total	Water	EPA 6020	10J0013_P

Metals (Continued)

Prep Batch: 10J0013_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10J0013-BLK1	10J0013-BLK1	total	Water	EPA 200/3005	
10J0013-BS1	10J0013-BS1	total	Water	EPA 200/3005	
10J0013-MS1	PTI0922-02	total	Water	EPA 200/3005	
ATI0083-01	10-KUST-MW1R-01GW	total	Water	EPA 200/3005	
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 200/3005	
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 200/3005	
10J0013-MS2	PTI0969-01	total	Water	EPA 200/3005	
10J0013-DUP1	PTI0922-01	total	Water	EPA 200/3005	

Analysis Batch: 10J0144

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10J0144-BLK1	10J0144-BLK1	total	Water	EPA 6020	10J0144_P
10J0144-BS1	10J0144-BS1	total	Water	EPA 6020	10J0144_P
ATI0083-02	10-KUST-MW2R-01GW	total	Water	EPA 6020	10J0144_P
10J0144-MS1	10-KUST-MW2R-01GW	total	Water	EPA 6020	10J0144_P
10J0144-MSD1	10-KUST-MW2R-01GW	total	Water	EPA 6020	10J0144_P

Prep Batch: 10J0144_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
10J0144-BLK1	10J0144-BLK1	total	Water	EPA 200/3005	
10J0144-BS1	10J0144-BS1	total	Water	EPA 200/3005	
ATI0083-02	10-KUST-MW2R-01GW	total	Water	EPA 200/3005	
10J0144-MS1	10-KUST-MW2R-01GW	total	Water	EPA 200/3005	
10J0144-MSD1	10-KUST-MW2R-01GW	total	Water	EPA 200/3005	

Fuels

Prep Batch: 10J0028_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
ATI0083-01	10-KUST-MW1R-01GW	total	Water	EPA 3510	
ATI0083-02	10-KUST-MW2R-01GW	total	Water	EPA 3510	
ATI0083-04	10-KUST-MW4R-01GW	total	Water	EPA 3510	
10J0028-BLK1	10J0028-BLK1	total	Water	EPA 3510	
10J0028-DUP1	ATI0082-02	total	Water	EPA 3510	
10J0028-BS1	10J0028-BS1	total	Water	EPA 3510	
10J0028-MS1	ATI0082-02	total	Water	EPA 3510	
10J0028-BSD1	10J0028-BSD1	total	Water	EPA 3510	
10J0028-MS2	10-KUST-MW2R-01GW	total	Water	EPA 3510	
10J0028-MSD2	10-KUST-MW2R-01GW	total	Water	EPA 3510	
10J0028-MSD1	ATI0082-02	total	Water	EPA 3510	
ATI0083-03	10-KUST-MW3R-01GW	total	Water	EPA 3510	

Analysis Batch: T000555

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
ATI0083-02	10-KUST-MW2R-01GW	total	Water	AK102/103	10J0028_P
ATI0083-04	10-KUST-MW4R-01GW	total	Water	AK102/103	10J0028_P
10J0028-BLK1	10J0028-BLK1	total	Water	AK102/103	10J0028_P
10J0028-BS1	10J0028-BS1	total	Water	AK102/103	10J0028_P
10J0028-BSD1	10J0028-BSD1	total	Water	AK102/103	10J0028_P

Fuels (Continued)

Analysis Batch: T000556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
ATI0083-01	10-KUST-MW1R-01GW	total	Water	AK102/103	10J0028_P
10J0028-DUP1	ATI0082-02	total	Water	AK102/103	10J0028_P
10J0028-MS1	ATI0082-02	total	Water	AK102/103	10J0028_P
10J0028-MS2	10-KUST-MW2R-01GW	total	Water	AK102/103	10J0028_P
10J0028-MSD2	10-KUST-MW2R-01GW	total	Water	AK102/103	10J0028_P
10J0028-MSD1	ATI0082-02	total	Water	AK102/103	10J0028_P

Analysis Batch: T000562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
ATI0083-03	10-KUST-MW3R-01GW	total	Water	AK102/103	10J0028_P

