



FINAL
AKIAK
2019 LONG-TERM MONITORING
REPORT
FEDERAL SCOUT READINESS CENTER
ALASKA ARMY NATIONAL GUARD
FY14 DEFENSE ENVIRONMENTAL
RESTORATION PROGRAM (DERP)

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AKARNG	Alaska Army National Guard
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
°C	degrees Celsius
COC	contaminant of concern
cy	cubic yards
DCRA	Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs
DGI	Data Gap Investigation
DRO	diesel-range organics
Eagle Eye	Eagle Eye Electric, Limited Liability Company
EPA	United States Environmental Protection Agency
°F	degrees Fahrenheit
FSRC	Federal Scout Readiness Center
GAC	granular activated carbon
GRO	gasoline-range organics
HRC	Hydrocarbon Risk Calculator
IC	institutional control
IDW	investigation-derived waste
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
LTM	long-term monitoring
mg/kg	milligram(s) per kilogram
MS/MSD	matrix spike/matrix spike duplicate
OPUS	online positioning user service
PAH	polynuclear aromatic hydrocarbons
PID	photoionization detector
PPE	personal protective equipment
RAP	Remedial Action Plan
ROD	Record of Decision
RPD	relative percent difference
RRO	residual-range organics
SGS	SGS-North America
SIM	selective ion monitoring
ug/L	microgram(s) per liter

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EXECUTIVE SUMMARY

This Long-Term Monitoring (LTM) Report describes the activities and findings of the 2019 groundwater LTM conducted at the Alaska Army National Guard (AKARNG) Federal Scout Readiness Center (FSRC) in Akiak, Alaska. This work was performed by Eagle Eye Electric, Limited Liability Company (Eagle Eye), a subsidiary of Bering Straits Native Corporation, in the summer of 2019 for AKARNG under Contract No. W91ZRU-14-C-0003.

In accordance with the Record of Decision (ROD) for the Akiak FSRC approved by Alaska Department of Environmental Conservation (ADEC) in 2013, five years of annual groundwater LTM is required following soil remediation. The primary objectives of the LTM activities at the Akiak FSRC are to monitor groundwater conditions to determine whether ADEC-approved cleanup levels are achieved and the site has been restored to conditions that are protective of human health and the environment, and to facilitate a Cleanup Complete determination without institutional controls, in accordance with ADEC regulations contained within the Alaska Administrative Code (AAC), Title 18, Chapter 75 (18 AAC 75), and ADEC's *Site Closure Memorandum* (ADEC, 2018; ADEC, 2016). Cleanup levels established in the ROD for contaminants of concern in groundwater were 1,500 micrograms per liter (ug/L) for diesel-range organics (DRO) and 5 ug/L for benzene.

Soil remediation was performed in July 2015. Three monitoring wells (MW-1, MW-2, and MW-3) were installed at the Akiak FSRC after the soil remediation activities were complete. Based on previous investigations that indicated the presence of shallow groundwater at depths of approximately 6 to 8 feet below ground surface (bgs), the monitoring wells were installed to depths of approximately 10 feet bgs. No water was observed in the monitoring wells 24 hours after installation. A second mobilization to the Akiak FSRC was performed on 1 September 2015. Less than 0.25 liters of water was purged from each MW-1 and MW-2 until the monitoring wells were purged dry. MW-3 was dry. Due to insufficient groundwater, the monitoring wells could not be developed and groundwater samples could not be collected. Insufficient water was encountered in 2016, 2017, and 2018, and no samples were collected in those field seasons.

On 26 August 2019, Eagle Eye decommissioned the three existing wells and installed three new wells at the site. During installation of the new monitoring wells, the existing boreholes from the decommissioned wells were advanced to 20 feet bgs. The predominant soil type from 10 to 20 feet bgs was silty sand. Sand was slightly damp at a depth of approximately 12 feet bgs in each, and was wet around 17 feet bgs. Permafrost was not encountered. Wells were set with the top of the screen between 13.7 and 14.6 feet bgs. New wells were developed by bailer and were sampled on 27 and 30 August 2019. Analytical results indicated that DRO was present at concentrations below the site-specific cleanup level established in the ROD. Benzene was not detected in any sample.

One additional sampling event in 2020 with results below the ROD-established cleanup levels is recommended for a cleanup complete determination.

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1.0 INTRODUCTION

This Long-Term Monitoring (LTM) Report describes the LTM activities performed at the Akiak Federal Scout Readiness Center (FSRC) in 2019. The work described in this LTM Report was performed by Eagle Eye Electric, Limited Liability Company (Eagle Eye), a subsidiary of Bering Straits Native Corporation, for the Alaska Army National Guard (AKARNG) under Contract W91ZRU-14-C-0003. The work was performed in accordance with Alaska Department of Environmental Conservation (ADEC) regulations contained within the Alaska Administrative Code (AAC), Title 18, Chapter 75 (18 AAC 75) as revised through 27 October 2018 (ADEC, 2018); ADEC's *Site Closure/Cleanup Complete Memorandum* dated 30 August 2016 (ADEC, 2016); contract documents including the task Scope of Work provided in the Performance Work Statement; the ADEC-approved 2013 Record of Decision (ROD); and local, state, and federal regulations and laws.

The ADEC file identification number for the Akiak FSRC is 2402.38.002, the Hazard Identification number is 2456, and the Exposure Tracking Model number is 73433.

1.1 Project Objectives

This report describes the fifth of five years of groundwater LTM sampling performed in 2019. The primary objectives of the LTM activities at the Akiak FSRC are to monitor groundwater conditions to determine whether ADEC-approved cleanup levels are achieved and the site has been restored to conditions that are protective of human health and the environment, and to facilitate a Cleanup Complete determination without institutional controls (IC) in accordance with ADEC regulations.

1.2 Remedial Action Report Organization

This LTM Report outlines LTM activities performed to meet the project objectives at the Akiak FSRC. The LTM Report is organized into the following sections:

- Section 1: Introduction. The introduction presents an overview of the LTM activities, including the project objectives, report organization, and regional setting and site background information.
- Section 2: Regulatory Framework. This section summarizes the applicable regulations and the groundwater cleanup levels applicable to this project.
- Section 3: Groundwater LTM 2019 Field Activities. This section describes the field methods used to collect groundwater samples.
- Section 4: Analytical Sample Results. The analytical groundwater sample results are summarized and discussed in this section.
- Section 5: Conclusions. This section presents the project conclusions and Eagle Eye's recommendations for future activities at the Akiak FSRC.
- Section 6: References. Sources referenced in the report are listed.
- Appendix A contains the report figures.
- Appendix B presents a log of photographs collected during site work.
- Appendix C contains the field notes.
- Appendix D contains the survey data collected during site work.

- Appendix E contains the lab data package and a completed ADEC data review checklist.
- Appendix F contains the ROD for the site.
- Appendix G contains the ADEC approval letter.

1.3 Site Description and Background

The following sections summarize the site location, climate, and environmental characteristics of Akiak, as well as the previous investigations and remedial actions performed at the Akiak FSRC. This information was obtained from the following sources:

- 1992 Environmental Compliance and Audit Survey (AKARNG, 1992)
- 1995 Site Investigation (CH2M HILL, 1996)
- 1998 Remedial Investigation (CH2M HILL, 1999)
- 2004 Interim Remedial Action (Ahtna Government Services Corporation, 2006)
- 2008 Secondary Site Characterization (North Wind, 2008)
- 2011 Data Gap Investigation (DGI) (CH2M HILL, 2013)
- 2013 ROD, included in Appendix A
- 2015 Remedial Action and LTM Report (Eagle Eye, 2016)
- 2016 LTM Report (Eagle Eye, 2017b)
- 2017 LTM Report (Eagle Eye, 2017a)
- 2018 LTM Report (Eagle Eye, 2018)
- Alaska Community Database Online (Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs [DCRA], 2014)

1.4 Site Location and Characteristics

Akiak is located on the west bank of the Kuskokwim River on the Yukon-Kuskokwim Delta, approximately 42 miles northeast of Bethel, Alaska (Figure 1). Total precipitation in the area averages 16 inches, with snowfall averaging 50 inches. Summer temperatures range from 42 degrees Fahrenheit (°F) to 62°F. Winter temperatures range from -2°F to 19°F (DCRA, 2014).

1.5 Akiak FSRC Property

The Akiak FSRC is located approximately 500 feet west of the Kuskokwim River (Figure 1). Map coordinates for the Akiak FSRC are Seward Meridian, Township 10 North, Range 66 West, Section 32, of the United States Geological Survey, Bethel D-6 Quadrangle. The Akiak FSRC is located at latitude 60.9121284 degrees north and longitude 161.2174846 degrees west, based on the 1984 (revised 2004) World Geodetic System datum.

A legal description of the site is: United States Survey 2243, beginning at a point lying S. 55 W., 190 feet from the southern corner of the Native Village Store; thence N. 35 W., 110 feet; thence S. 55 W., 200 feet; thence S. 35 E., 140 feet; thence N. 55 E., 100 feet; and thence N. 35 W., 20 feet, to the point of beginning; containing about 0.64 acre (CH2M HILL, 2013).

The Akiak FSRC is located along Ben Street (previously reported as Mukluk Street, the street sign in Akiak displays Ben Street), a gravel-fill road that cuts along the southern boundary of the FSRC property. A trail also passes through the northeastern corner of the property. Buildings and

businesses nearby the Akiak FSRC property include the following: the Stephen Ivan & Sons general store approximately 190 feet north; Kokarmuit Village Corporation approximately 300 feet northwest of the FSRC building; a village corporation warehouse approximately 45 feet east-northeast; Arlicaq High School approximately 1,000 feet southwest; and private residences approximately 150 feet west and 60 feet south (DCRA, 2014).

The Akiak FSRC has operated at its current location since 1960. Buildings and infrastructure currently onsite include a 20- by 60-foot prefabricated Butler building on a foundation consisting of wooden spread-footings; a 1,500-gallon, double-walled heating oil aboveground storage tank (AST) that is disconnected and located east-northeast of the FSRC; and a conex storage van also located east-northeast of the FSRC. The FSRC is currently inactive and all windows and doors of the FSRC building are boarded shut.

Infrastructure previously onsite included a 1,500-gallon, single-walled AST that was removed from the property after 1994. This AST was connected to the south side of the FSRC by underground transfer piping. A generator fueled by drummed diesel was also removed in 1992. This generator was housed in a shed supported by 55-gallon gravel-filled drums and was located between the building and the AST.

1.5.1 Geology

Akiak is underlain by discontinuous permafrost. Previous investigations at the Akiak FSRC indicate that an unconfined aquifer is present at approximately 6.5 feet below ground surface (bgs) and frozen soils have been encountered at depths ranging from 2.5 to 7 feet bgs. Soils at the Akiak FSRC are predominately gray silt and silt with sand (CH2M HILL, 2013).

1.5.2 Hydrology and Drinking Water

Akiak is located within the alluvial floodplain of the Kuskokwim River. The Kuskokwim River is the principal fresh-water body in Akiak and flows from northeast to southwest along the southern edge of the village. Erosion and flooding are major concerns in Akiak. In May of 2019, 75 to 100 feet of river bank eroded overnight. Wetlands in the area are separated by small, shallow lakes and ponds filled with water stained brown by the natural tannic acids produced by tundra plants, organic material, and peat. Consequently, the surface water is non-potable. Much of the terrain surrounding the FSRC is elevated relative to the FSRC property, and drainage tends to flow onto the property (CH2M HILL, 2013).

During the 1998 remedial investigation, groundwater was encountered at depths of approximately 6 to 8 feet bgs in temporary well points installed at the FSRC. Based on measurements collected from four temporary well points, it was determined that the shallow groundwater at the FSRC property generally flows to the east-southeast towards the Kuskokwim River at an approximate gradient of 0.00187 (CH2M HILL, 1999). An updated survey performed during the 2019 field effort confirmed the groundwater flow direction of east-southeast, but identified a steeper gradient of approximately 0.00237 (Section 3.6 and Figure 2). A comparison between surface water elevation in the Kuskokwim River and groundwater elevations in the temporary well points indicates that the shallow groundwater is hydraulically connected to the river (CH2M HILL, 1999).

Drinking water for Akiak residents is obtained from two groundwater wells located near the airport, approximately 0.4 mile southwest of the FSRC (CH2M HILL, 2013). According to well logs posted on the Alaska Department of Natural Resource Well Log Tracking System, these wells are installed to depths of 170 feet bgs and 211 feet bgs and access a water bearing zone at approximately 140 feet bgs. An additional well was installed to a depth of 40 feet bgs for use by the Bureau of Indian Affairs School, approximately 0.5 mile southwest of the FSRC. The current status of this well is unknown.

1.6 Previous Investigations and Remedial Actions

Two spills are known to have occurred at the Akiak FSRC. A large fuel spill occurred in August 1987 when the wooden stand for the former 1,500-gallon, single-walled heating oil AST collapsed and spilled up to 1,500 gallons of heating oil. The AST stand and single-walled AST were then replaced with a 1,500-gallon, double-walled heating oil AST. During an Environmental Compliance and Audit Survey completed in June 1992, a fuel release was discovered on the ground beneath the fuel supply piping between the 1,500-gallon, double-walled AST and the FSRC building. The cause and amount of this spill are unknown (CH2M HILL, 1996).

The following sections summarize previous site investigations and remedial action activities performed at the Akiak FSRC.

1.6.1 1995 Site Investigation

A site investigation was conducted in May 1995 to determine whether soil contamination was present at the former AST and new AST locations. Seven borings were advanced using a hand auger and electric jackhammer until frozen soil was encountered at depths up to 6 feet bgs. Samples were collected for field screening using infrared technology at approximate intervals of 1.5 feet. Samples for diesel-range organics (DRO) analysis by United States Environmental Protection Agency (EPA) Method 8100M were collected from the most contaminated intervals based on field screening results. DRO was detected at a maximum concentration of 12,000 milligrams per kilogram (mg/kg) at 3 feet bgs in boring B1 located north of the former AST (CH2M HILL, 1996).

1.6.2 1998 Remedial Investigation

A remedial investigation was conducted in 1998 to further delineate contamination in soil around the former AST and new AST. A total of 11 soil borings and four wells points were advanced and 15 soil gas probes were driven adjacent to the borings. Soil samples collected from the borings were analyzed for DRO by Alaska Method AK102. A subset of soil samples were also analyzed for residual-range organics (RRO) by Alaska Method AK103; gasoline-range organics (GRO) by Alaska Method AK101; benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method SW8020; and polynuclear aromatic hydrocarbons (PAH) by EPA Method SW8270 Selective Ion Monitoring (SIM). Soil gas probes were analyzed for oxygen and lower explosive limit, and groundwater from the well points was analyzed for DRO, RRO, GRO, and BTEX. Some groundwater samples were also analyzed for inorganic compounds.

Soil sample results indicated DRO concentrations up to 44,000 mg/kg at 2.5 feet bgs around the former AST location. RRO was detected at concentrations up 1,100 mg/kg and GRO was detected

at concentrations up to 1,200 mg/kg around the former AST and new AST. The soil gas sample results were determined to be inconclusive as an indicator of the extent of petroleum contamination in soil because the results indicated a general decrease in oxygen levels at depth in each boring. In the groundwater sample collected beneath the former AST location, DRO and benzene were detected at concentrations greater than the groundwater cleanup levels listed in 18 AAC 75 Table C (ADEC, 2018). Contaminant concentrations in the three well points installed upgradient and downgradient of the ASTs were either non-detect or were detected at concentrations less than the ADEC 18 AAC 75 Table C groundwater cleanup levels at the time of the investigation. Based on the vertical elevations established through a quick level survey, flow direction was identified to be generally east-southeast towards the Kuskokwim River (CH2M HILL, 1999).

1.6.3 2004 Interim Remedial Action

An interim remedial action was conducted in 2004 to remove soil with DRO concentrations greater than 12,500 mg/kg, which was the presumed soil cleanup level for the site at the time of excavation. Approximately 115 cubic yards (cy) of petroleum-contaminated soil was removed from the area around the former AST and new AST, and was transported offsite for disposal. The maximum depth of the excavation was 4.5 feet bgs. Confirmation soil samples collected from the limits of the excavation were analyzed for DRO by Alaska Method AK102, GRO by Alaska Method AK101, and BTEX by EPA Method 8021B. DRO was detected at concentrations up to 17,000 mg/kg in sample AKI012 collected along the northern excavation wall, west of the former AST, and adjacent to the FSRC building (Ahtna, 2006).

1.6.4 2008 Secondary Site Characterization

A secondary site characterization was conducted in 2008 in an effort to fully delineate remaining DRO contamination in soil. A total of 91 soil borings were advanced to maximum depths of 6 feet bgs in a grid with 5-foot spacing around the former AST and existing AST. Samples were collected for field screening using a photoionization detector (PID) at multiple depths in each boring. A total of 22 analytical soil samples were collected for DRO analysis by Alaska Method AK102. Most samples selected for laboratory analysis were collected from outside of the contaminated area along the apparent edge of contamination at intervals where headspace PID results were less than 5 parts per million. All analytical results were less than 100 mg/kg (North Wind, 2008).

1.6.5 2011 Data Gap Investigation

A DGI was conducted in July 2011 to delineate the extent of DRO contamination remaining in soil and to support risk assessment efforts. Six soil borings were advanced to depths up to 7 feet bgs using a hand auger. Groundwater was observed in several of the borings at approximately 6.5 to 7 feet bgs. Nine analytical soil samples were collected and analyzed for DRO by Alaska Method AK102, and a subset of samples were also analyzed for GRO by Alaska Method AK101, BTEX by EPA Method SW8260B, PAHs by EPA Method SW8270C SIM, extractable petroleum hydrocarbons by Washington Method Northwest EPH, and volatile petroleum hydrocarbons by Washington Method Northwest VPH.

DRO was detected at maximum concentrations of 32,000 mg/kg at 3-4 feet bgs in soil sample 11AKISB006 collected beneath the FSRC building and 21,000 mg/kg at 3-4 feet bgs in soil sample

11AKISB001 collected adjacent/south of the FSRC building. GRO was detected at a maximum concentration of 920 mg/kg and all BTEX concentrations were either non-detect or less than the most stringent ADEC Method Two cleanup levels. 1-Methylnaphthalene, 2-methylnaphthalene, and naphthalene were detected at 47 mg/kg, 56 mg/kg, and 22 mg/kg, respectively, in soil sample 11AKISB001 at a depth of 3-4 feet bgs. All other PAH concentrations were non-detect or less than the most stringent ADEC Method Two cleanup levels. The two borings (11AKISB001 and 11AKISB006) with the highest DRO concentrations were only advanced to a depth of 4 feet bgs, so the vertical extent of contamination was not determined (CH2M HILL, 2013).

The ADEC-approved Hydrocarbon Risk Calculator (HRC) was used to evaluate current cumulative risk to human health from petroleum hydrocarbons remaining at the Akiak FSRC. The cumulative risk calculations based on the assumption that all exposure pathways are complete and using maximum soil and groundwater concentrations detected at the Akiak FSRC indicate that there is an ingestion risk for aliphatic and aromatic DRO compounds. In addition, using the maximum remaining benzene concentration detected in soil (0.081 mg/kg), the HRC modeled a groundwater ingestion concentration for benzene that exceeded the groundwater ingestion regulatory criteria. The HRC indicated that the maximum RRO, toluene, ethylbenzene, xylenes, and PAH concentrations detected at the Akiak FSRC posed acceptable risk.

Site-specific cleanup levels for soil were calculated and proposed for GRO and DRO using the site-specific mass fractions and ingestion cleanup levels. A site-specific cleanup level for benzene was also calculated and proposed using an approved fate and transport model to meet migration to groundwater criteria. The site-specific soil cleanup levels proposed in the DGI were 1,400 mg/kg for GRO; 11,555 mg/kg for DRO; and 0.06 mg/kg for benzene. The DGI estimated that approximately 130 cy of petroleum-contaminated soil would need to be excavated from the Akiak FSRC in order to achieve the proposed cleanup levels (CH2M HILL, 2013).

