FINAL

GAMBELL
SITE CHARACTERIZATION REPORT
FEDERAL SCOUT READINESS CENTER
ALASKA ARMY NATIONAL GUARD
FY15 DEFENSE ENVIRONMENTAL RESTORATION PROGRAM (DERP)

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ACL	alternative cleanup level
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
COC	chain-of-custody
CSM	conceptual site model
DERP	Defense Environmental Restoration Program
DGI	Data Gap Investigation
DRO	diesel range organics
Eagle Eye	Eagle Eye Electric, Limited Liability Company
EPA	United States Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
FSRC	Federal Scout Readiness Center
FY	Fiscal Year
GAC	granular activated carbon
GRO	gasoline range organics
HI	hazard index
Hoefler	Hoefler Consulting Group
HRC	Hydrocarbon Risk Calculator
IDW	investigation-derived waste
L	liter
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS/MSD	matrix spike/matrix spike duplicate
ND	non-detect
PAH	polycyclic aromatic hydrocarbons
PPE	personal protective equipment
PVC	polyvinyl chloride
RPD	relative percent difference
RRO	residual range organics
SC	site characterization
SCP	Site Characterization Plan

SCR	Site Characterization Report
SIM	Selective Ion Monitoring
TOC	total organic carbon
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons
WRCC	Western Regional Climate Center

EXECUTIVE SUMMARY

This Site Characterization Report describes the activities and findings of the 2016 site characterization (SC) activities conducted at the Alaska Army National Guard (AKARNG) Federal Scout Readiness Center (FSRC) in Gambell, Alaska. This work was performed by Eagle Eye Electric, Limited Liability Company (Eagle Eye), a subsidiary of Bering Straits Native Corporation, for AKARNG under Contract No. W91ZRU-15-C-0013.

The primary objective of the SC effort was to fill data gaps and define the nature and extent of groundwater contamination at the facility. A secondary objective included the development of cleanup levels that will allow unrestricted future use (if needed). However, cleanup levels were previously established and approved by the Alaska Department of Environmental Conservation (ADEC) as part of the 2011 data gap analysis performed by CH2MHill (CH2MHill 2013). Data collected as part of the SC will be combined with historical information in order to develop a Decision Document for the facility.

Groundwater Well Installation and Monitoring

Eagle Eye installed and sampled seven groundwater monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7) at the Gambell FSRC between June 29 and July 2, 2016. Water was observed from 6.7 to 8.4 feet below ground surface (bgs) during monitoring well installation. Each of the monitoring wells was installed to approximately 10 feet bgs. After the monitoring wells were developed, groundwater samples were collected from each well and analyzed for gasoline-range organics; diesel-range organics (DRO); residual-range organics; benzene, toluene, ethylene, xylenes, and polycyclic aromatic compounds by an offsite laboratory. The groundwater sample collected from MW-2 contained a concentration of DRO of 14 milligrams per liter (mg/L) and a concentration of naphthalene of 0.011 mg/L, which are greater than the respective ADEC Title 18 Alaska Administrative Code Chapter 75 Section 345 Table C cleanup levels of 1.5 mg/L and 0.0017mg. All other results were less the ADEC cleanup levels. Data collected as part of the 2016 SC effort also corroborates that groundwater flow direction at the site is to the north-northwest.

Recommendations

Data collected from site groundwater in 2011 and 2016 indicates that concentrations of DRO are present above the ADEC groundwater cleanup level. It is recommended that long-term groundwater monitoring be conducted on a regular basis to determine if additional actions need to be considered for site groundwater.

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1.0 INTRODUCTION

This Site Characterization Report (SCR) describes the site characterization (SC) activities performed at the Gambell Federal Scout Readiness Center (FSRC) in 2016. The work described in this SCR 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-15-C-0013. 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 April 6, 2016 (ADEC 2016b); ADEC's *Site Closure/Cleanup Complete Memorandum* (ADEC 2016a); ADEC's *Field Sampling Guidance* (ADEC 2016c); ADEC's *Monitoring Well Guidance* (ADEC 2013); contract documents including the task Scope of Work provided in the Performance Work Statement; and local, state, and federal regulations and laws.

1.1 Project Objectives

The primary objective of the SC effort was to fill data gaps and define the nature and extent of groundwater contamination at the facility. A secondary objective included the development of cleanup levels that will allow unrestricted future use (if needed). However, cleanup levels were previously established and approved by the ADEC as part of the 2011 data gap analysis performed by CH2MHill (CH2MHill 2013). Data collected as part of the SC will be combined with historical information in order to develop a Decision Document for the facility.

1.2 Site Characterization Report Organization

This SCR outlines activities performed to meet the project objectives at the Gambell FSRC. The SCR is organized into the following sections:

- Section 1: Introduction. The introduction presents an overview of the SC activities, including the project objectives, SCR organization, and regional setting and site background information.
- Section 2: Regulatory Framework. This section summarizes the regulations and the groundwater cleanup levels applicable to this project.
- Section 3: Site Characterization Field Activities. This section describes the field methods used to install monitoring wells, collect groundwater samples, decontaminate equipment, and manage the investigation-derived waste.
- Section 4: Analytical Sample Results. This section summarizes and discusses the groundwater sample results and presents the data validation.
- Section 5: Conclusions and Recommendations. This section presents the conclusions and recommendations for the FSRC
- Section 6: References. Lists the sources referenced in the SCR.

1.3 Site Description and Background

This section summarizes the site location, climate, and environmental characteristics of Gambell, as well as the previous investigations performed at the Gambell FSRC. This information was obtained from the following sources:

- 2006 Site Investigation (Hoefler 2008)
- 2011 Gambell Federal Scout Readiness Center Data Gap Investigation (DGI) Report (CH2MHill 2013)

The ADEC Hazard ID number for the Gambell FSRC is 4276; the ADEC file number is 660.38.007.

1.4 Site Location and Characteristics

The City of Gambell is located on a gravel spit on the northwestern tip of Saint Lawrence Island in the Bering Sea, 36 miles from the coast of Siberia (**Figure 1**). This area is situated on 10.9 square miles of land and 19.5 square miles of water. Troutman Lake, located south of the city, is separated from the Bering Sea by a narrow gravel spit. The level of the lake is approximately 2 feet above sea level. Sevuokuk Mountain lies approximately 1 mile to the east of the city, rising to an elevation of 614 feet above sea level. The topography of the area is relatively flat.