Lab Chronicle

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Client Sample ID: 10-KUST-MW1R-01GW

Lab Sample ID: ATI0083-01

Date Collected: 09/25/10 09:20

Matrix: Water

Date Received: 09/27/10 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
total	Prep	GC/MS Volatiles		1	10I0203_P	09/30/10 08:44	CBW	TestAmerica Spokane
total	Analysis	EPA 8260B		10	10I0203	09/30/10 14:35	ms	TestAmerica Spokane
total	Prep	GC Volatiles		1	10I0211_P	09/30/10 13:49	MFH	TestAmerica Spokane
total	Analysis	AK 101		1	10I0211	09/30/10 19:47	MH	TestAmerica Spokane
total	Prep	EPA 3510/600 Series		1	10I0194_P	09/29/10 11:49	ms	TestAmerica Spokane
total	Analysis	EPA 8011		1	10I0194	09/30/10 10:16	ms	TestAmerica Spokane
total	Prep	EPA 200/3005		1	10J0013_P	10/01/10 10:03	JMF	TestAmerica Portland
total	Analysis	EPA 6020		1	10J0013	10/02/10 19:20	TNL	TestAmerica Portland
total	Prep	EPA 3510		0.7937	10J0028_P	10/06/10 14:31	STL	TestAmerica Anchorage
total	Analysis	AK102/103		1	T000556	10/09/10 16:29	deb	TestAmerica Anchorage

Client Sample ID: 10-KUST-MW2R-01GW

Lab Sample ID: ATI0083-02

Date Collected: 09/25/10 10:45

Matrix: Water

Date Received: 09/27/10 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
total	Prep	GC/MS Volatiles		1	10I0203_P	09/30/10 08:44	CBW	TestAmerica Spokane
total	Analysis	EPA 8260B		1	10I0203	09/30/10 15:03	ms	TestAmerica Spokane
total	Prep	GC Volatiles		1	10I0211_P	09/30/10 13:49	MFH	TestAmerica Spokane
total	Analysis	AK 101		1	10I0211	09/30/10 20:12	MH	TestAmerica Spokane
total	Prep	EPA 3510/600 Series		1	10I0194_P	09/29/10 11:49	ms	TestAmerica Spokane
total	Analysis	EPA 8011		1	10I0194	09/30/10 10:40	ms	TestAmerica Spokane
total	Prep	EPA 200/3005		1	10J0144_P	10/05/10 21:07	JMF	TestAmerica Portland
total	Analysis	EPA 6020		2	10J0144	10/06/10 14:57	kah	TestAmerica Portland
total	Prep	EPA 3510		0.813	10J0028_P	10/06/10 14:31	STL	TestAmerica Anchorage
total	Analysis	AK102/103		1	T000555	10/09/10 17:01	deb	TestAmerica Anchorage

Client Sample ID: 10-KUST-MW3R-01GW

Lab Sample ID: ATI0083-03

Date Collected: 09/25/10 11:45

Matrix: Water

Date Received: 09/27/10 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
total	Prep	GC/MS Volatiles		1	10I0203_P	09/30/10 08:44	CBW	TestAmerica Spokane
total	Analysis	EPA 8260B		1	10I0203	09/30/10 17:24	ms	TestAmerica Spokane
total	Analysis	EPA 8260B		10	10I0203	10/01/10 12:02	ms	TestAmerica Spokane
total	Prep	GC Volatiles		1	10I0211_P	09/30/10 13:49	MFH	TestAmerica Spokane
total	Analysis	AK 101		1	10I0211	09/30/10 21:51	MH	TestAmerica Spokane
total	Prep	EPA 3510/600 Series		1	10I0194_P	09/29/10 11:49	ms	TestAmerica Spokane
total	Analysis	EPA 8011		1	10I0194	09/30/10 11:53	ms	TestAmerica Spokane
total	Prep	EPA 200/3005		1	10J0013_P	10/01/10 10:03	JMF	TestAmerica Portland
total	Analysis	EPA 6020		1	10J0013	10/02/10 19:24	TNL	TestAmerica Portland
total	Prep	EPA 3510		0.813	10J0028_P	10/06/10 14:31	STL	TestAmerica Anchorage
total	Analysis	AK102/103		1	T000562	10/11/10 12:06	deb	TestAmerica Anchorage