1.6.6 2013 Record of Decision

A ROD for the Akiak FSRC was approved by ADEC in 2013 (AKARNG, 2013). The ROD established site-specific cleanup levels for the contaminants of concern (COC) presented in the DGI Report. ROD COCs indicated unacceptable risk to human health based on the HRC calculations or exceedance of groundwater ingestion criteria. The ADEC-approved site-specific cleanup levels for soil listed in the ROD were 10,000 mg/kg for DRO aliphatics; 1,555 mg/kg for DRO aromatics; 11,555 mg/kg for total DRO; 1,000 mg/kg for GRO aliphatics; 798 mg/kg for GRO aromatics; 1,400 mg/kg for total GRO; and 0.06 mg/kg for benzene. The ROD also established groundwater cleanup levels for COCs in accordance with 18 AAC 75.345 Table C (ADEC, 2018). Cleanup levels for groundwater were 1,500 micrograms per liter (ug/L) for DRO and 5 ug/L for benzene.

Remedial alternatives were selected for soil and groundwater to protect human health and meet applicable regulatory requirements. For petroleum-contaminated soil, the selected remedy was excavation of contaminated soil with petroleum concentrations greater than the site-specific cleanup levels established in the ROD and transport of the soil for offsite disposal or treatment. For groundwater, the selected remedy was LTM with ICs. The ROD prescribed groundwater sampling for DRO and benzene until the contaminant concentrations are shown to be less than the applicable Table C cleanup levels. At that time, the LTM and ICs on groundwater may be terminated with ADEC agreement.

1.6.7 2015 Remedial Action and Long-Term Monitoring

In June 2015, approximately 132 cy or approximately 167 tons of soil with DRO, GRO, and benzene concentrations exceeding the ADEC-approved site-specific cleanup levels was removed from the Akiak FSRC. Analytical results for confirmation samples collected at the final excavation limits indicated that all soil with DRO, GRO, and benzene concentrations greater than the ADEC-approved site-specific cleanup levels was removed. Total excavation depth was approximately 9 feet.

The excavated petroleum-contaminated soil was placed in 132 one-cy Super Sacks and transferred to secured, fully-enclosed storage containers. The storage containers with the excavated soil were barged to Seattle for continued transport to Arlington, Oregon for disposal at a permitted landfill. The excavation was filled with clean backfill and returned to original grade. Ground surfaces disturbed by project activities were fertilized and seeded with native grass species, and all structures were returned to conditions resembling their original state at the time of project initiation.

Three monitoring wells (MW-1, MW-2, and MW-3) were installed at the Akiak FSRC after the Remedial Action activities were complete. Based on previous investigations that indicated the presence of shallow groundwater at depths of approximately 6 to 8 feet bgs, the monitoring wells were installed to depths of approximately 10 feet bgs. No water was observed in the monitoring wells 24 hours after installation. A second mobilization to the Akiak FSRC was performed on September 1, 2015. Less than 0.25 liters of water was purged from each MW-1 and MW-2 until the monitoring wells were purged dry. MW-3 was dry. Due to insufficient groundwater, the monitoring wells could not be developed and groundwater samples could not be collected (Eagle Eye, 2016).

1.6.8 2016 Long-Term Monitoring

In August 2016, initial water level measurements were collected at the monitoring wells to determine the static water level and the total well depth. The height of the water column measured in each monitoring well ranged from 0.07 to 0.14 feet. Due to insufficient groundwater present in the monitoring wells, groundwater samples could not be collected (Eagle Eye, 2017b).

1.6.9 2017 Long-Term Monitoring

In September 2017, initial water level measurements were collected at the monitoring wells to determine the static water level to the 0.01-foot (Eagle Eye, 2017a). The total well depth was also measured to the hundredth of a foot (0.01 feet). There was no measurable water in the wells (less than 0.1 foot). Due to insufficient groundwater present in the monitoring wells, groundwater samples could not be collected.

In October 2017, Eagle Eye attempted to return to the site to collect groundwater samples from three monitoring wells at the Akiak FSRC. However, due to poor weather conditions, the team could not reach Akiak; therefore, no groundwater samples were collected in 2017 (Eagle Eye, 2017a).

1.6.10 2018 Long-Term Monitoring

In August 2018, Eagle Eye attempted to collect groundwater samples from the three monitoring wells at the Akiak FSRC (Eagle Eye, 2019b). Initial water level measurements were collected at the monitoring wells to determine the static water level to the 0.01-foot. MW-1 was dry. The total well depth was also measured to the hundredth of a foot (0.01 feet). There was no measurable water in the wells (less than 0.2 foot). Due to insufficient groundwater present in the monitoring wells, groundwater samples could not be collected.

2.0 REGULATORY FRAMEWORK

ADEC is the regulatory authority governing the cleanup of petroleum-contaminated soil and groundwater at contaminated sites in Alaska. LTM activities described in this report were conducted in accordance with 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC, 2018). Other applicable ADEC guidance documents include *Guidance on Using Institutional Controls on Oil and Other Hazardous Substances Cleanups* (ADEC, 2011), *Site Closure/Cleanup Complete Memorandum* (ADEC, 2016c), *Field Sampling Guidance* (ADEC, 2017), and *Monitoring Well Guidance* (ADEC, 2013).

The COCs in groundwater at the Akiak FSRC are established in the ROD, signed and dated 28 October 2013 (AKARNG, 2013; Appendix F). Table 2-1 summarizes the applicable groundwater cleanup levels for COCs at the Akiak FSRC.

TABLE 2-1 - GROUNDWATER CLEANUP LEVELS

Contaminant of Concern	Site-Specific Groundwater Cleanup Level from ROD
DRO	1,500 ug/L
Benzene	5 ug/L

Notes:

DRO = diesel-range organics
ug/L = micrograms per liter

3.0 GROUNDWATER LTM 2019 FIELD ACTIVITIES

Groundwater LTM activities occurred at the Akiak FSRC from 26 August to 30 August 2019. As detailed in the *Remedial Action Plan* (Eagle Eye, 2015) groundwater samples will be collected from the monitoring wells during the summer field season once per year for five years (2015 through 2019). Because the previous four years of sampling efforts have been unsuccessful, AKANG directed Eagle Eye to decommission the existing wells and replace them with deeper wells. Eagle Eye prepared a Remedial Action Plan Addendum (Eagle Eye, 2019) which was approved by ADEC in May 2019. This report summarizes the final year of groundwater LTM activities at the site.

3.1 Monitoring Well Decommissioning

The three existing wells, MW-1, MW-2, and MW-3, were decommissioned, dry decontaminated, and disposed at the Akiak landfill. A water meter level probe was lowered into the wells prior to removal; the probe verified a lack of water in each well.

3.2 Monitoring Well Installation and Development

A Geoprobe 6610 was used to direct push a 4.5-inch borehole to approximately 22, 23, and 20 feet bgs in the original boreholes from MW-1, MW-2, and MW-3, respectively. Cores were retrieved in 2-inch MacroCore sleeves and photographed, but were not logged in detail. The primary soil type was silty sand in all three borings. Sand was brown in color and was slightly damp beginning at approximately 12 feet bgs. Sand was not wet until 15 feet bgs or deeper. No odor was detected in any core, and permafrost was not encountered in any of the borings.

New wells MW1A, MW2A, and MW3A were constructed with 2" PVC and a GeoProbe slim prepack well screen (part number 220282). The screened length is 4.78 feet and was set so that the depth at which sand became fully wet in the soil cores was approximately 1.5 feet below the top of the screened interval. Wells were packed with sand, sealed with bentonite chips, and topped with backfill from the boring. A 7-inch vault was installed approximately flush to the ground and set in concrete. Well construction logs are available in Appendix C.

Due to the remoteness of the site, approval was granted by ADEC to forego the 24-hour wait time between installation and development, and between development and sampling, as outlined in the ADEC Field Sampling Guidance (ADEC, 2017). Well development was performed with a 1-inch bailer, and at least 10 borehole volumes were removed with little decrease in turbidity. Bailing was begun within an hour of well completion with care to not disturb the concrete finish. MW3A sat three days after development and prior to sampling; however, MW1A only had approximately 2.5 hours to settle before sampling commenced and MW2A had approximately 3 hours. A new and unused bailer was used for each well. Well development logs are available in Appendix C.

Pore water pressure is presumed to have been greater than expected, as the water levels measured down-well at completion of well development were 2 to 3 feet closer to the surface than the levels at which the soil cores became fully wet. This led to the screened interval being fully submerged.

3.3 Groundwater Sampling

On 27 August 2019, wells MW1A and MW2A were sampled; on 30 August 2019, well MW3A was sampled. Samples were analyzed for DRO, GRO, and benzene. The *Remedial Action Plan Addendum* [Eagle Eye, 2019a] mistakenly included GRO, a soil COC, as an analyte for the 2019 groundwater sampling event. Per low-flow sampling guidance (EPA, 2017), wells were purged until stable parameters were obtained. Flow rate was maintained below 0.5 liters per minute and drawdown was maintained at less than 0.3 feet. Water was pumped from the well by a peristaltic pump connected to dedicated, polyethylene tubing deployed with the intake set approximately one foot below the top of screened interval. The tubing was connected to a Yellow Springs Instruments (YSI) multiparameter meter with flow-through cell for measurement of the groundwater quality parameters. Six parameters were monitored to assess stabilization of the water quality: dissolved oxygen (DO), specific conductance, temperature, pH, oxidation-reduction potential (ORP), and turbidity. Water was purged from the wells until four of the parameters were stable in accordance with the *Field Sampling Guidance* (ADEC, 2017) and the LTM Plan (Eagle Eye, 2015). Purge water was collected in a 5-gallon bucket and treated immediately after equipment decontamination using a granular activated carbon (GAC) filter system (see Section 3.5). Polyethylene tubing with a section of silicone tubing (for the peristaltic pump head) was left in each well for future use.

Analytical groundwater samples were collected directly from the peristaltic pump into sample jars and were submitted to the laboratory for analysis of GRO, DRO, and benzene by Alaska Methods AK101 and AK102, and EPA Method 8260D, respectively. One sample was collected from each well and one duplicate sample was collected from well MW2A (as MW12A). Photographs of sampling activities are provided in Appendix B and groundwater sampling forms are provided in Appendix C.

3.4 Decontamination Procedures

All reusable sampling equipment, including the water level meter was decontaminated after each use by scrubbing in an Alconox and water solution, and rinsing with deionized water. Decontamination rinsate water was collected into a 5-gallon bucket and treated with a GAC system upon completion of decontamination.

3.5 Investigation-Derived Waste

Types of investigation-derived waste (IDW) generated during the completion of monitoring well installation and sampling activities included site-generated contaminated water originating from decontamination procedures, purge water, and field sampling materials such as used polyethylene tubing, personal protective equipment (PPE), and other debris.

A GAC filter system was used to treat decontamination water and monitoring well purge water. Prior and during discharge from the GAC, water was visually inspected for sheen and released back to a vegetated portion of the site. The carbon in the GAC filter was returned to Anchorage for disposal at an appropriate facility. Used PPE and other IDW solid waste was placed in plastic trash bags and disposed of as non-hazardous waste in the local landfill.

3.6 Site Surveying

A comprehensive site survey using real-time kinematic global positioning system (RTK-GPS) and level loop methods was performed while onsite. A temporary benchmark, AKIAK1, was established near the site, over which a Leica GS-15 base station was used to collect static Global Navigation Satellite System (GNSS) data for submission to the National Oceanic and Atmospheric Administration (NOAA) Online Positioning User Service (OPUS) website. The OPUS solution for AKIAK1 is included in Appendix D. Locations of site features including new monitoring wells, the FSRC building, a connex, an AST, and a downed telephone pole were surveyed using a Leica GS-18 rover mounted on a 2.0-meter rover pole. Data was collected in the Universal Transverse Meridian Zone 4 North (UTM4N) projection and the North American 1983 (NAD83) datum in meters. Collected data points were referenced to the base station at AKIAK1, and post-processed in Leica Infinity software to correct the base station location to the calculated OPUS solution. A table of collected data points is included in Appendix D. Figure 2 displays the site features.

After completion of the lateral survey, a vertical survey was conducted by level loop using a Leica LS10 digital level and barcode staff. AKIAK1 was used as the starting point and the heights of well monuments, well casings, and the surrounding ground level were measured relative to AKIAK1. Measurements were post-processed to reference them to the calculated OPUS solution elevation. Level loop data is included in Appendix D.

Using the calculated heights of top of casing, and the measured depth to groundwater, an elevation of groundwater surface was calculated for each well. Groundwater elevations, in meters above mean sea level, are displayed for each well on Figure 2. Using groundwater elevations, a groundwater flow direction was established. The elevation gradient of groundwater at the Akiak FSRC drops towards the East-Southeast at a slope of approximately 0.0024.

4.0 ANALYTICAL SAMPLE RESULTS

The following subsections summarize and discuss the analytical results for the groundwater samples collected at the Akiak FSRC. SGS North America, Inc. (SGS), an ADEC-approved laboratory located in Anchorage, Alaska, performed the analysis of the groundwater samples. The SGS analytical data report is provided in Appendix E.

4.1 Groundwater Sample Results

Three groundwater samples plus one duplicate were collected from the three monitoring wells at the Akiak FSRC. None of the samples contained COC concentrations above the site-specific cleanup levels established in the ROD (or the ADEC Table C groundwater cleanup level for GRO). The analytical results are presented in Table 4-1 and are displayed on Figure 3.

TABLE 4-1 - AKIAK FSRC GROUNDWATER SAMPLE RESULTS

ADEC Site-Specific Cleanup Levels:			5	2,200*	1,500
Monitoring Well	Sample Identification	Date	Benzene (ug/L)	GRO (ug/L)	DRO (ug/L)
MW1A	19-AKI-MW1A	27 Aug 2019	ND (0.2)	ND (50)	898
MW2A	19-AKI-MW2A	27 Aug 2019	ND (0.2)	ND (50)	874
	19-AKI-MW12A (duplicate)	27 Aug 2019	ND (0.2)	ND (50)	812
MW3A	19-AKI-MW3A	30 Aug 2019	ND (0.2)	ND (50)	385 J

Notes:

ADEC = Alaska Department of Environmental Conservation

GRO = gasoline-range organics

DRO = diesel-range organics

ug/L = micrograms per liter

ND = Not detected at the associated detection limit, which is listed in parentheses

J = the quantitation is considered estimated

* The GRO cleanup level is the 18 AAC 75 Table C value, as a site-specific cleanup level was not established for GRO in groundwater.

4.2 Data Validation Summary

The laboratory analytical data package and associated documentation records were reviewed by the project environmental scientist. The field and analytical data quality collected during the execution of this LTM event were evaluated based on an assessment of the precision, accuracy, representativeness, completeness, and comparability of the data package. A thorough data quality review was performed in accordance with Environmental Laboratory Data and Quality Assurance Requirements Technical Memorandum dated March 2009. A completed ADEC Laboratory Data Review Checklist along with the data quality assessment is provided in Appendix E.

TABLE 4-2 - DATA PACKAGE SUMMARY

Data Number	Package	Matrix
1195082		Groundwater

Chain-of-custody documentation was maintained to track collection, shipment, laboratory receipt, custody, and disposal of the samples. The sample containers were received at the laboratory intact and within the recommended temperature range of 4 degrees Celsius [°C] ±2°C. The complete laboratory data packet is included in Appendix E.

4.2.1 Analytical Methods

Table 4-3 details the analytical methods requested for all project samples.

TABLE 4-3 - ANALYTICAL METHODS

Analyte	Analytical Method	Matrix
Benzene	EPA Method 8260D	Groundwater
GRO	Alaska Method AK101	Groundwater
DRO	Alaska Method AK102	Groundwater

4.2.2 Precision

4.2.2.1 Field Duplicates

One field duplicate sample, 19-AKI-MW12A, was collected from the MW2A location (primary sample identification 19-AKI-MW2A) for assessment of the field data collection precision. Relative percent differences (RPD) between the primary and duplicate samples were calculated where at least one of the results was detected above the limit of quantitation (LOQ). The recommended RPD for detected duplicate results for water samples is 30%. The RPDs all met that criteria and overall precision was acceptable.

4.2.2.2 Laboratory Sample Duplicates and/or Spike Duplicates (Laboratory Control Samples or Matrix Spikes)

Laboratory precision was assessed by calculating the RPD between the laboratory control samples/laboratory control sample duplicates (LCS/LCSD). LCS/LCSD analyses were conducted at the required frequency of one per preparatory and analytical batch of 20 or fewer samples. There were no LCS/LCSD recovery or RPD failures affecting project-sample data quality or usability.

4.2.3 Accuracy

Accuracy was assessed by calculating the percent recovery for LCS, and surrogates. Surrogate recoveries represent the extraction efficiencies for groups of analytes within a sample.

4.2.3.1 Laboratory Quality Control Samples Percent Recoveries – Spikes (Laboratory Control Samples and/or Matrix Spikes)

All recoveries for LCS/LCSDs were within Alaska method quality control limits; therefore, no data flags were required. No samples were designated for matrix spike/matrix spike duplicate (MS/MSD), and no MS/MSD samples were prepared or analyzed.

4.2.3.2 Surrogate Percent Recoveries

Surrogate recoveries were reviewed for each project sample and analysis. Surrogate recovery failures are not considered to affect project-sample data quality when the dilution factor is greater than 10 (i.e. surrogates were “diluted out” of the sample). There were no surrogate recovery failures to report for this project, and thus project-sample data quality was not affected.

4.2.4 Representativeness

Representativeness is a qualitative parameter used to assess whether sample results are representative of true site conditions. Representativeness relative to analytical measurements is primarily influenced by application of consistent sampling and analytical methodology. Measurement representativeness is considered acceptable for this project based on an adherence to the following measures and requirements:

1. Sample collection was performed by a qualified environmental professional as required by 18 AAC 75 (ADEC, 2018) using methods listed in the Remedial Action Plan (RAP) (Eagle Eye, 2015).
2. To minimize the potential for cross-contamination, new disposable collection equipment and new, pre-cleaned containers were used as specified in the RAP. Field instruments and measuring devices were calibrated daily and operated in accordance with the manufacturer recommendations.
3. Samples were labeled and uniquely identified in accordance with the RAP, and field records indicate the location from which each field sample was collected.
4. Laboratory protocol was performed in accordance with laboratory standard operating procedures.

4.2.5 Comparability

Comparability is a qualitative indicator of the confidence with which one data set can be compared to another. Project data-set comparability is considered acceptable based on the following:

1. Sample collection, documentation, and handling were performed in accordance with the RAP (Eagle Eye, 2015).
2. Standard analytical methods were used in accordance with the LTM Plan (Eagle Eye, 2015). Analytical results were reported in standard units.
3. Laboratory analyses were performed in accordance with the analytical method and laboratory quality assurance/quality control procedures.
4. Samples were prepared and analyzed within the method-required holding time.

Field instruments and measuring devices were calibrated daily and operated in accordance with the manufacturers' recommendations.

4.2.6 Completeness

All data necessary to complete a Level II data quality assurance summary was provided. No data were rejected, so 100% of the results are usable indicating completeness of 100%.

4.2.7 Sensitivity

4.2.7.1 Limits of Detection

All reporting limits were below the site-specific cleanup level, and there were no non-detect results with reporting limits over the cleanup level. There was no effect on data quality or usability.

4.2.7.2 Blank Results (Trip Blanks and Method Blanks)

One trip blank sample was analyzed for GRO and for benzene. Both analytes were non-detect in the trip blank sample, which indicates no interference from outside sources that may have occurred during outbound or inbound transport of the samples, glassware, and preservatives.

The laboratory analyzed method blanks for each preparatory batch, to test for laboratory-based sample contamination. Method blanks were analyzed at the required frequencies of one per matrix, analysis, and 20 or fewer samples. None of the sampled analytes were detected in method blanks for preparatory batch 1195082.