The climate is maritime with continental influences in winter. Precipitation falls 300 days of the year with an annual precipitation of 17.6 inches and an average annual snowfall of 70.5 inches (Western Regional Climate Center [WRCC] 2015). Average summer temperatures range from 34 to 49.5 degrees Fahrenheit (°F) while average winter temperatures range from -2.5 to 12.1 °F (WRCC 2015).

1.5 Gambell FSRC Property

The Gambell FSRC property is owned by Sivuqaq Incorporated and is licensed to the Alaska AKARNG until June 30, 2020, with a 30-year renewal option. It is approximately ¼ mile northeast of the Gambell Airport. The facility is used as an office for the Native Corporation and for dry storage. The FSRC is located at latitude 63.7783386 degrees north and longitude –171.3400335 degrees west, based on the 1984 (revised 2004) World Geodetic System datum, and within Section 03 of Township 20 S, Range 67 W of the Kateel River Meridian. Gambell is located within the Cape Nome Recording District.

The Gambell FSRC is an inoperable scout readiness center. It currently contains the following:

- A 20- by 60-foot, prefabricated scout readiness center known as the Old FSRC, which was built around 1970
- A 30- by 40-foot, prefabricated scout readiness center known as the New FSRC, which was built in 1979 and attached to the Old FSRC with an enclosed walkway

- Two 1,500-gallon, double-walled aboveground storage tanks (AST) near the southeastern corner of the New FSRC building, west of the storage van, and two beside the northwestern corner of the Old FSRC building
- An 8- by 20-foot storage van east of the New FSRC building
- A 12- by 12-foot, metal storage shed, along the western property boundary
- A hazardous materials storage locker at the northwestern corner of the New FSRC

The Gambell FSRC previously contained:

- A 3,000-gallon, single walled heating oil AST
- An 8- by 12-foot, wooden storage shed, along the western property boundary

Site features are presented in **Figure 1**.

1.5.1 Geology

The dominant soil lithologies underlying the Gambell area are unconsolidated, poorly to well-sorted gravels with sand and poorly to well-sorted sand with gravels. Gravels are underlain by bedrock. The bedrock beneath Gambell consists of granitic Cretaceous plutonic rocks.

1.5.2 Surface Water

There are no surface water features at the site; however, there are three major surface water features in the area (Bering Sea, Kittilngook Bay, and Troutman Lake). Troutman Lake, the nearest body of surface water, is approximately 1,200 feet south of the site. The lake water is considered slightly brackish because of influences from the Bering Sea (U.S. Army Corps of Engineers [USACE] 2005). Surface water flow direction from the site is estimated to be toward the north, with localized variations because of mounded gravel.

1.5.3 Hydrogeology and Drinking Water

Permafrost is commonly encountered at depths ranging from 3 to 15 feet below ground surface (bgs). Historical data from two former water wells in Gambell suggested that the shallow permafrost was "seasonal" in nature (CH2MHill 2013). A 1985 investigation found permafrost to be discontinuous throughout the area. Where present, it was found between 7 to 10 feet bgs. Further investigations in 1992 indicated that permafrost is discontinuous nearest the sea and becomes continuous as you move south and east across the gravel spit toward the bluff. Shallow permafrost near the bluff was shown to vary seasonally in its distance from the bluff, therefore controlling the volume of the shallow drinking water aquifer at the base of the bluff. Permafrost was not encountered in any of the borings advanced in 2016.

Groundwater resources at Gambell are limited (CH2MHill 2013). During the 2016 data gap investigation, groundwater was encountered at the FSRC from 6.7 to 8.4 feet bgs and groundwater flow direction was established to the north-northwest. The village water well

provides the water for the town. Groundwater from the central spit area is often saline, difficult to recover in usable quantities, and is located in an active lens over permafrost.

The lack of shallow permafrost near the sea and the presence of saline groundwater were noted in two well logs from the Alaska Department of Natural Resources. One well was located about 1,000 feet west of the armory, in the old village site and the other well was located about 750 feet northwest of the armory, next to the former elementary school. In the units above the screened interval, both wells penetrated seasonally frozen gravel inter-layered with thawed gravel. Both wells were abandoned due to poor water quality or low discharge rates. Groundwater for the new school and village is obtained from a shallow aquifer at the base of the bluff, located approximately 2,000 feet east of the armory. This aquifer occurs in a thaw bulb in the permafrost at the base of Sevuokuk Mountain. Although groundwater at the Gambell FSRC is not a current source or likely future source of drinking water, a drinking water determination per Title 18 Alaska Administrative Code (AAC) 75.350 has not been prepared or approved for the facility.

1.6 Data Gap Analysis and Previous Investigations

The only known contamination at the Gambell FSRC stems from an estimated 3,000-gallon spill of heating oil from a single-walled aboveground storage tank (AST) in 1983. The AST has since been removed. Due to the high permeability, well-drained, gravelly soils beneath the tank, the fuel likely moved downward to the permafrost, which is less than 10 feet below ground surface (bgs). The AKARNG conducted site inspections in 1990 and 1997 that identified stained soil at the 1983 spill location. In addition, several other surface stains and potential spill sources were identified (AKARNG 1990, 1997, 2003). No removal actions have been conducted to date. Sections 1.6.1 and 1.6.2 summarize the most recent data collected in 2006 and 2011. **Figure 2** presents the site features as well as the previous and recent 2016 soil and groundwater sample locations.

1.6.1 2006 Site Investigation

In 2006, Hoefler Consulting Group (Hoefler) collected and analyzed soil samples to investigate areas where past spills, past staining, and current staining had been reported or observed. Due to the coarse nature of the soil, the boring walls repeatedly collapsed. Therefore, the crew used temporary polyvinyl chloride (PVC) tubes to stabilize the boring walls in order to facilitate sample collection from depths greater than 1 foot bgs. Delineation samples were analyzed for diesel-range organics (DRO) and residual-range organics (RRO). Source area and near source area samples were analyzed for DRO, RRO, gasoline-range organics (GRO), benzene, toluene, ethylbenzene, and xylenes (BTEX), and total organic carbon (TOC). The data indicated concentrations of DRO above the ADEC Method Two soil cleanup level in four locations 1) north of the existing 1,500-gallon ASTs belonging to the old FSRC; 2) along the western edge of the old FSRC; 3) at the former snowmachine storage area; and 4) west of the Old FSRC ASTs, approximately where the former 3,000-gallon AST was situated (Hoefler 2008). No other analytes were detected above cleanup levels in site soil. However, it is important to note that soil samples could not be collected deeper than 3.5 feet bgs near the location of the 1983 heating oil spill. In

addition, groundwater samples were not collected because groundwater was not encountered at the depth of refusal (6.5 feet bgs) of the hand-driven groundwater monitoring probe.