Client Sample ID: 10-KUST-MW4R-01GW

Lab Sample ID: ATI0083-04

Date Collected: 09/25/10 10:00

Matrix: Water

Date Received: 09/27/10 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
total	Prep	GC/MS Volatiles		1	10I0203_P	09/30/10 08:44	CBW	TestAmerica Spokane
total	Analysis	EPA 8260B		1	10I0203	09/30/10 17:52	ms	TestAmerica Spokane
total	Analysis	EPA 8260B		10	10I0203	09/30/10 18:21	ms	TestAmerica Spokane
total	Prep	GC Volatiles		1	10I0211_P	09/30/10 13:49	MFH	TestAmerica Spokane
total	Analysis	AK 101		1	10I0211	09/30/10 22:16	MH	TestAmerica Spokane
total	Prep	EPA 3510/600 Series		1	10I0194_P	09/29/10 11:49	ms	TestAmerica Spokane
total	Analysis	EPA 8011		1	10I0194	09/30/10 12:17	ms	TestAmerica Spokane
total	Prep	EPA 200/3005		1	10J0013_P	10/01/10 10:03	JMF	TestAmerica Portland
total	Analysis	EPA 6020		1	10J0013	10/02/10 19:28	TNL	TestAmerica Portland
total	Prep	EPA 3510		0.8772	10J0028_P	10/06/10 14:31	STL	TestAmerica Anchorage
total	Analysis	AK102/103		1	T000555	10/09/10 17:33	deb	TestAmerica Anchorage

Client Sample ID: 10-KOTZ-TB-01GW

Lab Sample ID: ATI0083-05

Date Collected: 09/25/10 08:00

Matrix: Water

Date Received: 09/27/10 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
total	Prep	GC/MS Volatiles		1	10I0203_P	09/30/10 08:44	CBW	TestAmerica Spokane
total	Analysis	EPA 8260B		1	10I0203	09/30/10 18:49	ms	TestAmerica Spokane
total	Prep	GC Volatiles		1	10I0211_P	09/30/10 13:49	MFH	TestAmerica Spokane
total	Analysis	AK 101		1	10I0211	09/30/10 22:41	MH	TestAmerica Spokane

Certification Summary

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Laboratory	Authority	Program	EPA Region	Certification ID	Expiration Date
TestAmerica Anchorage	Alaska	Alaska UST	10	UST-067	06/16/11
TestAmerica Anchorage	Alaska	State Program	10	AK00975	06/30/11
TestAmerica Portland		USDA		P330-07-XXXXXX	11/13/10
TestAmerica Portland	Alaska	Alaska UST	10	UST-012	12/26/10
TestAmerica Portland	Alaska	State Program	10	OR00040	04/21/11
TestAmerica Portland	California	State Program	9	2597	09/30/11
TestAmerica Portland	Oregon	NELAC Primary AB	10	OR100021	01/09/11
TestAmerica Portland	Washington	State Program	10	C586	06/23/11
TestAmerica Spokane	Alaska	Alaska UST	10	UST-071	10/31/10
TestAmerica Spokane	Washington	State Program	10	C569	01/06/11

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Method Summary

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Method	Method Description	Protocol	Laboratory
EPA 8260B	Volatile Organic Compounds by EPA Method 8260B		TAL SPK
AK 101	Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101		TAL SPK
EPA 8011	EDB by EPA Method 8011		TAL SPK
EPA 6020	Total Metals per EPA 6000/7000 Series Methods		TAL PTL
AK102/103	Diesel Range Organics (C10-C25) and Residual Range Organics (C25-C36) per AK102/RRO		TAL ANC

Protocol References:

=

Laboratory References:

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

TAL PTL = TestAmerica Portland, 9405 SW Nimbus Avenue, Beaverton, OR/USA 97008, TEL (503) 906-9200