4.2.8 Data Summary

Based on the review completed on the laboratory data package, no data were rejected. All sample results are considered to be valid with no additional data qualifiers assigned. All analytical data is considered usable for the purpose of evaluating the presence or absence and magnitude of the suspected site contaminants.

5.0 CONCLUSIONS

In 2019, three monitoring wells were decommissioned, three new monitoring wells were installed, developed, and sampled at the AKARNG FSRC site in Akiak, Alaska. Sample results indicate that concentrations of DRO and benzene are either nondetect or less than the cleanup levels established in the ROD. One additional sampling event in 2020 with results below the cleanup levels is recommended before a cleanup complete determination can be made.

6.0 REFERENCES

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- Eagle Eye Electric, LLC (Eagle Eye), 2019a. Remedial Action Work Plan Addendum, Akiak Federal Scout Readiness Center, Final, 11 July 2019.
- Eagle Eye, 2018. Akiak 2019b Long Term Monitoring Report, Federal Scout Readiness Center, Akiak, Alaska, February 2019.
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- Eagle Eye, 2017b. Akiak 2016 Long-Term Monitoring Report, Federal Scout Readiness Center, Akiak, Alaska, 10 October 2017.
- Eagle Eye, 2016. Remedial Action Report, Federal Scout Readiness Center, Akiak, Alaska, 10 February 2016.

Eagle Eye, 2015. Remedial Action Plan, Federal Scout Readiness Center, Akiak, Alaska, 15 February 2015.

North Wind, Inc., 2008. Secondary Site Characterization Report, Federal Scout Armory, Akiak, Alaska, December 2008.

U.S. Environmental Protection Agency (EPA), 2017. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. September 2017 Revision #4. EPA Document Number EQASOP-GW4.

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APPENDIX A FIGURES

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C:\Users\bramsav\Desktop\Akiak_docs\GIS\MXD\Akiak Fig 1 - Site Loc\Vic.mxd bramsav

Note:
 Street names have been updated on this map to match street signs on the ground in Akiak. Previous reports (and online map sources) have mistakenly labeled Ben Street as Mukluk Street.



Scale
 1:1,500
 1 inch = 125 feet

PROJECT LOCATION AND VICINITY
AKIAK FEDERAL SCOUT READINESS CENTER
ALASKA ARMY NATIONAL GUARD

Akiak, Alaska



EAGLE EYE
 Airing Smalls Company

PROJECT MANAGER

Jennifer Wehrmann

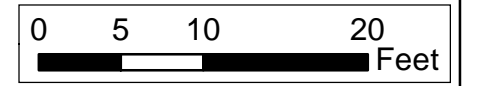
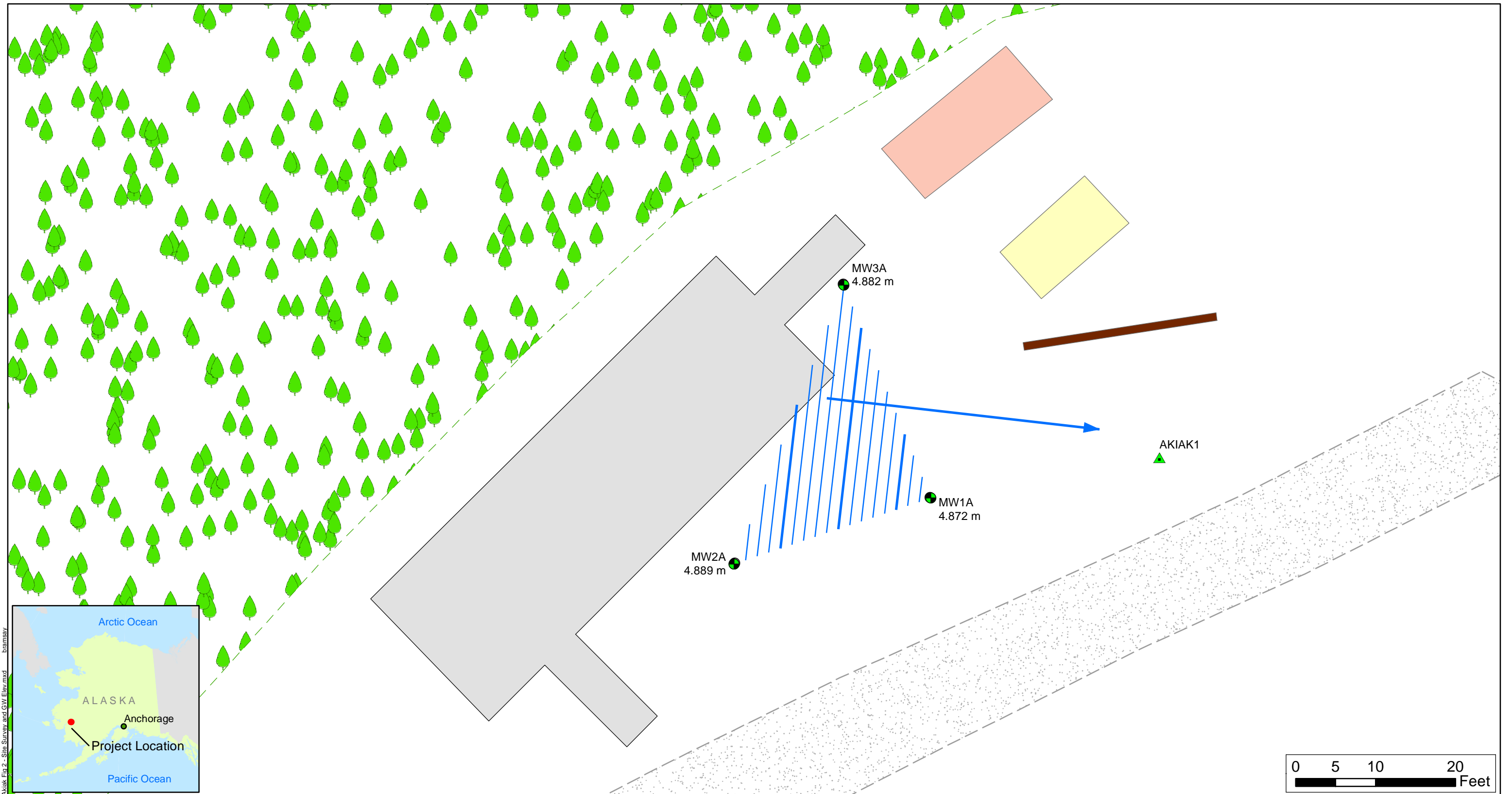
DATE

24 Oct 2019

FIGURE NUMBER

1

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- Monitoring Well
- Decommissioned Monitoring Well
- Temporary Survey Benchmark
- Approximate Groundwater Flow Direction
- 0.005m Groundwater Contour
- 0.001m Groundwater Contour
- Wooded area
- Scout Readiness Center
- Aboveground Storage Tank
- Connex
- Downed Power Pole
- Road

Notes:
Monitoring well labels include well identifier and groundwater elevation in meters above mean sea level (NAVD88).

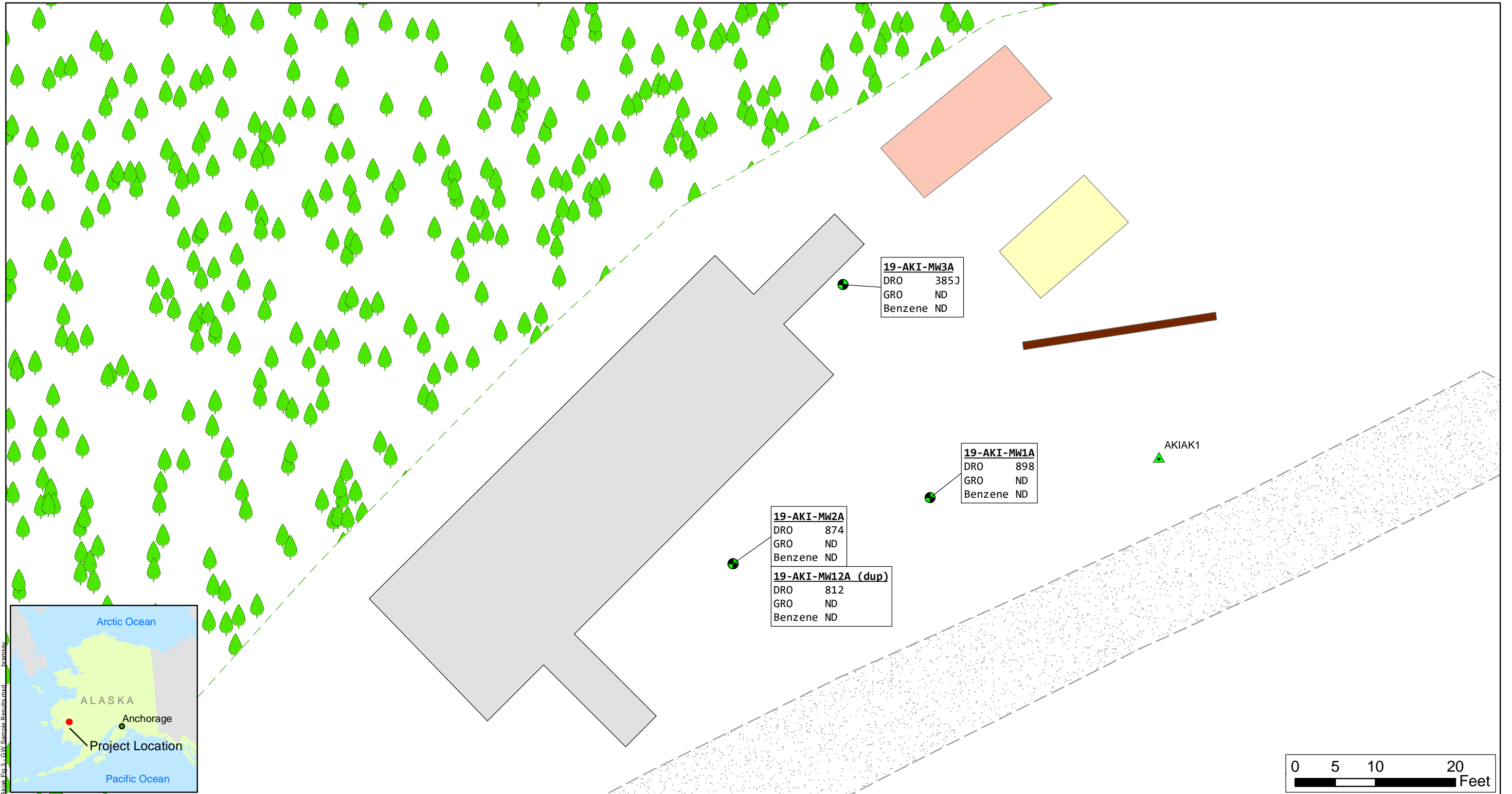
Scale
1:140
1 inch = 12 feet

2019 SITE SURVEY AND GROUNDWATER ELEVATIONS
AKIAK FEDERAL SCOUT READINESS CENTER
ALASKA ARMY NATIONAL GUARD
Akiak, Alaska

EAGLE EYE <small>A Seiberg Straits Company</small>	PROJECT MANAGER Jennifer Wehrmann	DATE 24 October 2019	FIGURE NUMBER 2
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C:\Users\bramsay\Desktop\AKIAK\Fig 2 - Site Survey and GW Elevations.mxd

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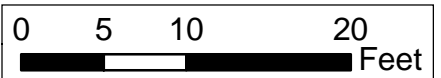
19-AKI-MW3A
 DRO 385J
 GRO ND
 Benzene ND

19-AKI-MW1A
 DRO 898
 GRO ND
 Benzene ND

19-AKI-MW2A
 DRO 874
 GRO ND
 Benzene ND

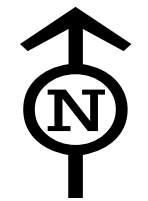
19-AKI-MW12A (dup)
 DRO 812
 GRO ND
 Benzene ND

AKIAK1



- Monitoring Well - no exceedance
- Temporary Survey Benchmark
- Wooded area
- Scout Readiness Center
- Aboveground Storage Tank
- Connex
- Downed Power Pole
- Road

Notes:
 ND = Not detected
 J = Result is approximate
 All results reported in ug/L
 Site-specific groundwater
 cleanup level for DRO
 is 1,500 ug/L.



Scale
 1:140
 1 inch = 12 feet

2019 GROUNDWATER MONITORING SAMPLE RESULTS
AKIAK FEDERAL SCOUT READINESS CENTER
ALASKA ARMY NATIONAL GUARD
 Akiak, Alaska

EAGLE EYE <small>A Seibing Straits Company</small>	PROJECT MANAGER	DATE	FIGURE NUMBER
	Jennifer Wehrmann	24 October 2019	3

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**APPENDIX B
PHOTOGRAPH LOG**

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**PHOTOGRAPH LOG
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<u>Photo Number</u>	<u>Page</u>
Photo No. 1 - 26 August 2019 Drillers work to advance the boring for MW2A. View facing North.	B-1
Photo No. 2 - 26 August 2019 The predominant soil type at the site was brown sand, such as this core from the 15-20 feet bgs interval from MW2A. View facing down.	B-1
Photo No. 3 - 26 August 2019 Still shot from video of the drillers trying to separate the sample holder from the outer tooling at MW1A. View facing East.	B-2
Photo No. 4 - 27 August 2019 Sampling MW3A. View facing Northwest.	B-2
Photo No. 5 - 27 August 2019 Survey base station set up over temporary benchmark AKIAK1. View facing Southeast.	B-3

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Photo No. 1 – 26 August 2019
Drillers work to advance the boring for MW2A. View facing North.



Photo No. 2 – 26 August 2019
The predominant soil type at the site was brown sand, such as this core from the 15-20 feet below ground surface interval from MW2A. View facing down.



Photo No. 3 – 26 August 2019

Still shot from video of the drillers trying to separate the sample holder from the outer tooling at MW1A. View facing East.



Photo No. 4 – 27 August 2019

Sampling MW3A. View facing Northwest.



Photo No. 5 – 27 August 2019

Survey base station set up over temporary benchmark AKIAK1. View facing Southeast.

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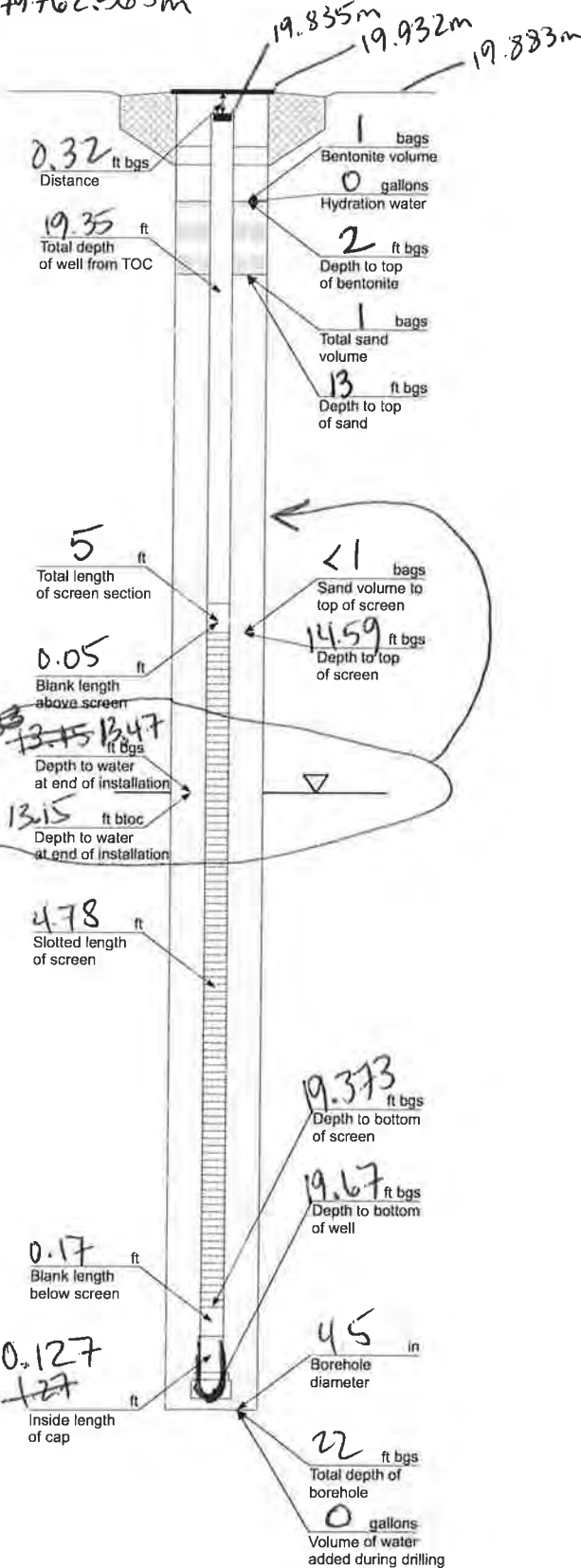
APPENDIX C
FIELD NOTES

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379762.505m

4N

L7 TOC
ELL. HT.