Background samples were also collected and analyzed for DRO, RRO, and TOC to calculate alternative cleanup levels (ACLs). Based on this data, an ACL of 280 milligrams per kilogram (mg/kg) was calculated for DRO (Hoefler 2008). Unfortunately, insufficient data were collected to fully define the volume of contaminated soil above the ACL. However, the volume appears to be relatively small because the maximum detected concentrations were close to the ACL. **Figure 2** presents the 2006 sample locations and exceedances.

1.6.2 2011 Data Gap Analysis

In 2011, CH2MHill performed a DGI to ensure that the AKARNG had all of the environmental data necessary to conduct remedial actions at the Gambell FSRC to allow divesture of the leased property without the use of institutional controls. The analysis included a review of background information, a summary of previous investigations, an updated conceptual site model (CSM), and data collection and analysis of the 2006 and 2011 field efforts. The DGI field work included the collection of soil samples from 13 soil boring locations and groundwater samples from 10 groundwater monitoring well locations. All soil samples were analyzed for DRO; a subset of samples was also analyzed for BTEX, polycyclic aromatic hydrocabons (PAH), extractable petroleum hydrocarbons (EPH), and volatile petroleum hydrocarbons (VPH). All groundwater samples were analyzed for DRO; one sample was also analyzed for BTEX, PAHs, EPH, and VPH. Concentrations of DRO exceeded the ADEC Method Two soil cleanup level in two soil borings and the ADEC groundwater cleanup level in three of the sampled wells in 2011. The maximum concentration of DRO detected in site soil was 600 mg/kg; the maximum detected concentration in site groundwater was 33 milligrams per liter (mg/L). No other analytes were detected above cleanup levels in either site soil or groundwater**. Figure 2** presents the 2011 sample locations and exceedances.

Based on all available data, including data collected in 2006 and 2011, an assessment of the cumulative risk was not required. However, cumulative risk for the site was assessed using the ADEC-approved hydrocarbon risk calculator (HRC). Results of the assessment indicate a cumulative carcinogenic cancer risk at 6×10^{-7} and a hazard index (HI) of 0.07 for cumulative non-carcinogenic risk. These results are less than the regulatory limits of 1×10^{-5} and 1, respectively.

The ADEC-approved HRC was also used to assess risk of petroleum hydrocarbons in soil. The maximum site concentration for DRO of 600 mg/kg was used in the risk calculations. The results of the assessment completed using the HRC showed that the risk for all petroleum hydrocarbons was less than the HI of 1 (Hoefler 2008). Data inputs were used to calculate a proposed ACL of 11,870 mg/kg for DRO.

The Report concluded that concentrations of DRO in soil exceed the ADEC Method 2 cleanup level, but not the proposed ACL of 11,870 mg/kg. The lateral extent of DRO-

contaminated soil has been adequately delineated and appears to exist sporadically to the northwest of the FSRC building. In addition, the existence of permafrost at approximately 7 to 9.5 feet bgs across the site limits the vertical extent of DRO-contaminated soil. DRO-contaminated suprapermafrost groundwater appears to extend laterally to the northwest corner of the FSRC property. However, it does not appear to be migrating offsite and potentially contaminating the Bering Sea. Based on the data collected to date, the Report recommended no further remedial action for either site soil or groundwater at Gambell FSRC. ADEC requested further delineation of site groundwater to confirm offsite migration is not occurring.

2.0 REGULATORY FRAMEWORK

ADEC is the regulatory authority governing the cleanup of petroleum-contaminated soil and groundwater at contaminated sites in Alaska. This SCR has been prepared in accordance with ADEC's *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* (ADEC 2009a). ADEC approval of the SCR will be attached in ***Appendix E*** as part of the final Report.

The activities described in this SCR were conducted in accordance with 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2015). Other applicable ADEC guidance documents include *Site Closure/Cleanup Complete Memorandum* (ADEC 2016a), *Field Sampling Guidance* (ADEC 2016c), and *Monitoring Well Guidance (ADEC 2013)*. Field activities were overseen by a qualified environmental professional in accordance with 18 AAC 75.333 and the ADEC *Field Sampling Guidance* (ADEC 2016c).

Data quality was evaluated based on their precision, accuracy, representativeness, completeness, and comparability. A thorough data quality review was conducted in accordance with *Environmental Laboratory Data and Quality Assurance Requirements Technical Memorandum* (ADEC 2009c). An ADEC Laboratory Data Review Checklist will be completed for each laboratory data package (***Appendix C***).

2.1 Contaminants of Potential Concern in Groundwater and Applicable Cleanup Levels

The primary contaminant of potential concern at the Gambell FSRC in site groundwater is DRO. ADEC Groundwater Cleanup Levels per 18 AAC 75 apply to site groundwater. The maximum detected concentrations of DRO compared to the cleanup level are presented in **Table 2-1.**

TABLE 2-1: MAXIMUM DETECTED CONCENTRATIONS AND GROUNDWATER CLEANUP LEVELS

Contaminant of Potential Concern	Maximum Detected Concentration - 2016 Field Effort (Sample ID)	Maximum Detected Concentration – Previous Field Effort (Sample ID)	ADEC Groundwater Cleanup Level[1]
DRO	14 (16GAM02MW02)	33 (11GAMGW007)	1.5

Notes:

[1] *18 AAC 88.345 Table C Cleanup Levels (ADEC 2016)*

- All concentrations and cleanup levels are in mg/L

- DRO = diesel range organics

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3.0 SITE CHARACTERIZATION ACTIVITIES

The activities proposed in the *Site Characterization Plan (SCP), Gambell FSRC, Gambell, Alaska* (Eagle Eye 2016) were performed at the Gambell FSRC in June and July 2016. Sections 3.1 through 3.5 describe the field activities that were conducted to meet the project objectives listed in Section 1.1. ***Appendix B*** includes the field forms from the field effort.

3.1 Mobilization and Site Preparation

Eagle Eye and its drilling subcontractor, Discovery Drilling, along with the drilling equipment and supplies, mobilized to Gambell on 28 and 29 June 2016 via commercial and chartered aircraft.