TAL SPK = TestAmerica Spokane, 11922 E. 1st Ave., Spokane, WA/USA 99206, TEL (509) 924-9200

Sample Summary

Client: Oasis Environmental, Inc.
Project/Site: 465-009

TestAmerica Job ID: ATI0083
SDG: ATI0083

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
ATI0083-01	10-KUST-MW1R-01GW	Water	09/25/10 09:20	09/27/10 12:00
ATI0083-02	10-KUST-MW2R-01GW	Water	09/25/10 10:45	09/27/10 12:00
ATI0083-03	10-KUST-MW3R-01GW	Water	09/25/10 11:45	09/27/10 12:00
ATI0083-04	10-KUST-MW4R-01GW	Water	09/25/10 10:00	09/27/10 12:00
ATI0083-05	10-KOTZ-TB-01GW	Water	09/25/10 08:00	09/27/10 12:00

Test America Anchorage Cooler Receipt Form

(Army Corps. Compliant)

Kotzebue Lot M

WORK ORDER # ATI00882 +883 CLIENT: Oasis PROJECT: Kotzebue UST Site

Date /Time Cooler Arrived 9/27/10 12 : 00 Cooler signed for by: Stephen Lam (Print name)

Preliminary Examination Phase:

Date cooler opened: [X] same as date received or ____/____/____

Cooler opened by (print) Stephen Lam (sign)

1. Delivered by [ ] ALASKA AIRLINES [ ] Fed-Ex [ ] UPS [ ] NAC [ ] LYNDEN [X] CLIENT [ ] Other:

Shipment Tracking # if applicable N/A (include copy of shipping papers in file)

2. Number of Custody Seals 2 Signed by See back Date 9/27/10

Were custody seals unbroken and intact on arrival? [X] Yes [ ] No

3. Were custody papers sealed in a plastic bag? [X] Yes [ ] No

4. Were custody papers filled out properly (ink, signed, etc.)? [X] Yes [ ] No

5. Did you sign the custody papers in the appropriate place? [X] Yes [ ] No

6. Was ice used? [ ] Yes [ ] No Type of ice: [ ] blue ice [X] gel ice [ ] real ice [ ] dry ice Condition of Ice: Solid

Temperature by Digi-Thermo Probe 3.0 °C Thermometer # Rec 5

Acceptance Criteria: 0 - 6°C

7. Packing in Cooler: [X] bubble wrap [ ] styrofoam [ ] cardboard [ ] Other:

8. Did samples arrive in plastic bags? [X] Yes [ ] No

9. Did all bottles arrive unbroken, and with labels in good condition? [X] Yes [ ] No

10. Are all bottle labels complete (ID, date, time, etc.) [X] Yes [ ] No

11. Do bottle labels and Chain of Custody agree? [X] Yes [ ] No

12. Are the containers and preservatives correct for the tests indicated? [X] Yes [ ] No

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

14. Is there adequate volume for the tests requested? [X] Yes [ ] No

15. Were VOA vials free of bubbles? [ ] N/A [X] Yes [ ] No

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

* EDB Vials unpreserved GRO/BTEX w/ HCl confirmed by client 9/28/10

Log-in Phase:

Date of sample log-in 9/27/10

Samples logged in by (print) Stephen Lam (sign)

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

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 [X]

CHAIN OF CUSTODY REPORT

Work Order #: ATL0683

CLIENT: OASIS ENVIRONMENTAL

REPORT TO: OASIS ENVIRONMENTAL
ADDRESS: 925 W 8th AVE
ANCH, AK 99504
PHONE: FAX:

INVOICE TO: OASIS ENVIRONMENTAL
C/O DAN FRANK

P.O. NUMBER:

PROJECT NAME: KOTZEBUE UST SITE
PROJECT NUMBER: 465-009
SAMPLED BY: M. PIKE / R. BURICH

TURNAROUND REQUEST in Business Days *

Organic & Inorganic Analyses: [10] STD. [7] [5] [4] [3] [2] [1] [<1]
Petroleum Hydrocarbon Analyses: [5] STD. [4] [3] [2] [1] [<1]
[OTHER] Specify:

* Turnaround Requests less than standard may incur Rush Charges.