Vault 7"
Size:
Manufacturer: MERRISON 7-418AA

Concrete around Vault
Type: MULTI PURPOSE CONCRETE MIX
Manufacturer: ASEG

Well Riser
Size: 2-inch Sch 40, ASTM F480 flush threads
Material: PVC
Manufacturer: GEDPROBE

Well Screen
Size: 0.020-inch slotted, 2-inch Sch 40, ASTM F480 flush threads
Material: PVC, MESH
Manufacturer: GEDPROBE

End Cap
LASCO 1 1/4"
SCH 40 D246b

Bentonite (sodium)
Size: 3/8-inch chips, 50 lb bag
Manufacturer: PERMA PLUG

Sand WHALE GRAIN
Size: 50-lb bag
Manufacturer: Colorado Silica PIONEER SANDS

Sand Utilization for 100% Open Hole (No Collapse)

Borehole Diameter		Sand Volume (2-inch Well)		
Inches	Feet	Bags/ft	Bags/11 ft	ft/Bag
<u>4.5</u>	0.38	0.18	1.9	5.7
6	0.50	0.35	3.8	2.9
8	0.67	0.65	7.1	1.5

Note:
50-lb bag = 0.504 ft³ based on a porosity of 0.4, corresponding to a bulk density of 99.3 lbs/ft³

Other Notes

SAND: 1
BENTONITE: 1
CEMENT: 1

SAND WAS BARELY DAMP IN CORE SLEEVE BETWEEN 10-15 ft bgs, BUT FULLY WET AROUND 17 ft bgs. ENOUGH WATER PRESSURE PUSHED WATER LEVEL IN WELL TO ABOUT 13.5 ft bgs. LEVEL VERY SIMILAR WHEN RE-CHECKED ON 8/30/19. -BR



EAGLE EYE
A Bering Strichs Company

Well Construction

Flush Mount, Water Table Screen

DRILLER: DISCOVERY - SONI

EQUIPMENT: GEOPROBE 6610

GEOLOGIST: BRAD RAMSAY 6755030.732m

EASTING: 379752.757m NORTHING: 6755029.180m

PROJECT: AKIAK SCOUT CENTER ITM

WELL ID: MW2A

DATE(S) INSTALLED: 26 AUG 2019

NAD83

BOREHOLE ID: MW2

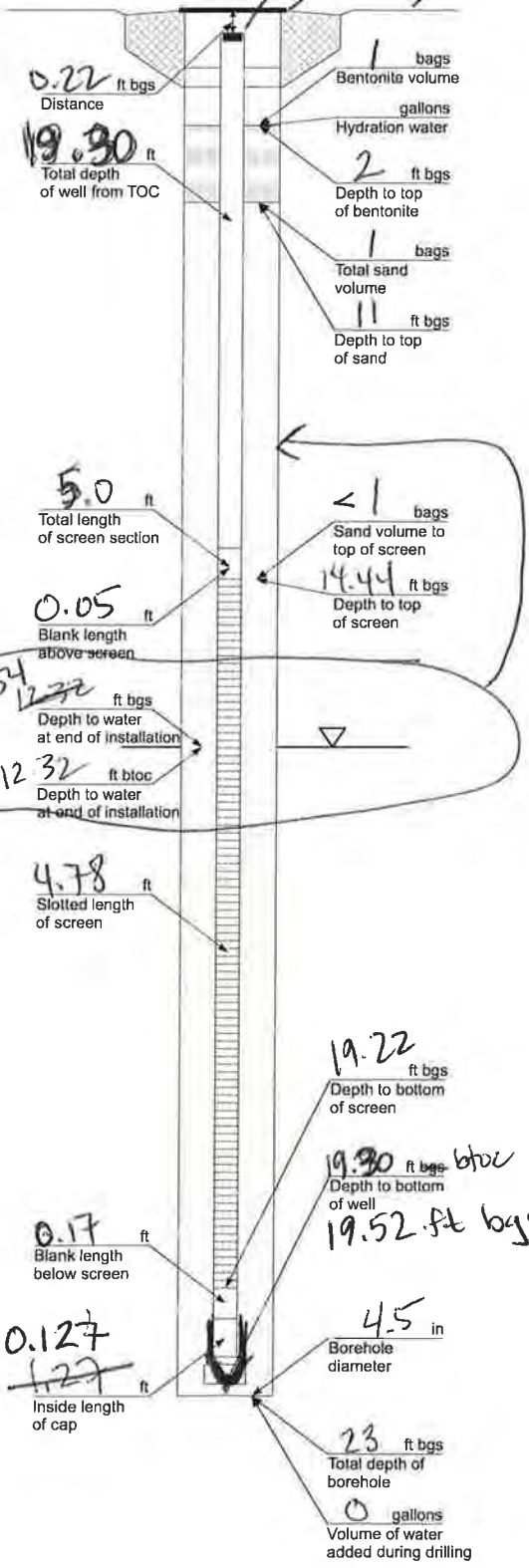
SYSTEM, UNITS: UTM-6M meters ELEVATION, UNITS, DATUM: 19.608m NAVD88

379755.064m

19.608m
19.674m
19.662m

4N

4 TOC
ELL: HT



Vault
Size: 7"
Manufacturer: MORRISON 7-413AA

Concrete around Vault
Type: MULTI PURPOSE CONCRETE MIX
Manufacturer: ASEG

Well Riser
Size: 2-inch Sch 40, ASTM F480 flush threads
Material: PVC
Manufacturer: GEO PROBE

Well Screen
Size: 0.020-inch slotted, 2-inch Sch 40, ASTM F480 flush threads
Material: PVC, MESH
Manufacturer: GEO PROBE

End Cap
LASCO 1 1/4"
SCH 40 D2466

Bentonite (sodium)
Size: 3/8-inch chips, 50 lb bag
Manufacturer: PERMA PLUS

Sand
Size: WHOLE GRAIN, 50-lb bag
Manufacturer: Colorado Silica

PIONEER SANDS

Sand Utilization for 100% Open Hole (No Collapse)

Borehole Diameter		Sand Volume (2-inch Well)		
Inches	Feet	Bags/ft	Bags/11 ft	ft/Bag
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6	0.50	0.35	3.8	2.9
8	0.67	0.65	7.1	1.5

Note:
50-lb bag = 0.504 ft³ based on a porosity of 0.4, corresponding to a bulk density of 99.3 lbs/ft³.

Other Notes

SAND: 1 BAG
BENTONITE: 1 BAG
CEMENT: 1 BAG

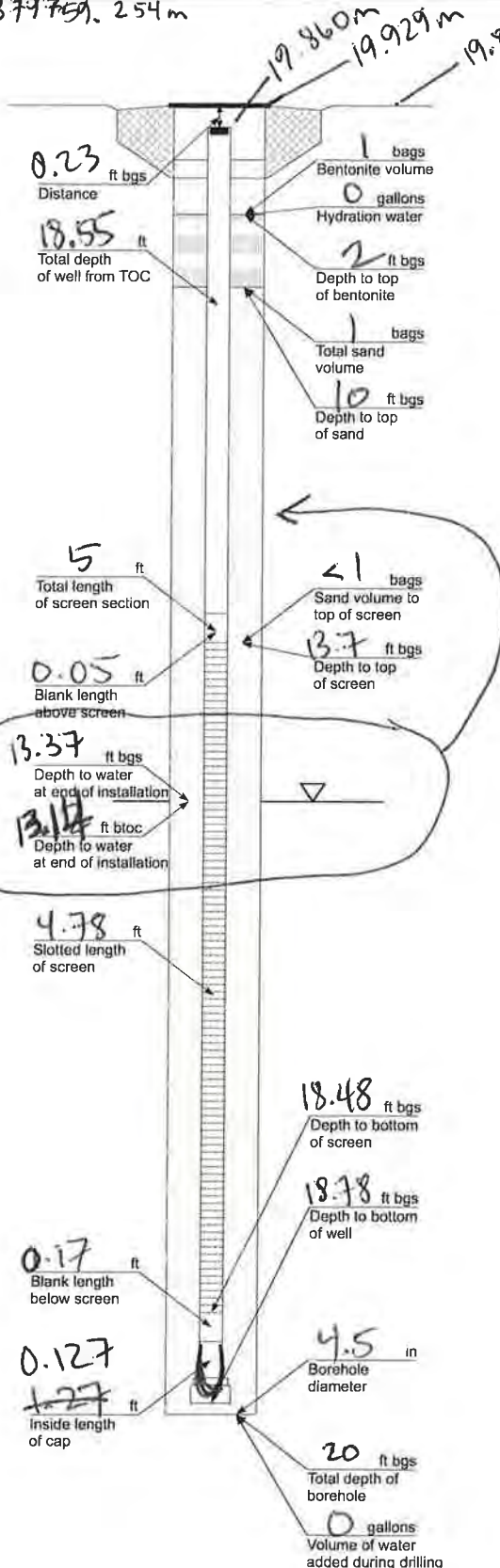
SAND WAS BARELY DAMP IN CORE SLEEVE BETWEEN 10-15 FT bgs, BUT FULLY WET AROUND 17-FT bgs. ENOUGH WATER PRESSURE TO PUSH LEVEL UP TO 12.5 FT bgs INSIDE WELL. LEVEL VERY SIMILAR WHEN RE-CHECKED ON 8/30/19. BR

K:\ACTIVE Contracts\EEEE 1141114 5003 W61ZRLJ-14-C-0003 Environmental Remediation Srvs\Submittals\005 Site Spec for Plans\AKIAK\CRAP Address\01 Field Form 2013 07 26

379756.254m

4N

↳ TOC
Elev. ht.



Vault
Size: 7"
Manufacturer: MORRISON 7-418AA

Concrete around Vault
Type: MULTI-PURPOSE CONCRETE MIX
Manufacturer: ASEG

Well Riser
Size: 2-inch Sch 40, ASTM F480 flush threads
Material: PVC
Manufacturer: GEOPROBE

Well Screen
Size: 0-020-inch slotted, 2-inch Sch 40, ASTM F480 flush threads
Material: PVC/MESH PRE-PACK
Manufacturer: GEO-PROBE

End Cap
LASCO 1 1/4"
SCH 40 D2466

Bentonite (sodium)
Size: 3/8-inch chips, 50 lb bag
Manufacturer: PERMA-PLUG

Sand WHOLE GRAIN
Size: 50-lb bag
Manufacturer: Colorado Silica PIONEER SANDS

Sand Utilization for 100% Open Hole (No Collapse)

Borehole Diameter		Sand Volume (2-inch Well)		
Inches	Feet	Bags/ft	Bags/11 ft	ft/Bag
<u>4.5</u>	0.38	0.18	1.9	5.7
6	0.50	0.35	3.8	2.9
8	0.67	0.65	7.1	1.5

Note:
50-lb bag = 0.504 ft³ based on a porosity of 0.4, corresponding to a bulk density of 99.3 lbs/ft³.

Other Notes

SAND: 1 BAG
BENTONITE: 1 BAG
CONCRETE: 1 BAG
SAND WAS BARELY DAMP IN 10-15 FT BAGS
CORE SLEEVE, BUT TOTALLY WET @
ABOUT 16 FT BAGS. ENOUGH WATER
PRESSURE FROM BELOW PUSHED WATER
LEVEL IN WELL TO ABOUT 13 FT BAGS
LEVEL WAS VERY SIMILAR WHEN
RE-CHECKED ON 8/30/19. -BR

Well Development Data Sheet



Site Name SCOUT READINESS CENTER	Event AKIAK LTM	Well ID MW1A	Project Number 1145003
Weather Conditions MOSTLY SUNNY ~60F	PID Readings of Total VOCs (ppm) Ambient <u>0</u> Breathing Zone <u>0</u> In Well <u>0</u>		Date 27 AUG 19
Developer Initials BR			

BUGS!

Well Information

Well Material / Size (in) PVC 2" SS / 2	Drilling Water Added (gal) 0	As-Built TD of Casing (ft) 19.35	Borehole Diameter(in) / Gallons per linear foot (gal/ft) 4.5 / 0.362 6 / 0.555 8 / 0.898 10 / 1.34 (filter pack porosity = 0.3)
Depth to Product (ft TOC) Ø	Depth to GW (ft TOC) 13.15	Initial TD of Casing (ft) 19.35	Product Thickness (ft) and Volume Recovered (mL) Ø

Borehole Vol. (BV) water table well = (TD of casing - depth to water) * gal/ft; submerged well = (TD of casing - Depth Top Filter Pack * gal/ft
 Min Purge Vol. = 2 * Added Water + 3 * BV Max Purge Vol. = 2 * Added Water + 10 * BV

BV = (19.35 ft - 13.15 ft) * 0.362 gal/ft = 2.244 gal (* 3.785 L/gal = _____ L)

Min Purge Vol. = 2 * 0 gal + 3 * 2.244 gal = 6.73 gal (* 3.785 L/gal = _____ L)

Max Purge Vol. = 2 * 0 gal + 10 * 2.244 gal = 22.44 gal (* 3.785 L/gal = _____ L)

Well Purging Information

Start Time 1025	Finish Time 1140	Final TD of Casing (ft) 19.35	Equipment Used for Purging sprinkler pump w/ surge block submersible pump peristaltic pump BAILER		
Color Clear Cloudy Brown Other:	Odor None Moderate Faint Strong	Sheen Yes No	Purged Dry Yes No	Stabilization Meters YSI Multi Meter Hach Turbidimeter	Pump Intake Depth (ft btoc) (during stabilization)
Purging reached: Stability <input checked="" type="checkbox"/> Max Vol.		Purge water was: Treated Stored Other		Note: GAC + DISCHARGE	

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						Water Level (feet btoc)
	Change	Total	± 1.0 °C	± 3%	± 10% or 0.3 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ± 1 NTU	
			Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	

BAILED ABOUT 76 GALLONS. WATER STILL APPY MURKY. WILL LET SETTLE A WHILE BEFORE SAMPLING. GW LEVEL OF 13 FT BTOC UNEXPECTED AS SAND WAS BARELY DAMP IN 10-15 FT INTERVAL AND WET BELOW THAT.

Suggested Notation

"—" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable

_____ Additional observations on back

Well Development Data Sheet



<u>Site Name</u> SCOUT READINESS CENTER		<u>Event</u> AKIAK ATM		<u>Well ID</u> MN 2A	<u>Project Number</u> 1145003
<u>Weather Conditions</u> PRY CWDY TO GVC LT WIND ~SS-60°F		<u>PID Readings of Total VOCs (ppm)</u> Ambient 0 Breathing Zone 0 In Well 0		<u>Date</u> 26 AUG 2019	<u>Developer Initials</u> BR

Well Information

<u>Well Material / Size (in)</u> PVC 12 SS / 2	<u>Drilling Water Added (gal)</u> 0	<u>As-Built TD of Casing (ft)</u> 19.30	<u>Borehole Diameter(in) / Gallons per linear foot (gal/ft)</u> 4.5 / 0.362 6 / 0.555 8 / 0.898 10 / 1.34 (filter pack porosity = 0.3)
<u>Depth to Product (ft TOC)</u> —	<u>Depth to GW (ft TOC)</u> 12.32	<u>Initial TD of Casing (ft)</u> 19.30	<u>Product Thickness (ft) and Volume Recovered (mL)</u> 0

Borehole Vol. (BV) water table well = (TD of casing - depth to water) * gal/ft; submerged well = (TD of casing - Depth Top Filter Pack *gal/ft
 Min Purge Vol. = 2 * Added Water + 3 * BV Max Purge Vol. = 2 * Added Water + 10 * BV

BV = (19.30 ft - 12.32 ft) * 0.362 gal/ft = 2.527 gal (* 3.785 L/gal = _____ L)

Min Purge Vol. = 2 * 0 gal + 3 * 2.527 gal = 7.58 gal (* 3.785 L/gal = _____ L)

Max Purge Vol. = 2 * 0 gal + 10 * 2.527 gal = 25.27 gal (* 3.785 L/gal = _____ L)

Well Purging Information

<u>Start Time</u> 1930 8/26 To ~2000	<u>Finish Time</u> START ~0830 0930 8/27	<u>Final TD of Casing (ft)</u> 19.30	<u>Equipment Used for Purging</u> sprinkler pump w/ surge block submersible pump peristaltic pump BAILER		
<u>Color</u> Clear Cloudy <u>Brown</u> Other:	<u>Odor</u> <u>None</u> Moderate Faint Strong	<u>Sheen</u> Yes <u>No</u>	<u>Purged Dry</u> Yes <u>No</u>	<u>Stabilization Meters</u> YSI Multi Meter Hach Turbidimeter	<u>Pump Intake Depth (ft btoc)</u> (during stabilization)
Purging reached: Stability <u>Max Vol</u>		Purge water was <u>Treated</u> Stored Other Note: <u>GAC + DISCHARGE</u>			

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						Water Level (feet btoc)
			± 1.0 °C	± 3%	± 10% or 0.3 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	
	BAILED ~ 28 GALLONS. LOOKS LIKE CHOCOLATE MILK STILL. SAND WAS DAMP IN 10-15 FT AND WET IN 15-20 FT, SO WELL WAS SET AT THAT INTERVAL, BUT ENOUGH PRESSURE PUSHING WATER UP TO ABOUT 12 FT GAS INSIDE WELL.								
	WILL LET SIT WHILE BAILING NEXT WELL BEFORE SAMPLING.								

Suggested Notation 13 15 19.35
 "—" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable
 _____ Additional observations on back

Well Development Data Sheet



Site Name SCOUT READINESS CENTER		Event AKIAK LTM		Well ID MW3A		Project Number 1145003	
Weather Conditions OCNL - RA, PLY CLOT TOWC		PID Readings of Total VOCs (ppm) Ambient <input type="radio"/> Breathing Zone <input type="radio"/> In Well <input type="radio"/>		Date 27 AUG 19		Developer Initials BR	

Well Information

Well Material / Size (in) PVC 2 SS 1/2	Drilling Water Added (gal) Ø	As-Built TD of Casing (ft) 18.55	Borehole Diameter(in) / Gallons per linear foot (gal/ft) 4.5 / 0.362 6 / 0.555 8 / 0.898 10 / 1.34 (filter pack porosity = 0.3)			
Depth to Product (ft TOC) /	Depth to GW (ft TOC) 13.14	Initial TD of Casing (ft) 18.55	Product Thickness (ft) and Volume Recovered (mL)			

Borehole Vol. (BV) water table well = (TD of casing - depth to water) * gal/ft; submerged well = (TD of casing - Depth Top Filter Pack * gal/ft
 Min Purge Vol. = 2 * Added Water + 3 * BV Max Purge Vol. = 2 * Added Water + 10 * BV
 BV = (18.55 ft - 13.14 ft) * 0.362 gal/ft = 1.95 gal (* 3.785 L/gal = _____ L)
 Min Purge Vol. = 2 * gal + 3 * 5.88 gal = 5.88 gal (* 3.785 L/gal = _____ L)
 Max Purge Vol. = 2 * gal + 10 * 1.95 gal = 19.58 gal (* 3.785 L/gal = _____ L)

Well Purging Information

Start Time 1340		Finish Time 1445		Final TD of Casing (ft) 18.55		Equipment Used for Purging sprinkler pump w/ surge block submersible pump peristaltic pump BAILER	
Color Clear Cloudy Brown Other:		Odor None Moderate Faint Strong		Sheen Yes <input type="radio"/> No <input checked="" type="radio"/>		Purged Dry Yes <input type="radio"/> No <input checked="" type="radio"/>	
Purging reached: <input checked="" type="radio"/> Stability <input type="radio"/> Max Vol.				Purge water was: <input checked="" type="radio"/> Treated <input type="radio"/> Stored <input type="radio"/> Other		Note: GAC + DISCHARGE	

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						Water Level (feet btoc)
			± 1.0 °C	± 3%	± 10% or 0.3 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	
Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)		

Suggested Notation
 "—" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable _____ Additional observations on back



WELL PURGE AND SAMPLING FORM

WELL ID: MW1A SHEET: 1 of 1

PROJECT NAME <u>AKIAK LTM</u>	WELL CONDITION <u>NEW</u>	DIAMETER <u>2"</u>	O.D. <u>2.375"</u>	I.D. <u>2.067"</u>	VOLUME (GAL/LIN FT) <u>0.17</u>
CLIENT <u>AKANG</u>	DAMAGE PRESENT <u>NONE</u>				
SITE <u>AKIAK SCOUT READINESS CENTER</u>	DEPTH TO WATER (FROM TOC) <u>13.17</u>	<u>3"</u>	<u>3.5"</u>	<u>3.068"</u>	<u>0.38</u>
SAMPLER <u>BDR</u>	DEPTH TO BASE (FROM TOC) <u>19.35</u>	<u>4"</u>	<u>4.5"</u>	<u>4.026"</u>	<u>0.66</u>
WEATHER/TEMPERATURE <u>MSLY CLOUDY, OVC, CEN-RA, LOOF</u>	HEIGHT OF WATER COLUMN <u>6.18</u>	<u>6"</u>	<u>6.625"</u>	<u>6.065"</u>	<u>1.5</u>
DATE <u>27 AUG 2019</u>	WELL VOLUME <u>1.05 GAL</u>	<u>8"</u>	<u>8.625"</u>	<u>7.981"</u>	<u>2.6</u>
START TIME <u>START PUMP 1430 START SAMPLE 1525 1945</u>	<u>3.98L</u>				
END TIME <u>END PUMP 1530 END SAMPLE 1530 1550</u>					

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): GW

SAMPLE COLLECTED WITH: Bailer Submersible ~~Bladder~~ Peristaltic Other (specify) _____

MADE OF: Stainless Steel PVC 2" Teflon Disposable LDPE

SAMPLING DECON PROCEDURE: DEDICATED TUBING, WATER DEPTH METER = ALCONOX, diH2O

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) CLEAR, NO ODOR, LOW TURBIDITY, NO PRODUCT

CRITERIA FOR STABLE PARAMETERS:

Parameter	Stability Criteria
Temperature	± 3%
pH	± 0.1
Conductivity	± 3%
ORP	± 10mV
Dissolved Oxygen	± 10%
Turbidity	± 10%

SAMPLING NOTES:

2x 250ML AMBER + HCL DRO
6x 40ML VOA + HCL GPC/BENZ
PUMP ON 1430

TUBING DEPTH 15.5 FE b70c
FLOW RATE 0.3L/MIN

FINAL DEPTH OF WELL 19.44 FINAL DEPTH TO GW 13.28

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallons) L	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP (mV)	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
<u>1430</u>	<u>0</u>	<u>PUMP</u>	<u>ON</u>									
<u>1445</u>	<u>~5L</u>	<u>13.27</u>	<u>0.1</u>	<u>5.8</u>	<u>6.24</u>	<u>465.9</u>	<u>-130.0</u>	<u>32.5</u>	<u>4.05</u>	<u>31.95</u>	<u>CLR</u>	<u>NONE</u>
<u>1500</u>	<u>~10L</u>	<u>13.27</u>	<u>0</u>	<u>5.9</u>	<u>6.27</u>	<u>474.7</u>	<u>-190.0</u>	<u>24.7</u>	<u>3.07</u>	<u>17.11</u>	<u>CLR</u>	<u>—</u>
<u>1525</u>	<u>~10.9L</u>	<u>13.28</u>	<u>6.01</u>	<u>5.8</u>	<u>6.30</u>	<u>478.0</u>	<u>-203.8</u>	<u>22.9</u>	<u>2.87</u>	<u>9.91</u>	<u>CLR</u>	<u>—</u>
<u>1510</u>	<u>~11.8L</u>	<u>13.28</u>	<u>0</u>	<u>5.6</u>	<u>6.33</u>	<u>477.7</u>	<u>-208.2</u>	<u>22.0</u>	<u>2.74</u>	<u>9.51</u>	<u>CLR</u>	<u>—</u>
<u>1515</u>	<u>~12.7L</u>	<u>13.28</u>	<u>0</u>	<u>5.5</u>	<u>6.29</u>	<u>478.9</u>	<u>-213.2</u>	<u>20.8</u>	<u>2.62</u>	<u>12.06</u>	<u>CLR</u>	<u>—</u>
<u>1520</u>	<u>~13.6L</u>	<u>13.28</u>	<u>0</u>	<u>5.4</u>	<u>6.29</u>	<u>477.8</u>	<u>-216.9</u>	<u>20.2</u>	<u>2.54</u>	<u>9.70</u>	<u>CLR</u>	<u>—</u>
		<u>— ALL PARAMETERS STABLE! —</u>										
<u>1525</u>	<u>—</u>	<u>BEGIN SAMPLES</u>										
<u>1530</u>	<u>—</u>	<u>END SAMPLES</u>										
		<u>— REALIZED SAMPLED FROM YSI FLOW CELL. RESAMPLED ENDING 1550 —</u>										

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification	Additional Sample	Time	Identification
<u>DRO/RO</u>	<u>1550</u>	<u>19-AKI-MW1A</u>	<u>Duplicate</u>	<u>/</u>	<u>/</u>
<u>GRO/BTEX</u>	<u>↓</u>	<u>↓</u>	<u>/</u>	<u>/</u>	<u>/</u>
<u>EPH/VPH</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
<u>PAH</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
<u>Other</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>

1439:00 1441:00 600ML = 300ML/min = 0
1L @ 1442:20



WELL PURGE AND SAMPLING FORM

WELL ID: MW2A

SHEET: 1 of 1

PROJECT NAME	AKIAK LTM	WELL CONDITION	NEW	DIAMETER	2"	O.D.	2.375"	I.D.	2.067"	VOLUME (GAL/LIN FT)	0.17
CLIENT	AKNG	DAMAGE PRESENT	NONE	DEPTH TO WATER (FROM TOC)	2.26	3"	3.5"	3.068"		0.38	
SITE	SCOUT READINESS CENTER	DEPTH TO BASE (FROM TOC)	19.38 (AT END)	4"		4.5"	4.026"			0.66	
SAMPLER	BDR	HEIGHT OF WATER COLUMN	7.04	6"		6.625"	6.065"			1.5	
WEATHER/TEMPERATURE	MBLY CLOUDY - DRY, ONLY SUN, ~60F	WELL VOLUME	1.20 gallons = 4.53L	8"		8.625"	7.981"			2.6	
DATE	27 AUG 2019										
START TIME	PUMP ON 1150	START SAMPLE	1245								
END TIME	PUMP OFF 1305	END SAMPLE	1305								

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): GW

SAMPLE COLLECTED WITH: Bailer Submersible Bladder Peristaltic Other (specify)

MADE OF: Stainless Steel PVC 2" Teflon Disposable LDPE

SAMPLING DECON PROCEDURE: DEDICATED TUBING, WATER METER = ALONGX + dH₂O

SAMPLE DESCRIPTION: CLEAR, NO ODOR, LOW TURBIDITY, NO PRODUCT

CRITERIA FOR STABLE PARAMETERS:

Parameter	Stability Criteria
Temperature	± 3%
pH	± 0.1
Conductivity	± 3%
ORP	± 10mV
Dissolved Oxygen	± 10%
Turbidity	± 10%

SAMPLING NOTES:

2X [2x 250mL + HCL DRO
6x 40mL VOA + HCL GRC/BENZ
= DUPLICATE

PUMP START 1150
TUBING @ 15 FE
FLOW RATE: 0.3L/min

FINAL DEPTH 19.38 FE

12.29 FE ^{ETOC} TO GW FINAL

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallons) L	Water Level (ft)	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
1150	-	12.26										
1220	~8L	12.35	0.1	4.8	6.35	368.0	-442	2.8	0.35	11.62	CLR	NONE
1225	~8.5L	12.37	0.02	4.6	6.33	369.0	-430.9	2.5	0.32	7.96	CLR	-
1230	~10L	12.37	0	4.6	6.30	371.0	-445.2	2.0	0.25	6.55	CLR	-
1240	~12L	12.33	-0.04	4.7	6.32	370.1	-445.3	2.1	0.26	4.38	CLR	-
ALL STABLE PARAM ETEES												
START SAMPLES 1245												
PUMP OFF 1305												

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification	Additional Sample	Time	Identification
DRO/RRO	1305	19-AKI-MW2A	Duplicate	1305	19-AKI-MW2A
GRO/BTEX	1305	↓			↓
EPH/VBM		/			/
PAH		/			/
Other		/			/

1236:20 1237:00 200ml / 0.3 min = 600ml/min?
300ml/min = PERFECT

Depths @
8/30
~19 25

1=13.75
2=12.89



EAGLE EYE
A Rating Strata Company

WELL PURGE AND SAMPLING FORM

WELL ID: MW3A

SHEET: (of 1)

PROJECT NAME	AKIAK LIM	WELL CONDITION	NEW	DIAMETER	2"	O.D.	2.375"	I.D.	2.067"	VOLUME (GAL/LIN FT)	0.17
CLIENT	AKANG	DAMAGE PRESENT	NONE, POOR CONCRETE FINISH		3"		3.5"		3.068"		0.38
SITE	AKIAK SCOUT READINESS CENTER	DEPTH TO WATER (FROM TOC)	13.74		4"		4.5"		4.026"		0.66
SAMPLER	BR	DEPTH TO BASE (FROM TOC)	18.55		6"		6.625"		6.065"		1.5
WEATHER/TEMPERATURE	OVC, MUGGY, BGGY, ~60F, CALM	HEIGHT OF WATER COLUMN	4.8		8"		8.625"		7.981"		2.6
DATE	30 AUG 2019	WELL VOLUME	0.816 Gal = 3.09L								
START TIME	1828										
END TIME	1918										

PID = 0.7 ppm

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): GW

SAMPLE COLLECTED WITH: Bailer Submersible Bladder Peristaltic Other (specify)

MADE OF: Stainless Steel PVC 2" Teflon Disposable LDPE

SAMPLING DECON PROCEDURE: DEDICATED TUBING. ALCONOX + DI H2O FOR WATER LEVEL METER

SAMPLE DESCRIPTION: CLEAR, NO PRODUCT, NO ODOR, NO TURBIDITY

CRITERIA FOR STABLE PARAMETERS:

Parameter	Stability Criteria
Temperature	± 3%
pH	± 0.1
Conductivity	± 3%
ORP	± 10mV
Dissolved Oxygen	± 10%
Turbidity	± 10%

SAMPLING NOTES:

TUBING @ 15' btoC
3CV = 9.27L
10CV = 30.9L
FLOW RATE ~ 310 mL/min

2x 250ML AMBER HPLC - DRO
6x 40ML VOA HPLC - GRO + BENZENE
FINAL DEPTH 18.55

FIELD WATER QUALITY PARAMETERS

DNR = DID NOT RECORD

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP (mV)	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
1828	0	13.74	0									
1835	~2L	13.81	0.07	4.3	6.21	353.0	282.7	41.2	5.34	DNR	CLR	NONE
1840	~4.35L	13.81	0	4.1	6.21	351.8	288.4	39.2	5.13	2.19	CLR	
1845	~6.5L	13.82	0.01	4.0	6.24	352.4	285.8	39.1	5.14	1.27	CLR	
1850	~8.65L	13.81	0.01	4.1	6.19	355.1	285.5	38.7	5.05	0.59	CLR	
1855	~9L	13.81	+	4.0	6.22	356.5	276.9	37.7	4.93	1.24	CLR	
1900	~9.5L	13.81	0	3.9	6.22	356.6	256.9	37.5	4.91	0.57	CLR	
1905	~11L	13.80	0.01	4.0	6.22	358.8	251.5	37.6	4.89	0.57	CLR	
1910	~12.5L	13.80	0	4.0	6.23	358.8	243.4	37.0	4.86	0.36	CLR	
ALL STABLE BUT ORP. START SAMPLE @ 1914 END @ 1918												

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification	Additional Sample	Time	Identification
DRO/ARO	1918	19-AKI-MW3A	Duplicate		
GRO/BTEX	1918				
EPH/VPH					
PAH					
Other					

5 280
7
1960
1854:00
1857:15 = 3.15/L 1832:45
4.2 = 310ml/min
1836:40 = 1.1L 3:55 = 281ml/min
TURN UP PUMP

INCH

1

2

3

4

5

6

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2016, GW Sampling

- TUNAWAK

- Kwekwek

- NENAPITCHUK

- AKIAK

2017 GW Sampling

2018 GW Sampling

2019 GW SAMPLING

2019 LTM FIELD NOTESAKIAK LTM #SRC

8/26/2019

BRAD RAMSAY } EAGLE EYE
BRIAN LUSTRELL }SONTS } DISCOVERY DRILLING
LOWX - ~55°F, OVC, LT BRZ, ONLY LT RAINOBS - PULL OLD WELLS, INSTALL
NEW, DEVELOP, SAMPLE,

IDENTIFY PERMAFROST, SURVEY SITE.

PPE - MODIFIED LEVEL D + GAR PROTECTIONACTIVITIES

0600 - DEPART ANCHORAGE

0715 - ARRIVE BETHEL, LOGISTICS IN
BETHEL, RYAN AIR

0800 - LEAVE BET FOR AKIAK

0920 - @ AKIAK. UNLOADING
GEAR FROM CASA. DRAWERS
ARE MISSING, TOOLS TO
ASSEMBLE RIG.

AKIAK LTM 8/26/19 (CONT)

LOCATING GEAR - RYAN AIR
HAS IT IN BET. ANOTHER
FLIGHT w/ TOOLS SOON.NOON - EVERYTHING ONSITE BUT
BRIAN'S BAG THAT MISSED
THE FLIGHT TO BET. HEAD
TO SITE. TRANSPORT BY
PETER WILLIAMS.1300 - AT SITE. SET UP BASE
STATION @ AKIAK 2019.CHECK WATER IN WELLS
BASE HT: 0.55 m1330 - OLD ^{MW2} WELL PULLED. BEGINALL ARE
DRYADVANCING BORING FOR MW2A
SOIL CORES IN 2" MACROCORE
SLEEVE. PREDOMINANTLY SAND
TO SILTY SAND. BROWN COLOR
DRY TO 12 ft bgs. BARELY
DAMP @ 12 ft bgs. WET @
17 ft bgs. ATTEMPT INSTALL
TOP OF SCREEN @ 16 ft bgsPERFORM
SITE
SURVEYSEE WELL INSTALLATION LOG
FOR DETAILS → MW2A1530 - MOVE TO MW1. PULL
WELL. BEGIN NEW BORING.

AKIAK LTM

8/26/19 (CONT)

1600 - EXPERIENCING ISSUES
REMOVING SAMPLE HOLDER
FROM BORING TOOLING.

1630 - VISIT PRINCIPAL BRANDON
@ AKIAK SCHOOL FOR LODGING.

~1700 - BACK TO SITE

CONTINUED TOOLING ISSUES

1930 - BEGIN BAILING MW2A

~2000 - TOOLING ISSUES CAUSING
FRUSTRATION, EXHAUSTION. DECISION
TO "CALL IT A DAY" AND TRY
AGAIN TOMORROW.

- CLEAN UP SITE AND HEAD
TO SCHOOL. PETER WILL
PICK US UP @ 0800.

EBD

8/26/19

AKIAK LTM

8/27/19

BRAD RAMSAY } EAGLE EYE
BRAD LUTTRELL }
SONI } DISCOVER
LO }

WX - NICE. ~55F, MOSTLY CLOUDY, LT BRZ

OBS - CONTINUE FROM YESTERDAY

PPE - MOD LEVEL D + EAR PROTECTION

ACTIVITIES

0800 - LOADING UP @ SCHOOL

0830 - CONTINUE BAILING @ MW2A

~0900 - FINISH MW1A, PULL MW3,

SEE WELL
INSTALLATION
FORM → BEGIN MW3A. MW1A CORE
SAMPLES SIMILAR TO MW2A.

SAND → SILTY SAND, BROWN.

WET ~17 FT bgs.

0930 - COMPLETE BAILING @ MW2A

AFTER ~28 GALLONS. SEE
WELL DEVELOPMENT LOG.

~1030 - BEGIN BAILING MW1A

~1100 - MW3A COMPLETE, SEE
WELL INSTALLATION FORM

AKIAK LTM 2019 (CONT.) 8/27/19

1130 - DRILLERS CLEANING UP AND DEPART SITE. BEGIN SAMPLING, NW 2A.

CALIBRATE YSI → DRO - 2, 250ML AMBER + HCE
GRO - 3 VOA + HCE
BENZENE - 3 VOA + HCE

SEE SAMPLING FORM

~1145 - COMPLETE BAILING @ MW1A
SEE WELL DEVELOPMENT FORM

~1300 COMPLETE MW2A SAMPLE,
MOVE TO MW1A

~1345 BEGIN BAILING MW3A

1430 BEGIN MW1A SAMPLING
SEE SAMPLING FORM

1445 COMPLETE BAILING MW3A
SEE WELL DEVELOPMENT FORM

1550 COMPLETE MW1A SAMPLE
OUT OF TUBING, WILL HAVE TO RETURN W/ MORE TUBING TO SAMPLE MW3A.

1600 - SITE CLEANUP. SET UP RTK BASE @ AKIAK 1 SURVEY NEW WELLS, ROADWAY

AKIAK LTM 2019 (CONT.) 8/27/19

1630 - LEVEL LOOP OF NEW WELLS. SEE LEVEL LOOP DATA FORM. REQUEST TRANSPORT TO AIRPORT, FLIGHT TO BET.

1730 - LEAVE AKI FOR BET - BR ONLY.

1800 - BR CHECKING @ B, BACK TO AIRPORT FOR BL, PREP FOR TUNUNAK ON WEDNESDAY.

EVENING -

- ICE FOR SAMPLE COOLER
- SAMPLE MANAGEMENT

END

BR 8/27/19

Discovery Drilling Inc Daily Drilling Report

Project No. 1-19-151		DATE: 8-26-19		Client:					
Project Name and Location				Geologist: BRAD					
				Geotech:		Environmental: XXX			
ARIAK				Equip: Rig Type:					
				Carrier: FOOT-MOBILE					
				Support:					
Hours		Description of work	Foot-age	Mobe to site	Travel on site	Rig work	Other	Stand by	Down time
Start	Stop								
4:30		CHECKED IN TO AIRPORT FLEW							
	7:30	TO BETHAL							
7:30		MET CLIENT HELPED WITH GEAR					3		
		MOBE'D TO RYAN AIR FOR START							
	9:00	FLIGHT TO ARIAK.					1.5		
		FLEW TO ARIAK TRIED TO							
		BUILD RIG TOGETHER THEN							
	1:30	WAIT FOR REST OF TOOLS.							
1:30		WALKED RIG TO SIGHT			4.5				
		THEN STARTED DRILLING.							
		DRILLED 1 ST HOLE TO 22'							
		SET IT, AT 20' BACK FILLED							
	3:30	SAND & CHIPS, CUTTINGS				2			
3:30		ATTEMPTED TO DRILL SECOND							
		HOLE AND NOTHING WENT							
	8:30	RIGHT. SO STOP CLEANED SIGHT				5			
8:30		TOOK THINGS TO SCHOOL							
		THEN WENT BACK LOAD MORE							
	9:00	STUFF.			.5				
		WAIT FOR PRINCEPAL TO							
	9:30	OPEN DOORS.						.5	
TOTALS									

MATERIALS

QTY	DESCRIPTION	QTY	2", 4", 6" PVC / SS	QTY	DESCRIPTION
	EXPENDABLES		Screen 5' / 10' Slot:	1	Sand: 8/12 10/20/40
	AUGER BITS SIZE	2	Riser 5' / 10'	1	Bentonite chip/crumble
	TEETH	1	Bottom Cap Slip / Threaded		Volclay Grout
	2.5 SAMPLER/CATCHER/SHOE	1	Geoprobe Pre-Packs		Portland Cement
	1.4 SAMPLER/CATCHER/SHOE		DDI Pre-Packs	1	Concrete Mix
6	Liner MC5/MC7				Pea Gravel
	1-INCH	1	2" Latk CAP		Sand _____
	10' PVC Pipe			1	Flush Overcasings 7"
	Couplers				Stickup Overcasing
	Caps				Cold Patch
					Bollards
					Shelby Tubes
					Concrete Pads
					Pel Plug
					55 gal. Waste Drums
					Supersacks
DRILL CREW					
TITLE	NAME	HRS			
DRILLER	SOMI	17			
HELPER	LO	17			
HELPER					

Drillers Signature:

Clients Signature:

Discovery Drilling Inc Daily Drilling Report

Project No. 1-19-151		DATE: 8-27-19	Client:						
Project Name and Location		Geologist: BRAD							
		Geotech: Environmental: x x x							
AKIAK		Equip: Rig Type:							
		Carrier: FOOT MOBILE							
		Support:							
Hours	Description of work		Foot-age	Mobe to site	Travel on site	Rig work	Other	Stand by	Down time
Start	Stop								
7:00	7:00	GOT UP CLEAN BEDS AND							
	8:00	PLACE WE SLEPT AT					1		
8:00		PICKED UP AND MOBE TO SIGHT.							
		STARTED DRILLING USING DT45 EXPENDABLE CUTTING							
		SAMPLED TO 20' SET 2" WELLS BACKFILLED SAND & CHIPS. FLUSH							
	11:00	AND concrete				3			
11:00		CLEAN SIGHT. TAKE RIG TO AIRPORT FOR DEMOBE PALLET-							
	2:00	IZE TOOLING WAIT FOR CASA.				3			
2:00	3:30							15	
3:30		LOAD HALF OF OUR STUFF ON							
	4:00	CASA THEN WAIT FOR FLIGHT.						5	
4:00		PLANE PICKED US UP TOOK US TO BETHAL. LAND THEN							
	5:00	HELP OFF LOAD RIG.					1		
5:00	8:00							3	
8:00	10:00	FLY HOME.						2	
TOTALS									

MATERIALS

QTY	DESCRIPTION	QTY	2", 4", 6" PVC / SS	QTY	DESCRIPTION
	EXPENDABLES		Screen 5' / 10' Slot:	2	Sand: 8/12 10/20 20/40
	AUGER BITS SIZE	4	Riser 5' / 10'	2	Bentonite chip/crumble
	TEETH	2	Bottom Cap Slip / Threaded		Volclay Grout
	2.5 SAMPLER/CATCHER/SHOE	2	Geoprobe Pre-Packs		Portland Cement
	1.4 SAMPLER/CATCHER/SHOE		DDI Pre-Packs	2	Concrete Mix
6	Liner MC5 / MC7				Pea Gravel
	1-INCH	2	2" Lock CAP		Sand
	10' PVC Pipe			2	Flush Overcasings 7"
	Couplers				Stickup Overcasing
	Caps				Cold Patch
					Bollards
					Shelby Tubes
					Concrete Pads
					Pel Plug
					55 gal. Waste Drums
					Supersacks