Upon arrival at the FSRC, site preparation activities included locating the areas of interest, clearing the site of obstacles and debris, identifying underground lines, marking the drilling/groundwater well locations, and securing all necessary equipment prior to the commencement of work.

3.2 Monitoring Well Installation

Seven permanent groundwater monitoring wells were installed on 30 June and 1 July 2016 to characterize potential groundwater contamination and to determine hydraulic gradient. Monitoring wells locations were selected based on site conditions, previous soil and groundwater sample results, and the determination of the site-specific groundwater flow direction to further refine the nature and extent of contamination at the site as described in the SCP (Eagle Eye 2016):

- 16GAMMW01 was installed just east of former monitoring well 11GAMGW006 and south of former monitoring well 11GAMGW007
- 16GAMMW02 was installed south and west of previous detections of DRO in groundwater (11GAMGW006) and soil (GAM-SI-11) greater than the ADEC cleanup levels
- 16GAMMW03 was installed southwest of former monitoring well 11GAMGW001
- 16GAMMW04 was installed northwest of former monitoring well 11GAMGW001 and southeast of former monitoring well 11GAMGW008
- 16GAMMW05 was installed northwest of former monitoring well 11GAMGW007
- 16GAMMW06 was installed north of the former monitoring well 11GAMGW008 and northeast of former monitoring well 11GAMGW007
- 16GAMMW07 was installed along the western edge of the property

One well could not be installed as planned; although several attempts were made near the western edge of the Old FSRC, water was not observed in any of the soil cores in this area. Additional attempts were restricted due to the presence of a buried electrical line. Outside of this line, all prior results were less than cleanup levels for site soil and groundwater.

The seven monitoring wells were installed according to ADEC's Monitoring Well Guidance (ADEC 2013). Wells were installed using a Geoprobe drill and consisted of a 5-foot, 2-inch nominal diameter 10-slot Schedule 40 PVC well screen connected to a 2-inch nominal

diameter Schedule 40 PVC riser. Approximately 5 to 6 feet of 20-40 silica sand was placed within the annulus followed by approximately 2 to 4 feet of bentonite above the sand to serve as the annular space sealant. Each well was finished as a flush mounted well. Well installations procedures are detailed in the Record of Well Construction logs (***Appendix B***).

3.3 Monitoring Well Development

Newly installed wells were developed following installation per ADEC approval (***Appendix E***). The wells were developed by purging using a peristaltic pump. Wells were considered developed after at least three borehole volumes of water had been removed and field parameters stabilized, the maximum purge volume was achieved, or the well purged dry. Well development procedures were recorded on the Well Development Data Sheets (***Appendix B***). A summary for each well is presented in **Table 3-1**. Any equipment used for multiple wells was decontaminated between each well as described in Section 3.5. Purge water was accumulated in 5-gallon buckets for treatment with granular activated carbon (GAC). See Section 3.6 for more details.

TABLE 3-1: WELL DEVELOPMENT STATUS

Well ID	Total Volume Purged (L)	Development Status
MW01	36.00	Maximum purge volume reached
MW02	23.47	Maximum purge volume reached
MW03	15.00	Purged dry
MW04	41.95	Maximum purge volume reached
MW05	30.00	Field parameters stabilized
MW06	43.52	Maximum purge volume reached
MW07	22.00	Maximum purge volume reached

Notes:
- Well IDs begin with "16GAM"
- L = liters

3.4 Monitoring Well Sampling

Newly installed wells were sampled after development was completed per ADEC approval (***Appendix E***). A PID was used for air monitoring to analyze for volatile organic compounds (VOC) in the breathing zone prior to opening the well or removing the well plug and immediately after opening the well and removing the well plug. Depth to water was measured using an interface probe.

Purging was conducted with ADEC *Field Sampling Guidance* (ADEC 2016c) and the US Environmental Protection Agency (EPA) *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedure* (EPA 1996).

Purging continued until water quality parameter stabilization was reached or the maximum purge volume was achieved. Once the parameters stabilized or the maximum purge volume was achieved, groundwater sampling commenced. Water was purged using the pump directly into the sampling container. The flow rate was continually adjusted to

attempt to ensure that the drawdown rate did not exceed 0.3 feet. Samples were collected in the following order:

- BTEX
- GRO
- DRO/RRO
- PAHs

The vials for BTEX and GRO were filled slowly to prevent splashing and entrapment of air bubbles. The bottles were filled until a meniscus formed. The cap was then secured and the bottle inverted, tapped firmly, and checked for the presence of air bubbles. Following completion of sampling, the pump was removed and the total depth of the well was measured. Well sampling procedures were recorded on the Well Purge and Sampling Form (***Appendix B***).

The following quality control samples were collected:

- Matrix spike and matrix spike duplicates (MS/MSD) (5% frequency)
- Field duplicates (10% frequency)
- Trip blanks (one per cooler for each VOC analysis including BTEX and GRO)

3.5 Decontamination Procedures

Reusable equipment (e.g., drill cutting shoes, drill stem augers) was decontaminated after use and between each well. Non-reusable equipment was disposed of as investigation derived waste (IDW) as described in Section 4.2.

Decontamination proceeded using brushes to scrub the drilling shoes with potable water, deionized water, and Alconox detergent over a catch basin to minimize the spread of contaminants.

3.6 Investigation Derived Wastes

Types of IDW included decontamination water, purge water, and well development water, used personal protective equipment (PPE), and other debris. Wastewater was treated with a GAC water filter system and discharged on site. No sheen was observed pre- or post-treatment. Field observations during treatment were noted in the logbook to document the condition of the discharged water.

Used PPE and other IDW solid waste was placed in plastic trash bags and disposed of as non-hazardous waste in the local landfill.

3.7 Demobilization and Site Restoration

Following the completion of the well installation, development, and sampling activities, the area surrounding each well was tamped down to meet the pre-existing terrain and grade. Site personnel, remaining materials and supplies, departed from Gambell via regularly scheduled and chartered aircraft on 2 July 2016.

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4.0 ANALYTICAL SAMPLE RESULTS

Seven groundwater samples plus one duplicate were collected from the seven newly installed monitoring wells. The groundwater sample collected from MW-2 contained a concentration of DRO at 14 mg/L, which exceeds the ADEC 18 AAC 75.345 Table C cleanup level. In the same well, a concentration of naphthalene was also detected above cleanup level. All other analytes were either non-detect or were less than the ADEC 18 AAC 75.345 Table C cleanup levels. **Table 4-1** summarizes the sample that exceeded the ADEC groundwater cleanup level in 2016. **Appendix C** presents the complete analytical data set.