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PRESERVATIVE: HCl	HCl	HNO3	—	REQUESTED ANALYSES: * GRO + BTEX + EDC + DCA	* DRO / RRO	* TOTAL Lead (Pb)	* EDB	MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
1 10-KUST-MW1R-01GW	09/25/10 / 0920					X	X	X	X	W	10		1
2 10-KUST-MW2R-01GW	09/25/10 / 1045					X	X	X	X	W	10	MS/MSD	2
3 10-KUST-MW3R-01GW	09/25/10 / 1145					X	X	X	X	W	10		3
4 10-KUST-MW4R-01GW	09/25/10 / 1000					X	X	X	X	W	10		4
5 10-KOTZ-TB-01GW	09/25/10 / 0800					X				W	3	TRIPBLANK	5
6													
7													
8													
9													
10													

RELEASED BY: MPike
PRINT NAME: M PIKE FIRM: OASIS DATE: 9/27/10 TIME: 0950

RECEIVED BY: [signature] PRINT NAME: FIRM: DATE: 9/27/10 TIME: 1200

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

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

ADDITIONAL REMARKS:

TEMP: 3.0°C PAGE OF

KEY : * GRO / BTEX + EDC + DCA - AK101 / SW8260
* DRO / RRO - AK102 / AK103
* TOTAL LEAD - EPA 6010 / 6020
* EDB - EPA 8011

TAL-1000(0408)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
463559

Custody Seal

DATE 9/27/10

SIGNATURE [signature]

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
463559

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
463560

Custody Seal

DATE 9/27/10

SIGNATURE [signature]

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
463560

APPENDIX F

ADEC Conceptual Site Model Human Health Scoping Form and Graphic

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Print Form

Human Health Conceptual Site Model
Scoping Form

Site Name: Crowley Kotzebue Former UST Site; BLK 4, LT 1

File Number: To Be Determined

Completed by: M. Pike, OASIS Environmental, Inc.

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

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

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

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

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

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

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

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

* bgs - below ground surface

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

a) Direct Contact -

1. Incidental Soil Ingestion

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

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

Comments:

2. Dermal Absorption of Contaminants from Soil

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

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

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

Comments:

b) Ingestion -

1. Ingestion of Groundwater

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

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

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

Comments:

2. Ingestion of Surface Water

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

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

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

Comments:

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

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

Comments:

2. Inhalation of Indoor Air

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

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

If both boxes are checked, label this pathway complete:

Comments:

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

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

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

Comments:

Inhalation of Volatile Compounds in Tap Water

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

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

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

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

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

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

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

Comments:

Direct Contact with Sediment

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

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

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

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

Comments:

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

APPENDIX A

BIOACCUMULATIVE COMPOUNDS OF POTENTIAL CONCERN

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 B-1 of 18 AAC 75.341 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 greather 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 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 OF POTENTIAL CONCERN

A chemical is identified here as sufficiently volatile and toxic for further evaluation if the Henry's Law constant is 1 x 10^{-5} atm-m^3/mol or greater, the molecular weight is less than 200 g/mole (EPA 2004a), and the vapor concentration of the pure component posed an incremental lifetime cancer risk greater than 10^{-6} or a non-cancer hazard quotient of 0.1, or other available scientific data indicates the chemical should be considered a volatile. Chemicals that are solid at typical soil temperatures and do not sublime are generally not considered volatile.