Drillers Signature:

Clients Signature:

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**APPENDIX D
SURVEY DATA**

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Akiak 2019 Processed RTK-GPS Survey Data

PointID	Northing NAD83 UTM4N (m)	Easting NAD83 UTM4N (m)	Orthometric Height (m)	Ellipsoidal Height (m)	3D Quality (m)	Note
AST1	6755045.523	379768.427	8.099	18.89	0.0174	Aboveground Storage Tank Corner
AST2	6755043.722	379770.116	8.166	18.957	0.0145	Aboveground Storage Tank Corner
AST3	6755040.845	379766.776	8.097	18.888	0.0185	Aboveground Storage Tank Corner
AST4	6755042.619	379765.206	8.077	18.868	0.0317	Aboveground Storage Tank Corner
BUILDING1	6755029.41	379741.213	8.16	18.951	0.2156	FSRC Building/Ramp Corner
BUILDING2	6755024.755	379745.716	8.234	19.025	0.019	FSRC Building/Ramp Corner
BUILDING3	6755023.761	379750.973	8.59	19.381	0.0142	FSRC Building/Ramp Corner
BUILDING4	6755024.941	379752.134	8.471	19.262	0.0157	FSRC Building/Ramp Corner
BUILDING5	6755037.927	379758.897	8.155	18.946	0.059	FSRC Building/Ramp Corner
BUILDING6	6755042.899	379760.056	8.431	19.222	0.0211	FSRC Building/Ramp Corner
BUILDING7	6755044.043	379758.926	8.355	19.146	0.021	FSRC Building/Ramp Corner
BUILDING8	6755042.471	379754.378	8.031	18.822	0.0448	FSRC Building/Ramp Corner
CONNEX1	6755046.56	379760.68	8.381	19.172	0.0415	Connex Corner
CONNEX2	6755044.664	379762.347	8.161	18.952	0.062	Connex Corner
CONNEX3	6755048.449	379767.202	8.398	19.189	0.0261	Connex Corner
CONNEX4	6755051.528	379765.987	9.492	20.283	2.402	Connex Corner - unused (poor quality)
CONNEX5	6755050.465	379765.428	9.014	19.805	0.0309	Connex Corner
DOWNED POLE1	6755039.179	379766.08	8.928	19.719	0.0148	End of downed telephone pole
DOWNED POLE2	6755040.316	379773.436	8.963	19.754	0.0168	End of downed telephone pole
MW1A	6755033.247	379762.565	9.072	19.863	0.0165	MW1A top of casing
MW2A	6755030.732	379755.064	8.812	19.603	0.014	MW2A top of casing
MW3A	6755041.359	379759.253	9.1	19.891	0.0175	MW3A top of casing
OLD MW1	6755033.267	379762.535	8.627	19.418	0.0144	OLD MW1 top of casing
OLD MW2	6755030.769	379755.086	8.214	19.005	0.0153	OLD MW2 top of casing
OLD MW3	6755041.387	379759.225	8.523	19.314	0.0246	OLD MW3 top of casing
ROAD1	6755038.073	379783.574	9.516	20.307	0.0178	Road outline
ROAD2	6755033.302	379774.303	9.531	20.322	0.0132	Road outline
ROAD3	6755029.789	379766.633	9.363	20.154	0.0132	Road outline
ROAD4	6755026.392	379759.086	9.351	20.142	0.0124	Road outline
ROAD5	6755023.065	379752.368	9.37	20.161	0.0146	Road outline
ROAD6	6755018.808	379744.124	9.34	20.131	0.016	Road outline
ROAD7	6755015.126	379736.831	9.283	20.074	0.017	Road outline
ROAD8	6755011.774	379738.623	9.239	20.03	0.0152	Road outline

Akiak 2019 Processed RTK-GPS Survey Data

PointID	Northing NAD83 UTM4N (m)	Easting NAD83 UTM4N (m)	Orthometric Height (m)	Ellipsoidal Height (m)	3D Quality (m)	Note
ROAD9	6755015.603	379746.746	9.222	20.013	0.0131	Road outline
ROAD10	6755019.178	379754.182	9.34	20.131	0.0155	Road outline
ROAD11	6755023.552	379762.673	9.419	20.21	0.0152	Road outline
ROAD12	6755027.503	379770.565	9.525	20.316	0.0121	Road outline
ROAD13	6755030.356	379776.835	9.484	20.275	0.0142	Road outline
ROAD14	6755035.878	379787.751	9.232	20.023	0.0129	Road outline

AKIAK1 Base Station OPUS Solution

FILE: 7963_0826_214241.m00 OP1567621999765

NGS OPUS SOLUTION REPORT
=====

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: bill@tse-ak.com DATE: September 04, 2019
RINEX FILE: 7963238u.19o TIME: 18:35:40 UTC

SOFTWARE: page5 1603.24 master55.pl 160321 START: 2019/08/26 20:43:00
EPHEMERIS: igr20681.eph [rapid] STOP: 2019/08/27 00:11:00
NAV FILE: brdc2380.19n OBS USED: 9475 / 10591 : 89%
ANT NAME: LEIGS15 NONE # FIXED AMB: 57 / 63 : 90%
ARP HEIGHT: 0.5563 OVERALL RMS: 0.012(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2019.6519)

X: -2943145.874(m) 0.006(m) -2943147.052(m) 0.006(m)
Y: -1000948.729(m) 0.022(m) -1000947.733(m) 0.022(m)
Z: 5550607.454(m) 0.017(m) 5550607.738(m) 0.017(m)

LAT: 60 54 43.71926 0.017(m) 60 54 43.70130 0.017(m)
E LON: 198 46 58.45444 0.020(m) 198 46 58.36670 0.020(m)
W LON: 161 13 1.54556 0.020(m) 161 13 1.63330 0.020(m)
EL HGT: 20.041(m) 0.011(m) 20.676(m) 0.011(m)
ORTHO HGT: 9.251(m) 0.015(m) [NAVD88 (Computed using GEOID12B)]

Table with 3 columns: Coordinate Type, UTM COORDINATES (UTM Zone 04), STATE PLANE COORDINATES (SPC 5007 AK 7). Rows include Northing (Y), Easting (X), Convergence, Point Scale, and Combined Factor.

US NATIONAL GRID DESIGNATOR: 4VCN7977155034(NAD 83)

BASE STATIONS USED

Table with 6 columns: PID, DESIGNATION, CORS ARP, LATITUDE, LONGITUDE, DISTANCE(m). Rows include DL6426 AB14 DILLINGHAMAK2007, DK4091 BET1 BETHEL WAAS, and DQ5294 AC37 LAKECLARK_AK2007.

NEAREST NGS PUBLISHED CONTROL POINT

UV8091 AKIAK CHURCH CROSS N605437.329 W1611006.762 2641.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

Akiak 2019 Level Loop Information

PointID	BackStaffHt(ft)	ForeStaffHt(ft)	PointHt(ft)	EqHzn(ft)	PtHt(m)	EqHzn(m)	AdjPtHt(m)	AdjEqHzn(m)
BASE	5.203		0	5.203	0	1.5858744	9.251	10.8368744
MW1A PVC		5.819	-0.616	5.203	-0.1877568	1.5858744	9.0632432	10.8368744
MW1A PVC	5.819		-0.616	5.203	-0.1877568	1.5858744	9.0632432	10.8368744
MW1A VAULT		5.559	-0.356	5.203	-0.1085088	1.5858744	9.1424912	10.8368744
MW1A VAULT	5.559		-0.356	5.203	-0.1085088	1.5858744	9.1424912	10.8368744
MW1A GND		5.72	-0.517	5.203	-0.1575816	1.5858744	9.0934184	10.8368744
MW1A GND	5.72		-0.517	5.203	-0.1575816	1.5858744	9.0934184	10.8368744
MW2A PVC		6.625	-1.422	5.203	-0.4334256	1.5858744	8.8175744	10.8368744
MW2A PVC	6.625		-1.422	5.203	-0.4334256	1.5858744	8.8175744	10.8368744
MW2A VAULT		6.407	-1.204	5.203	-0.3669792	1.5858744	8.8840208	10.8368744
MW2A VAULT	6.407		-1.204	5.203	-0.3669792	1.5858744	8.8840208	10.8368744
MW2A GND		6.445	-1.242	5.203	-0.3785616	1.5858744	8.8724384	10.8368744
MW2A GND	6.445		-1.242	5.203	-0.3785616	1.5858744	8.8724384	10.8368744
MW3A PVC		5.797	-0.594	5.203	-0.1810512	1.5858744	9.0699488	10.8368744
MW3A PVC	5.797		-0.594	5.203	-0.1810512	1.5858744	9.0699488	10.8368744
MW3A VAULT		5.57	-0.367	5.203	-0.1118616	1.5858744	9.1391384	10.8368744
MW3A VAULT	5.57		-0.367	5.203	-0.1118616	1.5858744	9.1391384	10.8368744
MW3A GND		5.736	-0.533	5.203	-0.1624584	1.5858744	9.0885416	10.8368744
MW3A GND	5.736		-0.533	5.203	-0.1624584	1.5858744	9.0885416	10.8368744
BASE		5.203	0	5.203	0	1.5858744	9.251	10.8368744

Akiak 2019 Level Loop Information

BaseUsed AKIAK1
TrueBaseHt 9.251 meters
LoopDate 27-Aug-19

Ell Ht 20.041 (m)
 Ortho Ht 9.251 NAVD88 (m)


Column	Definition
BackStaffHt(ft)	Backshot staff height in feet
ForeStaffHt(ft)	Foreshot staff height in feet
PointHt(ft)	Height of point in feet
EqHzn(ft)	Height of equipment horizon in feet
PtHt(m)	Height of point in meters
EqHzn(m)	Height of equipment horizon in meters
AdjPtHt(m)	Height of point in meters, adjusted to OPUS solution of base
AdjEqHzn(m)	Height of equipment horizon in meters, adjusted to OPUS solution of base

Akiak 2019 Groundwater Elevation Data

	DepthGW(ft_btoc)	DepthGW(m_btoc)	ElevTOC(m)	ElevGW(m)
MW1A	13.75	4.191	9.0632432	4.872
MW2A	12.89	3.928872	8.8175744	4.889
MW3A	13.74	4.187952	9.070	4.882

Column	Definition
DepthGW(ft_btoc)	Depth to groundwater below top of casing, in feet
DepthGW(m_btoc)	Depth to groundwater below top of casing, in meters
ElevTOC(m)	Elevation of top of casing, in meters
ElevGW(m)	Elevation of groundwater, in meters

PointID	Initial	Back (+) ft	Fore (-) ft	Final	Adjusted
AKIAK 1		5.203		+5.203	
MW1A PVC			5.819	-0.617	
↓		9.819		5.203	
MW1A OUT			5.559	-0.356	
↓		5.559		5.203	
MW1A SURF			5.720	-0.517	
↓		5.720		5.203	
MW2A PVC			6.625	-1.422	
↓		6.625		5.203	
MW2A OUT			6.467	-1.264	
↓		6.467		5.203	
MW2A SURF	/	/	6.467	/	/
↓		6.467			
MW2A CURR			6.445	-1.242	
↓		6.445		5.203	
MW3A PVC			5.797	-0.594	
↓		5.797		5.203	
MW3A OUT			5.570	-0.367	
↓		5.570		5.203	
MW3A SURF			5.736 5.736	-0.533 -0.146	
↓		5.736		5.203 5.203	
AKIAK 1			5.203	φ	



EAGLE EYE
A Berling Stritts Company

Project: AKIAK LTM
 Location: AKIAK, AK
 Base used: AKIAK 1
 OPUS Base Ht: 20.041 m
 User: PR

27 AUG 2019
1645

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APPENDIX E
LABORATORY DATA

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Laboratory Report of Analysis

To: Eagle Eye Electric LLC
3301 C Street, Suite 400
Anchorage, AK 99503

Report Number: **1195082**

Client Project: **Akiak LTM**

Dear Jennifer Wehrmann,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Justin at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

Justin Nelson
Project Manager
Justin.Nelson@sgs.com

Date

Case Narrative

SGS Client: **Eagle Eye Electric LLC**
SGS Project: **1195082**
Project Name/Site: **Akiak LTM**
Project Contact: **Jennifer Wehrmann**

Refer to sample receipt form for information on sample condition.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

Print Date: 09/25/2019 9:17:03AM

Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification, and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.

Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
19-AKI-MW1A	1195082001	08/27/2019	09/03/2019	Water (Surface, Eff., Ground)
19-AKI-MW2A	1195082002	08/27/2019	09/03/2019	Water (Surface, Eff., Ground)
19-AKI-MW12A	1195082003	08/27/2019	09/03/2019	Water (Surface, Eff., Ground)
19-AKI-MW3A	1195082004	08/30/2019	09/03/2019	Water (Surface, Eff., Ground)
19-AKI-TB01	1195082005	08/27/2019	09/03/2019	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
AK102	DRO Low Volume (W)
AK101	Gasoline Range Organics (W)
SW8260C	Volatile Organic Compounds (W)

Print Date: 09/25/2019 9:17:07AM

Detectable Results Summary

Client Sample ID: **19-AKI-MW1A**

Lab Sample ID: 1195082001

Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.898	mg/L

Client Sample ID: **19-AKI-MW2A**

Lab Sample ID: 1195082002

Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.874	mg/L

Client Sample ID: **19-AKI-MW12A**

Lab Sample ID: 1195082003

Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.812	mg/L

Client Sample ID: **19-AKI-MW3A**

Lab Sample ID: 1195082004

Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.385J	mg/L



Results of 19-AKI-MW1A

Client Sample ID: **19-AKI-MW1A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082001
Lab Project ID: 1195082

Collection Date: 08/27/19 15:50
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.898		0.658	0.197	mg/L	1		09/21/19 23:37
Surrogates								
5a Androstane (surr)	90.2		50-150		%	1		09/21/19 23:37

Batch Information

Analytical Batch: XFC15337
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 09/21/19 23:37
Container ID: 1195082001-A

Prep Batch: XXX42188
Prep Method: SW3520C
Prep Date/Time: 09/05/19 08:58
Prep Initial Wt./Vol.: 228 mL
Prep Extract Vol: 1 mL



Results of **19-AKI-MW1A**

Client Sample ID: **19-AKI-MW1A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082001
Lab Project ID: 1195082

Collection Date: 08/27/19 15:50
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		09/09/19 08:35
Surrogates							
4-Bromofluorobenzene (surr)	87	50-150		%	1		09/09/19 08:35

Batch Information

Analytical Batch: VFC14916
Analytical Method: AK101
Analyst: NRB
Analytical Date/Time: 09/09/19 08:35
Container ID: 1195082001-D

Prep Batch: VXX34822
Prep Method: SW5030B
Prep Date/Time: 09/08/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-MW1A**

Client Sample ID: **19-AKI-MW1A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082001
Lab Project ID: 1195082

Collection Date: 08/27/19 15:50
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile GC/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		09/04/19 21:11
Surrogates							
1,2-Dichloroethane-D4 (surr)	92.3	81-118		%	1		09/04/19 21:11
4-Bromofluorobenzene (surr)	99.9	85-114		%	1		09/04/19 21:11
Toluene-d8 (surr)	101	89-112		%	1		09/04/19 21:11

Batch Information

Analytical Batch: VMS19401
Analytical Method: SW8260C
Analyst: CMC
Analytical Date/Time: 09/04/19 21:11
Container ID: 1195082001-F

Prep Batch: VXX34799
Prep Method: SW5030B
Prep Date/Time: 09/04/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-MW2A**

Client Sample ID: **19-AKI-MW2A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082002
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.874		0.670	0.201	mg/L	1		09/21/19 23:47
Surrogates								
5a Androstane (surr)	92.9		50-150		%	1		09/21/19 23:47

Batch Information

Analytical Batch: XFC15337
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 09/21/19 23:47
Container ID: 1195082002-A

Prep Batch: XXX42188
Prep Method: SW3520C
Prep Date/Time: 09/05/19 08:58
Prep Initial Wt./Vol.: 224 mL
Prep Extract Vol: 1 mL



Results of **19-AKI-MW2A**

Client Sample ID: **19-AKI-MW2A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082002
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		09/09/19 08:53
Surrogates							
4-Bromofluorobenzene (surr)	88.6	50-150		%	1		09/09/19 08:53

Batch Information

Analytical Batch: VFC14916
Analytical Method: AK101
Analyst: NRB
Analytical Date/Time: 09/09/19 08:53
Container ID: 1195082002-D

Prep Batch: VXX34822
Prep Method: SW5030B
Prep Date/Time: 09/08/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 19-AKI-MW2A

Client Sample ID: **19-AKI-MW2A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082002
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.200 U	0.400	0.120	ug/L	1		09/04/19 21:25
Surrogates							
1,2-Dichloroethane-D4 (surr)	96.5	81-118		%	1		09/04/19 21:25
4-Bromofluorobenzene (surr)	100	85-114		%	1		09/04/19 21:25
Toluene-d8 (surr)	101	89-112		%	1		09/04/19 21:25

Batch Information

Analytical Batch: VMS19401
Analytical Method: SW8260C
Analyst: CMC
Analytical Date/Time: 09/04/19 21:25
Container ID: 1195082002-F

Prep Batch: VXX34799
Prep Method: SW5030B
Prep Date/Time: 09/04/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-MW12A**

Client Sample ID: **19-AKI-MW12A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082003
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.812		0.647	0.194	mg/L	1		09/21/19 23:57
Surrogates								
5a Androstane (surr)	90.8		50-150		%	1		09/21/19 23:57

Batch Information

Analytical Batch: XFC15337
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 09/21/19 23:57
Container ID: 1195082003-A

Prep Batch: XXX42188
Prep Method: SW3520C
Prep Date/Time: 09/05/19 08:58
Prep Initial Wt./Vol.: 232 mL
Prep Extract Vol: 1 mL



Results of **19-AKI-MW12A**

Client Sample ID: **19-AKI-MW12A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082003
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		09/09/19 09:11
Surrogates							
4-Bromofluorobenzene (surr)	86.7	50-150		%	1		09/09/19 09:11

Batch Information

Analytical Batch: VFC14916
Analytical Method: AK101
Analyst: NRB
Analytical Date/Time: 09/09/19 09:11
Container ID: 1195082003-D

Prep Batch: VXX34822
Prep Method: SW5030B
Prep Date/Time: 09/08/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-MW12A**

Client Sample ID: **19-AKI-MW12A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082003
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile GC/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		09/04/19 21:40
Surrogates							
1,2-Dichloroethane-D4 (surr)	90.5	81-118		%	1		09/04/19 21:40
4-Bromofluorobenzene (surr)	98.8	85-114		%	1		09/04/19 21:40
Toluene-d8 (surr)	101	89-112		%	1		09/04/19 21:40

Batch Information

Analytical Batch: VMS19401
Analytical Method: SW8260C
Analyst: CMC
Analytical Date/Time: 09/04/19 21:40
Container ID: 1195082003-F

Prep Batch: VXX34799
Prep Method: SW5030B
Prep Date/Time: 09/04/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-MW3A**

Client Sample ID: **19-AKI-MW3A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082004
Lab Project ID: 1195082

Collection Date: 08/30/19 19:18
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.385 J	0.658	0.197	mg/L	1		09/22/19 00:07
Surrogates							
5a Androstane (surr)	90.4	50-150		%	1		09/22/19 00:07

Batch Information

Analytical Batch: XFC15337
Analytical Method: AK102
Analyst: JMG
Analytical Date/Time: 09/22/19 00:07
Container ID: 1195082004-A

Prep Batch: XXX42188
Prep Method: SW3520C
Prep Date/Time: 09/05/19 08:58
Prep Initial Wt./Vol.: 228 mL
Prep Extract Vol: 1 mL