TABLE 4-1: GROUNDWATER SAMPLE RESULTS

Analyte	Monitoring Well ID	Sample ID	Sample Date	Results (mg/L)	ADEC Cleanup Level (mg/L)
DRO	MW02	16GAM02MW02	07/01/2016	14	1.5
Naphthalene	MW02	16GAM02MW02	07/01/2016	0.011	0.0017

Notes:
ADEC = Alaska Department of Environmental Conservation
DRO = diesel range organics
mg/L = milligrams per liter

4.1 Data Validation Summary

The laboratory analytical data packages and associated documentation records were reviewed by a project chemist independent of the analytical laboratory and not directly involved with the project. Laboratory analyses were conducted by the ADEC-approved laboratory, ALS Environmental, located in Kelso, Washington. **Table 4-2** provides the data package summary.

TABLE 4-2: DATA PACKAGE SUMMARY

Data Package Number	Matrix
K1607616	Water

Chain-of-custody (COC) documentation was maintained to track collection, shipment, laboratory receipt, custody, and disposal of the samples. The ADEC Data Review Checklist is included in ***Appendix C*** and the data quality review is summarized below. This data quality review includes a review of the precision, accuracy, sensitivity, representativeness, comparability, and completeness of analytical results generated for the sampling activities conducted at the Gambell FSRC.

Data quality issues requiring results to be qualified are identified in the following sections. Any potential bias resulting from quality issue identified by the data qualifier is discussed and where possible, direction of bias is indicated (+/-).

4.1.1 Analytical Methods

Table 4-3 presents the analytical methods performed on the project samples.

TABLE 4-3: ANALYTICAL METHODS

Analyte	Analytical Method	Matrix
GRO	AK101	Water
DRO/RRO	AK102/AK103	Water
VOC (BTEX)	SW8260C	Water
PAH	SW8270D SIM	Water

4.1.2 Sample Holding Times and Preservation

All samples were prepared and analyzed within the method-required holding times.

Samples were received at the laboratory in good condition and preserved appropriately for the analytical methods that were requested.

Six coolers containing groundwater samples were received at the laboratory with temperatures exceeding the recommended range of 4±2 degrees Celsius (°C). **Table 4-4** lists the cooler temperatures and temperature blank temperatures for each of the coolers.

Coolers were not identified and the COCs did not identify which samples were in which coolers, with the exception of one cooler that was identified on the laboratory cooler receipt form as containing the VOC samples (VOA vials).

All sample results were qualified as estimated (J-/UJ) to indicate a potential low bias. Sample results that were affected by other quality control failures as well may be qualified as estimated without direction of bias indicated (direction of bias indeterminate). Validation qualifiers are included with the results in the data summary table (***Appendix C***).

TABLE 4-4: SAMPLE RECEIPT TEMPERATURES

Cooler ID	Cooler Temperature (°C)	Temperature Blank (°C)
1	6.0	7.3
2	8.6	15.1
3	5.7	8.4
4	8.4	9.7
5	7.8	9.0
6 (VOA vials)	4.9	7.2

4.1.3 Precision

4.1.3.1 Field Duplicates

One field duplicate was collected and analyzed for seven primary samples. Relative percent difference (RPD) was calculated for primary and duplicate samples where both results were greater than the limit of quantitation (LOQ) (Table 5-6). The recommended RPD for detected duplicate results for water samples is 30%. The higher of the two results was used for decision-making purposes.

Field duplicate pair 16GAM02MW02/16GAM08FD01 was analyzed by the methods listed in Table 4-3. Out of 26 pairs of duplicate results, nine pairs had both results that were non-detect.

Of the remaining 17 pairs of results, 13 pairs had both results greater than the LOQ and the RPDs were calculated. Seven pairs had results that were greater than the recommended 30% for waters (**Table 4-5**).

One pair of SW8270D SIM fluoranthene results and one pair of benzene results had both results less than the LOQ; therefore, no additional flags were required for RPD greater than the QC limit of 30% for waters. One pair of SW8270D SIM pyrene results and one pair of AK103 RRO results had one result less than the LOQ and one result greater than the LOQ; both results for each pair were qualified as estimated "J" (indeterminate bias).

TABLE 4-5: RELATIVE PERCENT DIFFERENCE CALCULATIONS

Method	Analyte	K1607616-002 16GAM02MW02 7/1/16	K1607616-008 16GAM08FD01 7/1/16	RPD/Notes
SW8260C	Benzene	0.07 J	0.1 UJ	Both results < LOQ
SW8260C	Ethylbenzene	3.6 J-	3.7 J-	2.7
SW8260C	m,p-Xylenes	7.7 J-	8 J-	3.8
SW8260C	o-Xylene	0.67 J-	0.66 J-	1.5
SW8260C	Toluene	9.5 J-	10 J-	5.1
SW8270D SIM	2-Methylnaphthalene	12 J	0.15 J	195.1
SW8270D SIM	Acenaphthene	0.68 J	0.34 J	66.7
SW8270D SIM	Acenaphthylene	0.37 UJ	0.11 UJ	Both ND
SW8270D SIM	Anthracene	0.1 J	0.049 J	68.5
SW8270D SIM	Benz(a)anthracene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Benzo(a)pyrene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Benzo(b)fluoranthene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Benzo(g,h,i)perylene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Benzo(k)fluoranthene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Chrysene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Dibenz(a,h)anthracene	0.005 UJ	0.005 UJ	Both ND

Method	Analyte	K1607616-002 16GAM02MW02 7/1/16	K1607616-008 16GAM08FD01 7/1/16	RPD/Notes
SW8270D SIM	Dibenzofuran	0.72 J	0.29 J	85.1
SW8270D SIM	Fluoranthene	0.014 J	0.013 J	Both results < LOQ
SW8270D SIM	Fluorene	1.2 J	0.59 J	68.2
SW8270D SIM	Indeno(1,2,3-cd)pyrene	0.005 UJ	0.005 UJ	Both ND
SW8270D SIM	Naphthalene	11 J	1.1 J	163.6
SW8270D SIM	Phenanthrene	0.11 J-	0.096	13.6
SW8270D SIM	Pyrene	0.015 J	0.022 J	One FD >LOD & <LOQ, one FD >LOQ
AK 102.0/103.0	C10 - C25 DRO	14,000 J-	14,000 J-	0.0
AK 102.0/103.0	C25 - C36 RRO	360 J	510 J	One FD >LOD & <LOQ, one FD >LOQ
AK101	C6 - C10 GRO	310 J-	340 J-	9.2