Acetone	Mercury (elemental)
Benzene	Methyl bromide (Bromomethane)
Bis(2-chloroethyl)ether	Methyl chloride (Chloromethane)
Bromodichloromethane	Methyl ethyl ketone (MEK)
Bromoform	Methyl isobutyl ketone (MIBK)
n-Butylbenzene	Methylene bromide
sec-Butylbenzene	Methylene chloride
tert-Buytlbenzene	**1-Methylnaphthalene**
Carbon disulfide	**2-Methylnaphthalene**
Carbon tetrachloride	Methyl *tert*-butyl ether (MTBE)
Chlorobenzene	**Naphthalene**
Chlorodibromomethane (Dibromochloromethane)	Nitrobenzene
Chloroethane	n-Nitrosodimethylamine
Chloroform	**n-Propylbenzene**
2-Chlorophenol	**Styrene**
1,2-Dichlorobenzene	1,1,2,2-Tetrachlorethane
1,3-Dichlorobenzene	Tetrachloroethylene (PCE)
1,4-Dichlorobenzene	**Toluene**

Dichlorodifluoromethane	1,2,4-Trichlorobenzene
1,1-Dichloroethane	1,1,1-Trichloroethane
1,2-Dichloroethane	1,1,2-Trichloroethane
1,1-Dichloroethylene	Trichloroethane
cis-1,2-Dichloroethylene	2,4,6-Trichlorophenol
trans-1,2-Dichloroethylene	1,2,3-Trichloropropane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)
1,3-Dichloropropane	Trichlorofluoromethane (Freon-11)
Ethylbenzene	**1,2,4-Trimethylbenzene**
Ethylene dibromide (1,2-Dibromoethane)	**1,3,5-Trimethylbenzene**
Hexachlorobenzene	Vinyl acetate
Hexachloro-1,3-butadiene	Vinyl chloride (Chloroethene)
Hexachlorocyclopentadiene	**Xylenes (total)**
Hexachloroethane	GRO (see note 3 below)
Hydrazine	DRO (see note 3 below)
Isopropylbenzene (Cumene)	RRO (see note 3 below)

Notes:

1. Bolded chemicals should be investigated as volatile compounds when petroleum is present. If fuel containing additives (e.g., 1,2-dichloroethane, ethylene dibromide, methyl *tert*-butyl ether) were spilled, these chemicals should also be investigated.
2. If a chemical is not on this list, and not in Tables B of 18 AAC 75.345, the chemical has not been evaluated for volatility. Contact the ADEC risk assessor to determine if the chemical is volatile.
3. At this time, ADEC does not require evaluation of petroleum ranges GRO, DRO, or RRO for the indoor air inhalation (vapor intrusion) pathway.

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Crowley Former Kotzebue UST Site; Block 4 Lot 1

Completed By: M. Pike, OASIS Environmental, Inc.

Date Completed: 12/03/2010

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

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

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

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

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

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

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	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 to subsurface — check soil		☑ Dermal Absorption of Contaminants from Soil		C/F	C/F	C/F			
	☑ Migration to groundwater — check groundwater		☐ Inhalation of Fugitive Dust							
	☑ Volatilization — check air	☑ groundwater	☐ Ingestion of Groundwater							
	☑ Runoff or erosion — check surface water		☐ Dermal Absorption of Contaminants in Groundwater							
	☐ Uptake by plants or animals — check biota		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ Other (list):	☑ air	☑ Inhalation of Outdoor Air		C/F	C/F	C/F			
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil — check soil		☐ Inhalation of Indoor Air							
	☑ Migration to groundwater — check groundwater		☐ Inhalation of Fugitive Dust							
	☐ Volatilization — check air	☑ surface water	☑ Ingestion of Surface Water							
	☐ Uptake by plants or animals — check biota		☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Other (list):		☑ Inhalation of Volatile Compounds in Tap Water							
☐ Ground-water	☑ Direct release to groundwater — check groundwater	☑ sediment	☑ Direct Contact with Sediment							
	☐ Volatilization — check air	☑ biota	☐ Ingestion of Wild or Farmed Foods							
	☐ Flow to surface water body — check surface water									
	☐ Flow to sediment — check sediment									
	☑ Uptake by plants or animals — check biota									
	☑ Other (list): OASIS Environmental, Inc									
☑ Surface Water	☑ Direct release to surface water — check surface water									
	☐ Volatilization — check air									
	☑ Sedimentation — check sediment									
	☑ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment									
	☑ Resuspension, runoff, or erosion — check surface water									
	☑ Uptake by plants or animals — check biota									
	☐ Other (list):									

Revised, 10/01/2010