Results of **19-AKI-MW3A**

Client Sample ID: **19-AKI-MW3A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082004
Lab Project ID: 1195082

Collection Date: 08/30/19 19:18
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		09/09/19 09:29
Surrogates							
4-Bromofluorobenzene (surr)	85.2	50-150		%	1		09/09/19 09:29

Batch Information

Analytical Batch: VFC14916
Analytical Method: AK101
Analyst: NRB
Analytical Date/Time: 09/09/19 09:29
Container ID: 1195082004-D

Prep Batch: VXX34822
Prep Method: SW5030B
Prep Date/Time: 09/08/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 19-AKI-MW3A

Client Sample ID: **19-AKI-MW3A**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082004
Lab Project ID: 1195082

Collection Date: 08/30/19 19:18
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile GC/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.200 U	0.400	0.120	ug/L	1		09/04/19 21:55
Surrogates							
1,2-Dichloroethane-D4 (surr)	90.9	81-118		%	1		09/04/19 21:55
4-Bromofluorobenzene (surr)	99.1	85-114		%	1		09/04/19 21:55
Toluene-d8 (surr)	100	89-112		%	1		09/04/19 21:55

Batch Information

Analytical Batch: VMS19401
Analytical Method: SW8260C
Analyst: CMC
Analytical Date/Time: 09/04/19 21:55
Container ID: 1195082004-F

Prep Batch: VXX34799
Prep Method: SW5030B
Prep Date/Time: 09/04/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-TB01**

Client Sample ID: **19-AKI-TB01**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082005
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.0500 U	0.100	0.0310	mg/L	1		09/09/19 11:52
Surrogates							
4-Bromofluorobenzene (surr)	86.2	50-150		%	1		09/09/19 11:52

Batch Information

Analytical Batch: VFC14916
Analytical Method: AK101
Analyst: NRB
Analytical Date/Time: 09/09/19 11:52
Container ID: 1195082005-B

Prep Batch: VXX34822
Prep Method: SW5030B
Prep Date/Time: 09/08/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **19-AKI-TB01**

Client Sample ID: **19-AKI-TB01**
Client Project ID: **Akiak LTM**
Lab Sample ID: 1195082005
Lab Project ID: 1195082

Collection Date: 08/27/19 13:05
Received Date: 09/03/19 15:11
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile GC/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		09/04/19 18:29
Surrogates							
1,2-Dichloroethane-D4 (surr)	92.8	81-118		%	1		09/04/19 18:29
4-Bromofluorobenzene (surr)	100	85-114		%	1		09/04/19 18:29
Toluene-d8 (surr)	100	89-112		%	1		09/04/19 18:29

Batch Information

Analytical Batch: VMS19401
Analytical Method: SW8260C
Analyst: CMC
Analytical Date/Time: 09/04/19 18:29
Container ID: 1195082005-D

Prep Batch: VXX34799
Prep Method: SW5030B
Prep Date/Time: 09/04/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Method Blank

Blank ID: MB for HBN 1798971 [VXX/34799]
Blank Lab ID: 1529827

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1195082001, 1195082002, 1195082003, 1195082004, 1195082005

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.200U	0.400	0.120	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	92.5	81-118		%
4-Bromofluorobenzene (surr)	99.5	85-114		%
Toluene-d8 (surr)	101	89-112		%

Batch Information

Analytical Batch: VMS19401
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: CMC
Analytical Date/Time: 9/4/2019 3:14:00PM

Prep Batch: VXX34799
Prep Method: SW5030B
Prep Date/Time: 9/4/2019 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/25/2019 9:17:12AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1195082 [VXX34799]
 Blank Spike Lab ID: 1529828
 Date Analyzed: 09/04/2019 15:29

Spike Duplicate ID: LCSD for HBN 1195082 [VXX34799]
 Spike Duplicate Lab ID: 1529829
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1195082001, 1195082002, 1195082003, 1195082004, 1195082005

Results by SW8260C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	30	30.5	102	30	29.8	99	(79-120)	2.40	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	87.3	87	30	85.9	86	(81-118)	1.70	
4-Bromofluorobenzene (surr)	30	101	101	30	98.1	98	(85-114)	2.50	
Toluene-d8 (surr)	30	101	101	30	102	102	(89-112)	0.66	

Batch Information

Analytical Batch: **VMS19401**
 Analytical Method: **SW8260C**
 Instrument: **VPA 780/5975 GC/MS**
 Analyst: **CMC**

Prep Batch: **VXX34799**
 Prep Method: **SW5030B**
 Prep Date/Time: **09/04/2019 06:00**
 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 09/25/2019 9:17:13AM



Method Blank

Blank ID: MB for HBN 1799131 [VXX/34822]
Blank Lab ID: 1530540

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1195082001, 1195082002, 1195082003, 1195082004, 1195082005

Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	87.4	50-150		%

Batch Information

Analytical Batch: VFC14916
Analytical Method: AK101
Instrument: Agilent 7890A PID/FID
Analyst: NRB
Analytical Date/Time: 9/9/2019 5:54:00AM

Prep Batch: VXX34822
Prep Method: SW5030B
Prep Date/Time: 9/8/2019 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 09/25/2019 9:17:15AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1195082 [VXX34822]
 Blank Spike Lab ID: 1530541
 Date Analyzed: 09/09/2019 11:34

Spike Duplicate ID: LCSD for HBN 1195082 [VXX34822]
 Spike Duplicate Lab ID: 1530542
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1195082001, 1195082002, 1195082003, 1195082004, 1195082005

Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.05	105	1.00	1.01	101	(60-120)	3.90	(< 20)

Surrogates

4-Bromofluorobenzene (surr)	0.0500	95	95	0.0500	91.1	91	(50-150)	4.10	
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Batch Information

Analytical Batch: **VFC14916**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **NRB**

Prep Batch: **VXX34822**
 Prep Method: **SW5030B**
 Prep Date/Time: **09/08/2019 06:00**
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 09/25/2019 9:17:17AM

Matrix Spike Summary

Original Sample ID: 1530543
 MS Sample ID: 1530544 MS
 MSD Sample ID: 1530545 MSD

Analysis Date: 09/09/2019 9:47
 Analysis Date: 09/09/2019 10:05
 Analysis Date: 09/09/2019 10:22
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1195082001, 1195082002, 1195082003, 1195082004, 1195082005

Results by AK101

Parameter	Sample	Matrix Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	0.0500U	0.500	0.527	105	0.500	0.535	107	60-120	1.60	(< 20)
Surrogates										
4-Bromofluorobenzene (surr)		0.0500	0.0443	89	0.0500	0.0451	90	50-150	1.80	

Batch Information

Analytical Batch: VFC14916
 Analytical Method: AK101
 Instrument: Agilent 7890A PID/FID
 Analyst: NRB
 Analytical Date/Time: 9/9/2019 10:05:00AM

Prep Batch: VXX34822
 Prep Method: Volatile Fuels Extraction (W)
 Prep Date/Time: 9/8/2019 6:00:00AM
 Prep Initial Wt./Vol.: 5.00mL
 Prep Extract Vol: 5.00mL

Print Date: 09/25/2019 9:17:18AM



Method Blank

Blank ID: MB for HBN 1798955 [XXX/42188]
Blank Lab ID: 1529772

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1195082001, 1195082002, 1195082003, 1195082004

Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	94.1	60-120		%

Batch Information

Analytical Batch: XFC15337
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: JMG
Analytical Date/Time: 9/21/2019 7:14:00PM

Prep Batch: XXX42188
Prep Method: SW3520C
Prep Date/Time: 9/5/2019 8:58:53AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 09/25/2019 9:17:19AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1195082 [XXX42188]
 Blank Spike Lab ID: 1529773
 Date Analyzed: 09/21/2019 20:15

Spike Duplicate ID: LCSD for HBN 1195082
 [XXX42188]
 Spike Duplicate Lab ID: 1529774
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1195082001, 1195082002, 1195082003, 1195082004

Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	22.7	113	20	22.5	113	(75-125)	0.63	(< 20)
Surrogates									
5a Androstane (surr)	0.4	119	119	0.4	119	119	(60-120)	0.71	

Batch Information

Analytical Batch: **XFC15337**
 Analytical Method: **AK102**
 Instrument: **Agilent 7890B F**
 Analyst: **JMG**

Prep Batch: **XXX42188**
 Prep Method: **SW3520C**
 Prep Date/Time: **09/05/2019 08:58**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 09/25/2019 9:17:21AM



SGS North America Inc.
CHAIN OF CUSTODY RECORD

1195082



www.us.sgs.com

Form containing sections 1-5 with fields for CLIENT, CONTACT, PROJECT, INVOICE, and a detailed table of samples with columns for identification, date, time, matrix, and analysis results.



e-Sample Receipt Form

SGS Workorder #:

1195082



1 1 9 5 0 8 2

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements	<input checked="" type="checkbox"/> Yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	<input type="checkbox"/> N/A	Absent
COC accompanied samples?	<input checked="" type="checkbox"/> Yes	
DOD: Were samples received in COC corresponding coolers?	<input type="checkbox"/> N/A	
<input type="checkbox"/> N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	<input checked="" type="checkbox"/> Yes	Cooler ID: 1 @ 4.0 °C Therm. ID: D50
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.		
*If >6°C, were samples collected <8 hours ago?	<input type="checkbox"/> N/A	
If <0°C, were sample containers ice free?	<input type="checkbox"/> N/A	
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?	<input checked="" type="checkbox"/> Yes	
Do samples match COC** (i.e., sample IDs, dates/times collected)?	<input checked="" type="checkbox"/> Yes	
**Note: If times differ <1hr, record details & login per COC.		
***Note: If sample information on containers differs from COC, SGS will default to COC information		
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals)	<input checked="" type="checkbox"/> Yes	
Were proper containers (type/mass/volume/preservative***) used?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> N/A ***Exemption permitted for metals (e.g, 200.8/6020A). Lids to containers 3B and 4B were damaged upon receipt and were replaced. Proceeding with analysis.
Volatile / LL-Hg Requirements		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	<input checked="" type="checkbox"/> Yes	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	<input checked="" type="checkbox"/> Yes	
Were all soil VOAs field extracted with MeOH+BFB?	<input type="checkbox"/> N/A	
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1195082001-A	HCL to pH < 2	OK			
1195082001-B	HCL to pH < 2	OK			
1195082001-C	HCL to pH < 2	OK			
1195082001-D	HCL to pH < 2	OK			
1195082001-E	HCL to pH < 2	OK			
1195082001-F	HCL to pH < 2	OK			
1195082001-G	HCL to pH < 2	OK			
1195082001-H	HCL to pH < 2	OK			
1195082002-A	HCL to pH < 2	OK			
1195082002-B	HCL to pH < 2	OK			
1195082002-C	HCL to pH < 2	OK			
1195082002-D	HCL to pH < 2	OK			
1195082002-E	HCL to pH < 2	OK			
1195082002-F	HCL to pH < 2	OK			
1195082002-G	HCL to pH < 2	OK			
1195082002-H	HCL to pH < 2	OK			
1195082003-A	HCL to pH < 2	OK			
1195082003-B	HCL to pH < 2	OK			
1195082003-C	HCL to pH < 2	OK			
1195082003-D	HCL to pH < 2	OK			
1195082003-E	HCL to pH < 2	OK			
1195082003-F	HCL to pH < 2	OK			
1195082003-G	HCL to pH < 2	OK			
1195082003-H	HCL to pH < 2	OK			
1195082004-A	HCL to pH < 2	OK			
1195082004-B	HCL to pH < 2	OK			
1195082004-C	HCL to pH < 2	OK			
1195082004-D	HCL to pH < 2	OK			
1195082004-E	HCL to pH < 2	OK			
1195082004-F	HCL to pH < 2	OK			
1195082004-G	HCL to pH < 2	OK			
1195082004-H	HCL to pH < 2	OK			
1195082005-A	HCL to pH < 2	OK			
1195082005-B	HCL to pH < 2	OK			
1195082005-C	HCL to pH < 2	OK			
1195082005-D	HCL to pH < 2	OK			
1195082005-E	HCL to pH < 2	OK			
1195082005-F	HCL to pH < 2	OK			

Container Id

Preservative

Container
Condition

Container Id

Preservative

Container
Condition

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

BU - The container was received with headspace greater than 6mm.

DM - The container was received damaged.

FR - The container was received frozen and not usable for Bacteria or BOD analyses.

IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

QN - Insufficient sample quantity provided.

Laboratory Data Review Checklist

Completed By:

Brad Ramsay

Title:

Environmental Scientist

Date:

21 October 2019

CS Report Name:

Akiak 2019 Long Term Monitoring Report - Federal Scout Readiness Center DERP

Report Date:

October 2019 (Draft)

Consultant Firm:

Eagle Eye Electric

Laboratory Name:

SGS-Anchorage

Laboratory Report Number:

1195082

ADEC File Number:

2402.38.002

Hazard Identification Number:

2456

1. Laboratory

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

 Yes No

Comments:

All samples were received and analyzed by SGS-Anchorage

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

 Yes No

Comments:

No samples were transferred to another laboratory.

2. Chain of Custody (CoC)

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

 Yes No

Comments:

CoC was complete/signed/dated, and is included in the data report package.

- b. Correct Analyses requested?

 Yes No

Comments:

The correct analyses were requested, per the work plan addendum.

3. Laboratory Sample Receipt Documentation

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

 Yes No

Comments:

Temperature blank was 4.0°C upon receipt at the lab.

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

 Yes No

Comments:

Appropriate sample preservatives were used for the requested analyses.

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

 Yes No

Comments:

Two jar lids were broken and replaced. No other issues were noted.

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

Yes No

Comments:

There were no discrepancies.

- e. Data quality or usability affected?

Comments:

Data quality/usability was not affected.

4. Case Narrative

- a. Present and understandable?

Yes No

Comments:

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

Yes No

Comments:

There were no discrepancies, errors or QC failures.

- c. Were all corrective actions documented?

Yes No

Comments:

No corrective actions were necessary.

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

Comments:

There is no effect on data quality/usability.

5. Samples Results

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

Yes No

Comments:

The correct analyses were performed.

- b. All applicable holding times met?

Yes No

Comments:

All holding times were met.

c. All soils reported on a dry weight basis?

Yes No

Comments:

N/A. There were no soil samples.

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

Yes No

Comments:

Reported LOQs are all below minimum detection levels for the project.

e. Data quality or usability affected?

Yes No

Comments:

Data quality/usability is not affected.

6. QC Samples

a. Method Blank

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

Yes No

Comments:

One method blank per matrix was performed. There were less than 20 samples.

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

Yes No

Comments:

All method blank results are less than the LOQ.

iii. If above LOQ, what samples are affected?

Comments:

N/A. There are no affected samples.

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

Yes No

Comments:

N/A. There are no affected samples.

v. Data quality or usability affected?

Comments:

N/A. There are no affected samples.

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

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

Yes No

Comments:

One LCS/LCSD pair was performed per analysis. There were less than 20 samples.

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

Yes No

Comments:

No metals/inorganics analyses were performed.

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

Yes No

Comments:

All recoveries were within method and laboratory limits.

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

Yes No

Comments:

All RPDs were reported and are less than method and laboratory limits.

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

Comments:

N/A. No samples are affected.

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

Yes No

Comments:

N/A. No samples are affected.

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

Comments:

N/A. No samples are affected.

c. Surrogates – Organics Only

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

 Yes No

Comments:

Surrogate recoveries are reported for organic analyses.

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

 Yes No

Comments:

All surrogate recoveries were reported and are within method and laboratory limits.

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

 Yes No

Comments:

N/A. There are no failed surrogate recoveries.

- iv. Data quality or usability affected?

Comments:

N/A. Quality/usability is 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

Comments:

One trip blank was analyzed for BTEX and GRO.

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

 Yes No

Comments:

The COC includes the VOA samples and the trip blank, as well as cooler information.

- iii. All results less than LOQ?

 Yes No

Comments:

All trip blank results are below the LOQ.

iv. If above LOQ, what samples are affected?

Comments:

No samples are affected.

v. Data quality or usability affected?

Comments:

Data quality/usability is not affected.

e. Field Duplicate

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

Yes No

Comments:

One field duplicate was submitted for each matrix. There were less than 10 samples.

ii. Submitted blind to lab?

Yes No

Comments:

The duplicate was submitted blind to the lab.

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

Comments:

Only DRO was quantifiable in any sample or the duplicate. The RPD was 7.3%.

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

Comments:

Data quality/usability was not affected.

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

Yes No Not Applicable

Only disposable sampling equipment and dedicated (and new) tubing was used.

i. All results less than LOQ?

Yes No

Comments:

N/A. There were no decontamination or equipment blank samples.

ii. If above LOQ, what samples are affected?

Comments:

N/A. There were no decontamination or equipment blank samples.

iii. Data quality or usability affected?

Comments:

N/A. There were no decontamination or equipment blank samples.

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

a. Defined and appropriate?

Yes No

Comments:

There are no other data flags or qualifiers.

APPENDIX F
RECORD OF DECISION

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ALASKA ARMY NATIONAL GUARD

Final

Akiak
Federal Scout Readiness Center
Record of Decision for
Petroleum Contamination

September 2013

Contents

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Acronyms and Abbreviations

AAC	<i>Alaska Administrative Code</i>
ACL	alternative cleanup level
ADEC	Alaska Department of Environmental Conservation
ARNG	Army National Guard
bgs	below ground surface
DRO	diesel-range organics
FSRC	Federal Scout Readiness Center
GRO	gasoline-range organics
IC	institutional control
LTM	long-term monitoring
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTGW	migration to groundwater
NA	not applicable

1 Site Name and Location

Facility name: Akiak Federal Scout Readiness Center (FSRC), Akiak, Alaska.

Hazard ID: 2456

ADEC file number: 2402.38.002

AEDB-R number: CCAK010940

Site location: Akiak FSRC is located within the City of Akiak. The City of Akiak is located on the west bank of the Kuskokwim River, approximately 42 air miles northeast of Bethel, on the Yukon-Kuskokwim Delta and 380 miles west of Anchorage (Figure 1). (Figures are at the end of this Record of Decision.) The FSRC is situated on a parcel of land legally described as U.S. Survey 2243, beginning at a point lying south 55 degrees west 190 feet from the southern corner of the Native Village Store; thence north 35 degrees west, 110 feet; thence south 55 degrees west, 200 feet; thence south 35 degrees east, 140 feet; thence north 55 degrees east, 100 feet; thence north 35 degrees west, 104 feet to the point of beginning, containing about 0.608 acre, more or less, within the Bethel Recording District, Fourth Judicial District. The Akiak FSRC is located in Section 23 of Township 10 North, Range 66 West of the Seward Meridian.

Latitude and longitude: Akiak FSRC is located at 60.9121284 degrees north, -161.2174846 degrees west, based on the 1984 (revised 2004) World Geodetic System (WGS 84) datum.

Facility owner and point of contact: The facility owner is the Alaska Army National Guard (ARNG), and the point of contact is Lieutenant Colonel Joel Gilbert, CFMO/Environmental, Building 57024, Joint Base Elmendorf-Richardson, Alaska, 99505.

2 Contaminants of Concern and Affected Media

Historical practices have resulted in release of petroleum hydrocarbons to soil and groundwater at Akiak FSRC, and the affected areas have been investigated. Based on results of sampling conducted during investigations, the following contaminants of concern and affected media have been identified (CH2M HILL, 2013):

Soil: Diesel-range organics (DRO) and gasoline-range organics (GRO) were detected at concentrations greater than Alaska Department of Environmental Conservation (ADEC) Method 2 cleanup levels presented in Table B2 of Title 18, Chapter 75 the *Alaska Administrative Code* (AAC), Section 341(d) (18 AAC 75.341[d]), in surface and subsurface soil to a depth of approximately 8.5 feet below ground surface (bgs). Benzene was detected at concentrations greater than ADEC Method 2 cleanup level established in Table B1 of 18 AAC 75.341(c) in surface and subsurface soil to a depth of approximately 8.5 feet bgs.