Notes:
All results in µg/L (micrograms per liter)
Bold indicates the result exceeds the cleanup level
Yellow highlighting indicates results qualified due to RPD outside criteria
DRO = diesel range organics
FD = field duplicate
GRO = gasoline range organics
J = estimated; result is greater than the MDL and less than the LOQ, the result is an estimated due to discrepancies in meeting certain analyte-specific quality control criteria
LOD = limit of detection
LOQ = limit of quantification
ND = nondetect
RPD = relative percent difference
RRO = residual range organics
U = not detected at the limit of detection

4.1.3.2 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/LSCD analyses were conducted at the required frequency of one per preparatory and analytical batch of 20 or fewer samples. The RPDs for LCS/LCSD recoveries were within laboratory limits; therefore, no data flags were required.

Matrix spike (MS) and MS duplicate (MSD) samples were submitted and analyzed. All RPDs for MS/MSD recoveries were within control limits.

4.1.4 Accuracy

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

4.1.4.1 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.

One sample, 16GAM01MW01, was designated for MS/MSD. Recovery of SW8270D SIM analyte naphthalene exceeded the upper control limit in both the MS and MSD performed for sample 16GAM01MW01. The associated sample result was qualified as estimated ("J") because it falls between the method detection limit (MDL) and the LOQ. High recovery in the MS/MSD indicates a potential high bias, however, because this samples is also affected by the cooler temperature and temperature blank exceedances discussed in Section 4.1.2, the qualifier applied to the result is "J" (indeterminate bias).

4.1.4.2 Surrogate Percent Recoveries

In most cases, surrogate recoveries were within control limits. However, several samples had one or more surrogates that exceeded the upper control limits; as this indicates a potential high bias, no data flags were required for associated nondetect results and there was no effect on data quality or usability. Additional details are included in the ADEC laboratory data review checklist.

Several samples had surrogate recoveries that required results to be qualified. Validation qualifiers are included in the data summary tables (***Appendix C***).

For SW8260C, recovery of toluene-d8 (116%) and 4-bromofluorobenzene (115%) exceeded the upper control limits of 112% and 114%, respectively, in sample 16GAM07MW07. Several associated sample results were nondetect and as this indicates a potential high bias, no data flags were required and there was no effect on data quality/usability. Sample results for ethylbenzene (0.080 µg/L) and m,p-xylenes (0.18 µg/L) may be considered potentially biased high but since the results are significantly below the associated cleanup levels, there is no effect on data quality or usability. Both results are already flagged as estimated ("J") because the results fall between the MDL and the LOQ. These samples are also affected by the cooler temperature/temp blank exceedances discussed in Section 4.1.2. Therefore, the qualifier "J" (estimated, indeterminate bias) has been applied to the results.

For SW8270D SIM, recovery of surrogate fluorene-d10 exceeded the upper control limit of 114% at 136% in sample 16GAM08FD01. Several associated sample results were nondetect and as this indicates a potential high bias, no data flags were required and there was no effect on data quality/usability. Associated results with positive detections may be considered potentially biased high but since all qualified results are below the associated cleanup levels, there is no effect on data quality or usability. These results are also affected by cooler temp/temp blank exceedances, as discussed in Section 4.1.2, therefore these positive results were qualified as estimated "J" (indeterminate bias). In addition, recovery of surrogate terphenyl-d10 was less than the lower control limit of 58% at 44% in sample 16GAM02MW02. Associated sample results were qualified as estimated "J-/UJ" and may be

considered potentially biased low. The other two surrogates were recovered within control limits.

4.1.5 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. Sample representativeness is considered acceptable for this project based on the following measures taken to maintain the integrity of material collected for analysis:

1. Sample collection was performed by an ADEC qualified environmental professional as detailed in 18 AAC 75.333 (ADEC 2016) using methods listed in the SCP (Eagle Eye 2016).
2. To minimize the potential for cross-contamination, sampling equipment was decontaminated between uses and new, pre-cleaned containers were used as specified in the SCP.
3. Samples were labeled and uniquely identified in accordance with the SCP, and field records indicate the monitoring well location from which each field sample was collected.
4. Laboratory protocol was performed in accordance with laboratory standard operating procedures.

4.1.6 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 and documentation was performed in accordance with the SCP (Eagle Eye 2016).
2. Standard analytical methods were used in accordance with the SCP (Eagle Eye 2016). 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.
5. Field instruments and measuring devices were calibrated daily and operated in accordance with the manufacturer recommendations.

4.1.7 Completeness

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

4.1.8 Sensitivity

4.1.8.1 Limits of Detection

Several samples required dilutions for high concentrations of target analytes which caused reporting limits to be elevated. All reporting limits were below the site-specific cleanup level, and there were no nondetect results with reporting limits over the cleanup level. There was no effect on data quality or usability.

4.1.8.2 Blank Results (Trip Blanks and Method Blanks)

Method blanks were analyzed at the required frequencies of one per matrix, analysis, and 20 or fewer samples. No target analytes were detected in the method blanks at levels above the reporting limit.

4.1.9 Data Summary

Based on the review completed on the laboratory data package, no data were rejected. However, several data quality issues were identified that required results to be qualified. The most significant data quality issue identified for these project samples is the temperature exceedances associated with the sample coolers at the time they were received at the laboratory.

The results may be considered usable, with the limitations discussed in the previous sections and in the associated ADEC laboratory data review checklist with regard to the qualifiers applied to the results. The data qualifiers applied as indicated, specifically with regard to the temperature exceedances, may modify the usefulness of those individual values.

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5.0 CONCEPTUAL SITE MODEL

CSMs were created for the Gambell FSRC site as part of the SC process. The CSM process assists in determining if any data gaps are present as well as complete pathways that need to be considered when working towards site closure. CSMs can be updated as more information is gathered at the site.

Using sample information collected from previous investigations along with the 2016 SC effort, the CSMs prepared for the SCP were reviewed. The conceptual model for exposure at Gambell FSRC incorporates past or current sources of contamination, chemical release mechanisms, transport/exposure media, potential exposure points, potential exposure routes, and potential receptors. The future scenario used in the models is conservative and assumes that the site and the adjoining properties will remain under the ownership of Sivuqaq Incorporated for the foreseeable future. Regarding human health exposure pathways, the inhalation of outdoor air exposure pathway is complete, but not significant at the site due to the small quantities and low concentrations of near-surface volatiles previously detected. Similarly, due to the shallow depth of some of the contaminated soil, incidental soil ingestion and dermal contact with soil is a complete, but unlikely, pathway of exposure. Although the public water supply for the village is an aquifer at the base of the mountain, approximately 2,000 feet east of the village, exposure to groundwater is considered complete because a formal groundwater determination per 18 AAC 75.350 has not been prepared for and approved by ADEC. All potentially complete ecological exposure pathways are considered insignificant because of the small size of the site, the location within Gambell, and the presence of more optimal habitat nearby. ***Appendix D*** presents the human health and ecological CSMs for the site.

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6.0 CONCLUSIONS AND RECOMMENDATIONS

In June and July 2016, Eagle Eye installed and collected analytical groundwater samples from seven groundwater monitoring wells. Well locations were chosen based on prior data and inferred groundwater flow at the site. Only one groundwater sample collected in 2016 contained DRO and naphthalene at concentrations above the ADEC groundwater cleanup levels. Prior data from 2011 indicates that DRO is above the ADEC groundwater cleanup level in multiple locations. The information gathered in 2016 confirms the information presented in the conceptual sites models prepared for the SCP. Based on these data results, it is recommended that the site be recommended for cleanup complete with institutional controls and that long-term groundwater monitoring be conducted on a regular basis to determine if additional actions need to be considered for site groundwater. This information should be presented in a Decision Document for the site.

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7.0 REFERENCES

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FIGURES

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EAGLE EYE
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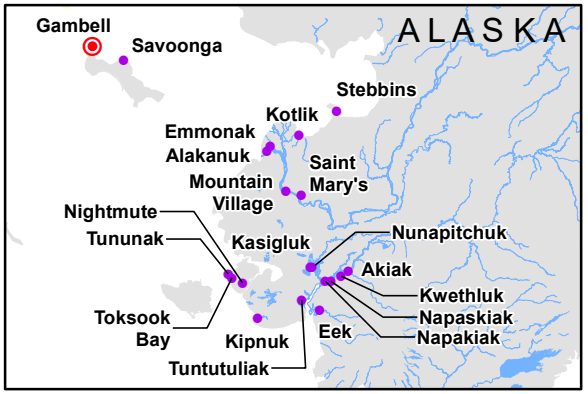
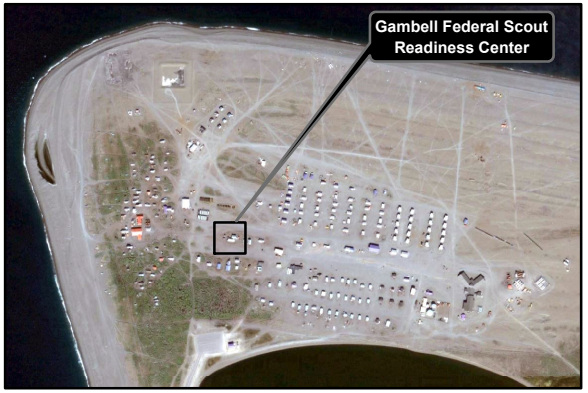
FIGURE 1
State and Site Location Maps
Site Characterization
Gambell Federal Scout Readiness Center
Gambell, AK

VICINITY MAP



GAMBELL OVERVIEW



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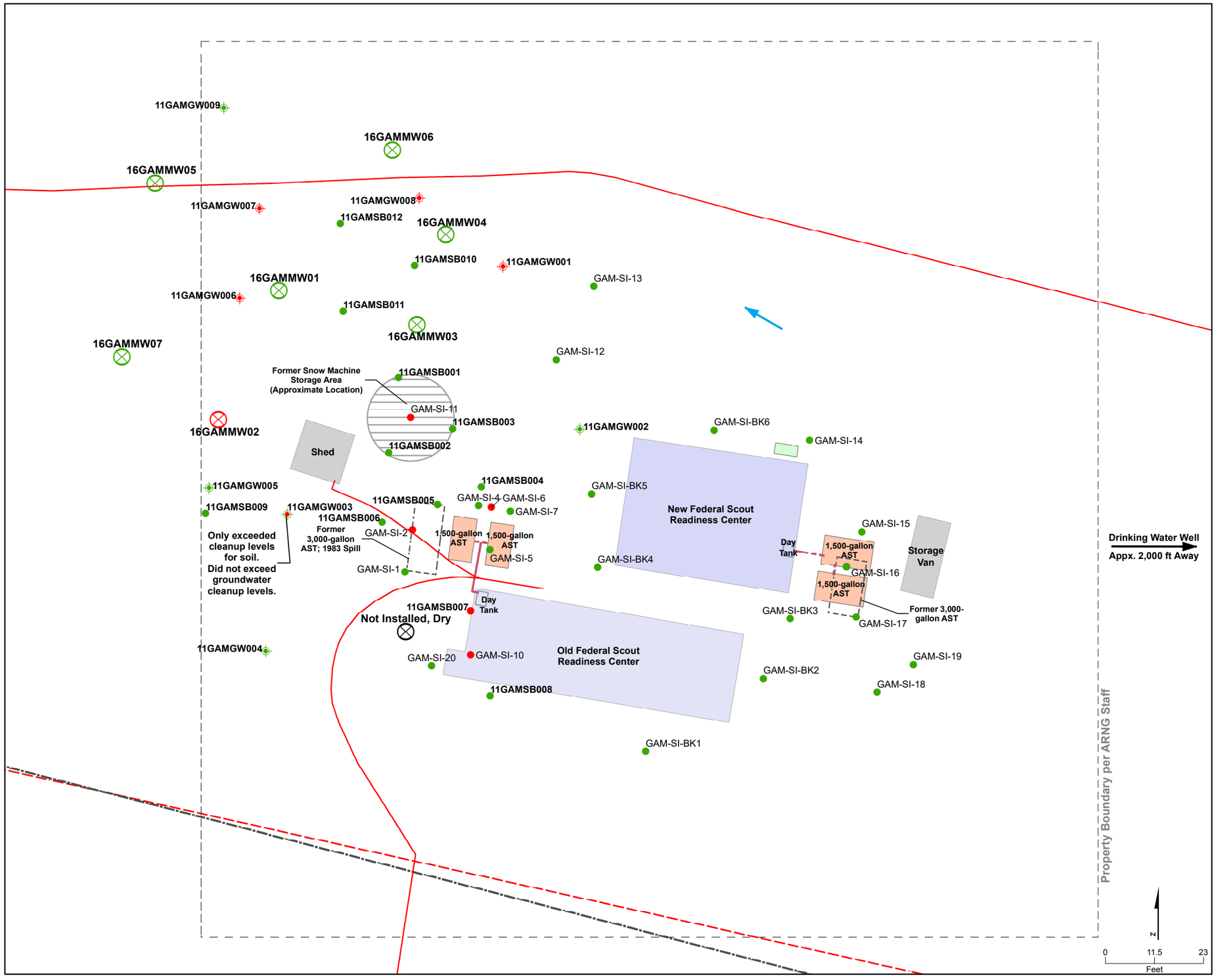