Groundwater: Concentrations of DRO and benzene detected in samples of onsite groundwater were greater than ADEC cleanup levels established in Table C of 18 AAC 75.345(b)(1).

The maximum reported onsite concentrations for contaminants of concern by medium type are presented in Table 1.

3 Regulatory Authority

The agency with regulatory authority (ADEC) is identified in applicable State of Alaska regulations as promulgated in the Oil and Other Hazardous Substance Pollution Control, 18 AAC 75, revised April 8, 2012, and Water Quality Standards, 18 AAC 70, amended July 1, 2008.

TABLE 1
Summary of Contaminant Concentrations by Medium
Akiak Federal Scout Readiness Center

Chemical of Concern	Maximum Concentration	Sample Depth (feet bgs)
Soil		
DRO	32,000 mg/kg	3 – 4
GRO	1,700 mg/kg	2
Benzene	0.18 mg/kg	2
Groundwater		
DRO	27 mg/L	NA
Benzene	0.012 mg/L	NA

bgs = below ground surface
 DRO = diesel-range organics
 GRO = gasoline-range organics
 mg/kg = milligrams per kilogram
 mg/L = milligrams per liter
 NA = not applicable

4 Relevant Guidance and Policy

The following ADEC guidance documents are applicable for this Record of Decision: *Policy Guidance to Developing Conceptual Site Models* (2010), *Cumulative Risk Guidance* (2008), *Ecoscoping Guidance* (2012), *Implementing Guidance for the Method 3 Hydrocarbon Risk Calculator* (2011b), *Guidance on Using Institutional Controls in Oil and Other Hazardous Substances Cleanups* (2011a), and *Site Closure Memorandum* (2009).

5 Confirmed Routes of Exposure

The conceptual model for primary routes of exposure at Akiak FSRC (Figure 2) was developed in accordance with ADEC guidance (2010). Potentially affected media are surface and subsurface soil and groundwater. The model takes into account past and current sources of contamination, chemical release mechanisms, transport/exposure media, potential exposure points, potential exposure routes, and potential receptors. The assessed routes of exposure are as follows:

- Surface soil ingestion and direct contact pathways are considered complete under current and reasonably expected future conditions.
- Direct contact and ingestion of subsurface soil pathways are considered complete under current and reasonably expected future conditions.
- Ingestion of and direct contact with surface water on the property are not considered significant potential exposure pathways because the surface water is typically seasonal in nature and surface water is not likely to be used as a drinking water source.
- Outdoor and indoor inhalation pathways are considered complete for the purposes of this model; however, potential exposure through outdoor inhalation is limited because volatile chemicals are diffused and diluted in the breathing zone, and potential exposure through indoor inhalation is not considered significant because all buildings are constructed on floating (elevated) foundations, generally limiting the exposure pathway.
- All potentially complete ecological exposure pathways are considered insignificant because the compounds of concern for bioaccumulation are not present and because of the small size of the contaminated area (ADEC, 2012), the location of the site within the City of Akiak, and the presence of more optimal habitat nearby.
- The ingestion of groundwater is considered a complete pathway.

6 Basis for Action

On the basis of findings of the cumulative human health risk assessment, it was determined that remedial action is necessary to protect human health from the risk associated with ingestion of petroleum-contaminated soil at Akiak FSRC. Remedial actions are also necessary to protect human health from the risk associated with ingestion of petroleum-contaminated groundwater at the FSRC because contaminant concentrations detected in groundwater samples exceeded cleanup levels defines in State of Alaska regulations (Table C of 18 AAC 75.345).

7 Site-specific Cleanup Levels

As stated in 18 AAC 75.340(d), for each affected site, a responsible person shall propose soil cleanup levels for hazardous substances in soil for ADEC approval. The proposed soil cleanup levels must be based upon an estimate of the reasonable maximum exposure expected to occur under current and future site conditions and must be developed using one or more of the following methods:

- ADEC Method 1 for petroleum hydrocarbon-contaminated soil in a non-Arctic zone, as set out in Table A1 of 18 AAC 75.341(a), or in an Arctic zone, as set out in Table A2 of 18 AAC 75.341(b)
- ADEC Method 2 for soil contaminated with chemicals other than petroleum hydrocarbons, as set out in Table B1 of 18 AAC 75.341(c), or with petroleum hydrocarbons, as set out in Table B2 of 18 AAC 75.341(d)
- ADEC Method 3 for developing site-specific alternative cleanup levels (ACLs)

For each contaminant detected in soil at a concentration above its ADEC cleanup level, the respective cleanup level provided under Method 1 or 2 applies at a contaminated site unless ADEC approves an ACL that has been proposed under Method 3.

For Akiak FSRC, under Method 2, cleanup levels for soil contaminated with non-petroleum hydrocarbons were obtained from Table B1 of 18 AAC 75.341(c), while cleanup levels for soil contaminated with petroleum hydrocarbons were initially obtained from Table B2 of 18 AAC 75.341(d). Under Method 2, a site-specific ingestion cleanup level for DRO and GRO were also developed. The site-specific ingestion cleanup levels for DRO and GRO and a proposed benzene concentration, through use of an approved fate and transport model, were confirmed to meet migration to groundwater (MTGW) criteria and were therefore presented as ACLs in *Akiak Federal Scout Readiness Center Data Gap Investigation Report* (CH2M HILL, 2013), which has been approved by ADEC (ADEC, 2013). Table 2 summarizes cleanup levels for Akiak FSRC that are deemed protective of human health.

As stated in 18 AAC 75.345, contaminated groundwater must meet the cleanup levels defined in Table C if the current use or the reasonably expected potential future use of the groundwater, as determined under 18 AAC 75.350, is a drinking water source. Table 3 summarizes the applicable groundwater cleanup levels for Akiak FSRC, which are deemed protective of human health.

TABLE 2
Site-specific Soil Cleanup Levels
Akiak Federal Scout Readiness Center

Contaminant	Maximum Reported Soil Concentration	ADEC Method 2				Site-specific ACL ^c	Approved Site-specific Cleanup Level
		Table B1 Cleanup Level ^a		Table B2 Cleanup Level ^b			
		MTGW	Inhalation	MTGW	Ingestion		
DRO							
Aliphatics (86.54%)	--	--	--	7,200	10,000	10,000	10,000
Aromatics (13.46%)	--	--	--	100	4,100	1,555	1,555
Total	32,000	--	--	250	10,250	11,555	11,555
GRO							

TABLE 2
Site-specific Soil Cleanup Levels
Akiak Federal Scout Readiness Center

Contaminant	Maximum Reported Soil Concentration	ADEC Method 2				Site-specific ACL ^c	Approved Site-specific Cleanup Level
		Table B1 Cleanup Level ^a		Table B2 Cleanup Level ^b			
		MTGW	Inhalation	MTGW	Ingestion		
Aliphatics (55.61%)	--	--	--	270	1,000	1,000	1,000
Aromatics (44.39%)	--	--	--	150	1,000	798	798
Total	1,700	--	--	300	1,400	1,400 ^d	1,400 ^d
Benzene	0.18	0.025	11	--	--	0.06	0.06

Note: All values are in milligrams per kilogram.

^aMethod 2 cleanup levels obtained from 18 AAC 75.341(c), Table B1, under-40-inch zone

^bMethod 2 cleanup levels obtained from 18 AAC 75.341(d), Table B2, under-40-inch zone

^cSite-specific ACLs obtained from *Final Data Gap Investigation Report, Akiak Federal Scout Readiness Center* (CH2M HILL, 2013)

^dCleanup level limited by maximum allowable concentrations obtained from 18 AAC 75.341(d), Table B2, under 40-inch zone

-- = not applicable

ACL = alternative cleanup level

ADEC = Alaska Department of Environmental Conservation

DRO = diesel-range organics

GRO = gasoline-range organics

MTGW = migration to groundwater

TABLE 3
Groundwater Cleanup Levels
Akiak Federal Scout Readiness Center

Contaminant	Groundwater Cleanup Level (milligrams per liter)
Diesel-range organics	1.5
Benzene	0.005

Source: 18 AAC 75.345, Table C

8 Selected Remedies

Remedial alternatives selected for petroleum contamination at Akiak FSRC are presented in *Final Data Gap Investigation Report, Akiak Federal Scout Readiness Center* (CH2M HILL, 2013). The selected remedies will protect human health and meet applicable regulatory requirements by (1) preventing exposure through applying institutional controls (ICs) to limit potential exposure to residual contaminants or (2) by removing the petroleum contamination from the site.

ARNG is committed to implementing, monitoring, maintaining, and enforcing all components of the selected remedies to ensure that site conditions remain protective of human health.

Petroleum-contaminated soil. The remedy selected for petroleum-contaminated soil at Akiak FSRC is source removal. The major components of the selected remedy for petroleum-contaminated soil are as follows:

- Excavation of contaminated soil that contains petroleum contaminants in concentrations greater than site-specific cleanup levels (Table 2).
- Shipment of the excavated soil offsite for either offsite thermal treatment or disposal in an approved offsite landfill.

Petroleum-contaminated groundwater. The remedy selected for petroleum-contaminated groundwater at Akiak FSRC is long-term monitoring (LTM) with ICs. The major components of the selected remedy for petroleum-contaminated groundwater are as follows:

- LTM of petroleum-contaminated groundwater for DRO and benzene. The ARNG will submit an LTM sampling plan and subsequent monitoring reports to ADEC for approval.
- Implementation of site-specific ICs by ARNG, complying with state law restricting access and limiting human exposure to and use of petroleum-contaminated groundwater at Akiak FSRC, and prevention of discharge and spread of petroleum contamination, including the following:
 - Restricting excavation, drilling, and dewatering in areas containing petroleum-contaminated groundwater without prior ADEC and ARNG approval
 - If petroleum-contaminated groundwater is used or removed from the site, characterizing and managing the groundwater by following regulations that are applicable at the time
 - Obtaining ADEC approval before removing or disposing of petroleum-contaminated soil or groundwater at the site (as required by 18 AAC 75.325[i])
- Inclusion and documentation of ICs in ARNG property records for Akiak FSRC and filing a Notice of Environmental Contamination with the Bethel Recording District for U.S. Survey 2243 that states the prohibition on the use of groundwater.
- If the land is transferred the ARNG is responsible for assuring the use restrictions are included in the transfer documents and that the receiving party will maintain the use restrictions. The ARNG will provide notice to ADEC at least 6 months prior to any transfer or sale of property containing ICs so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer or conveyance documents to maintain effective ICs. If it is not possible for the facility to notify ADEC at least 6 months prior to any transfer or sale, then the facility will notify ADEC as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to ICs. The ARNG agrees to provide ADEC with such notice, within the same time frames, for federal-to-federal transfer of property accountability. The ARNG shall provide either access to or a copy of the executed deed or transfer assembly to ADEC.
- The ARNG shall notify ADEC of any violation of the ICs or any other activity that is inconsistent with the ICs or IC objectives. The ARNG will notify ADEC as soon as practicable, but no longer than 10 days after discovery, of any activity that violates or is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs. The ARNG must take prompt measures to correct the violation or deficiency and prevent its recurrence. In this notification, the ARNG will identify any corrective measures it has taken, or any corrective measures it plans to take, and the estimated time frame for completing them. For corrective measures taken after the notification, the ARNG shall notify ADEC when the measures are complete.
- The ARNG will monitor and inspect all site areas subject to ICs and submit a performance report to ADEC every year for the first 5 years after the date of the signed decision document. At that time, the frequency of inspections and reports may be reduced, if agreed upon by ARNG and ADEC.
- The ARNG will not modify or terminate ICs or modify land uses that may impact the effectiveness of the ICs without prior ADEC approval.
- LTM of the groundwater until the contaminant concentrations in the groundwater are shown to be stable or shrinking at which time the monitoring frequency may be reduced. Monitoring of the groundwater will continue to determine when cleanup levels are achieved in groundwater, as shown in Table 3, at which time monitoring and ICs on the groundwater may be terminated with ADEC agreement.

9 Post-closure Remedial Review

When the Akiak FSRC site meets the applicable cleanup levels shown in Table 2 and Table 3, the remedial actions can be considered complete without ICs, in accordance with 18 AAC 75.380(d)(1) and the ADEC Site Closure Memorandum (ADEC, 2009), subject to the following conditions:


- In accordance with 18 AAC 75.325(i), at a site where DRO and GRO are present in soil at concentrations above the MTGW cleanup level established in 18 AAC 75.341(d), Table B2, any proposal to transport soil offsite will require ADEC approval.
- Soil containing residual contamination may not be placed in surface water or other environmentally sensitive areas, in accordance with 18 AAC 70.
- Under 18 AAC 75.380(d)(1), ADEC may require additional site characterization or remedial action if new information is discovered that leads ADEC to make a determination that the cleanup action described in this Record of Decision is not protective of human health, safety, and welfare and the environment.

The undersigned parties concur with this Record of Decision for Akiak FSRC.



JOEL T. GILBERT, Lieutenant Colonel
Alaska Army National Guard

2/20/13
Date



DEBBA CAILLOUET, Environmental Specialist
Federal Facilities Section, Contaminated Sites Program
Alaska Department of Environmental Conservation

10/28/15
Date

10 References

- Alaska Department of Environmental Conservation (ADEC). 2008. *Cumulative Risk Guidance*. June 9.
- Alaska Department of Environmental Conservation (ADEC). 2009. Site Closure Memorandum. July 24.
- Alaska Department of Environmental Conservation (ADEC). 2010. *Policy Guidance to Developing Conceptual Site Models*. October.
- Alaska Department of Environmental Conservation (ADEC). 2011a. *Guidance on Using Institutional Controls in Oil and Other Hazardous Substances Cleanups*. February.
- Alaska Department of Environmental Conservation (ADEC). 2011b. *Implementing Guidance for the Method 3 Hydrocarbon Risk Calculator*. February 25.
- Alaska Department of Environmental Conservation (ADEC). 2012. *Ecoscoping Guidance*. January.
- CH2M HILL. 2013. *Final Data Gap Investigation Report, Akiak Federal Scout Readiness Center*. Prepared for Alaska Army National Guard. January.

Figures

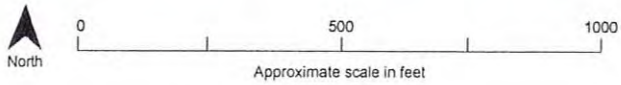


FIGURE 1
Akiak Location Map
 Akiak FSRC Data Gap Investigation
 Akiak, Alaska

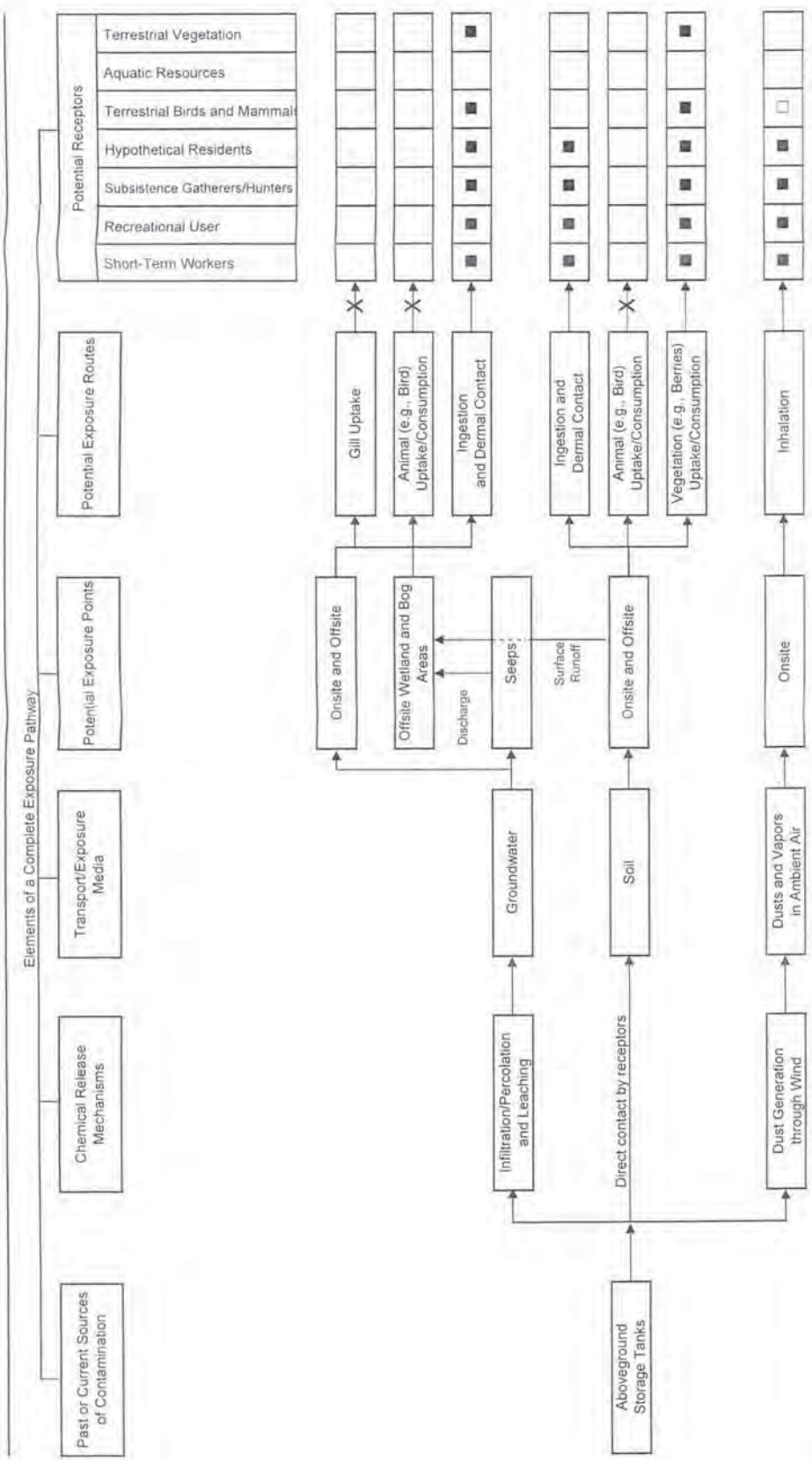


FIGURE 2
Conceptual Exposure Model
 Potential Human and Ecological Exposures
 Akiak FSRC Record of Decision
 Akiak, Alaska

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APPENDIX G
ADEC LETTER OF APPROVAL

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THE STATE
of **ALASKA**
GOVERNOR MICHAEL J. DUNLEAVY

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

555 Cordova Street
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File No: 2402.38.002

November 6, 2019

Sent via electronic mail only

Heidi Long
Alaska Army National Guard
Construction Facilities Management Office
PO Box 5800
JBER, AK 99505-0800

Re: *Draft Akiak 2017 Long-Term Monitoring Report*
Federal Scout Readiness Center (FSRC)
Alaska Army National Guard

Dear Ms. Long:

The Alaska Department of Environmental Conservation (ADEC) received the *Draft Akiak 2019 Long-Term Monitoring Report* dated October 2019 and prepared by Eagle Eye. The report presents the results of groundwater monitoring from three new monitoring wells advanced within existing boreholes from the historic decommissioned shallow monitoring wells. ADEC has no objections to this report. Please submit a final.

Based on the data in the report, the groundwater contained detectable concentrations of diesel range organics (DRO) below ADEC Table C groundwater cleanup levels. Benzene and gasoline range organics (GRO) were not detected in groundwater. The Report's *Conclusions* section recommends another round of groundwater sampling in 2020. ADEC agrees with this recommendation.

If you have any questions regarding this letter or concerns please feel free to contact me by telephone at 907-269-8685 or email at grant.lidren@alaska.gov

Sincerely,

A handwritten signature in blue ink that reads "Grant Lidren".

Grant Lidren
Project Manager

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