EAGLE EYE
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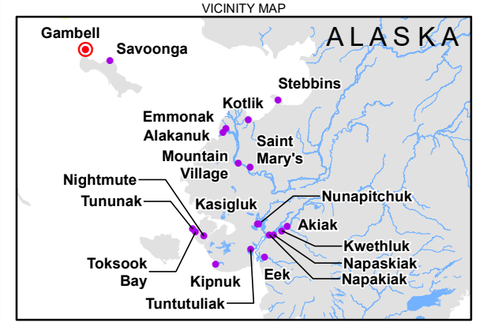
FIGURE 2
Sample Locations & Exceedances
Site Characterization
Gambell Federal Scout Readiness Center
Gambell, AK

VICINITY MAP



LEGEND

- New Federal Scout Readiness Center (FSRC)
- Old FSRC
- Storage Facility
- AST
- Former AST
- Day Tank
- Hazardous Material Storage Locker
- Property Line
- Tank Piping
- Easement Line
- Electric Line
- Fuel Line
- Presumed Groundwater Flow Direction

Monitoring Well Locations Installed and Sampled in 2016

- not installed, dry
- DRO < 1.5 mg/L
- DRO ≥ 1.5 mg/L

Previous Groundwater Sample Location (Sampled 2006-2011)

- DRO < 1.5 mg/L
- DRO ≥ 1.5 mg/L

Previous Soil Sample Location (Sampled 2006-2011)

- DRO < 250 mg/kg
- DRO ≥ 250 mg/kg, but < 10,250 mg/kg

Notes:
1. Location of historical samples is approximate based on historical figures and on orthophotography courtesy of Alaska Department of Commerce, Division of Community & Regional Affairs (DCRA), 1-foot pixels.
2. Definition:
   AST = aboveground storage tank
   DRO = diesel range organics
3. All prior wells have been abandoned/removed

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APPENDIX A

PHOTOGRAPH LOG

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Photograph 1: Discovery drilling 16GAMMW01. Facing west.

Photograph 2: Setting up at 16GAMMW03 for well development. Facing south.

Photograph 3: Well monument at 16GAMMW04. Facing north.

Photograph 4: Well development at 16GAMMW04. Facing north.

Photograph 5: Four-wheeler and trailer used for gear transport. Facing east.

Photograph 6: The Gambell FSRC jobsite. Facing south.

Photograph 7: Developing 16GAMMW07. Facing northwest.

Photograph 8: Developing 16GAMMW07. Facing northeast.

Photograph 9: Developing 16GAMMW07. Facing northeast.

Photograph 10: Purging well 16GAMMW01 for sampling. Facing southeast.

Photograph 11: Shed used for swing tie measurements. Facing east.

Photograph 12: The Gambell FSRC jobsite. Facing northeast.

Photograph 13: Drill rig and tooling staged at the airport for pick-up by the Sherpa. Facing north.

Photograph 14: Purging well 16GAMMW04 for sampling. Facing north.

Photograph 15: GAC setup. Facing west.

Photograph 16: Collecting sample 16GAM01MW07. Facing north.

Photograph 17: Loading the drill rig mast onto the Sherpa for transport. Facing west.

Photograph 18: The Sherpa loaded up with gear. Facing south.

Photograph 19: Loading the drill rig into the Sherpa for transport. Facing south.

Photograph 20: Last load of gear loaded up and secured in the Sherpa. Facing north.

Photograph 21: The village of Gambell. Facing west.

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APPENDIX B

FIELD DOCUMENTATION

B-1 FIELD NOTES

B-2 MONITORING WELL INSTALLATION AND SAMPLE FORMS

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B-1 FIELD NOTES

June 30, 2016 — Gambell — M. Helms — 45°F, Clear/Sunny, Slight Breeze

0600	Morning safety meeting w/ M. Helms and Discovery Drilling crew.
0620	Site walk. There are multiple indications of buried lines on site. We will need utility locates completed before drilling the holes close to the buried electric line. Work on contacting villagers to get someone to mark out lines.
1030	Christian Johnson arrives in Gambell from Nome. Alaska Village Electric Cooperative contacts us to come out for utility locates.
1300	The Gambell sewer and water company arrive on site for Sewer and Water locates.
1430	Lines have all been located. Drillers are just finishing going through all their gear. Ready to drill.
1440	Begin drilling at location closest to shed's NW corner.
1455	Depth to 10'. No water present. Drill to 15' still no water present.
1515	Move to next location ~30' N of shed. Drill to 10'. Water is present. Install well ~~16 GAMOTTMW01~~ 16 GAMMW01.
1625	Begin Developing well once well construction is complete, Drillers have moved on to another location. Had them step out 10' from 1st location. Step out 10' W. Water hit @ 10'. Install 16GAMMW02.
1700	Drillers move to location ~25' W of 16 GAMMW01. Water is present @ 10'. Install well 16 GAMMW03.
1730	Drillers move to location furthest south and closest to the old scout readiness center. Location is dry down to 15'. Drillers step out 10' W away from building. Hole drilled to 15'. Still dry. Already have previous clean data on the other side of electric line. Tell drillers to move locations
1742	Finish developing 16GAMMW01. Move set up to 16GAMMW02.
1750	Begin well development of 16GAMMW02.
1800	Drillers begin drilling at location ~20' NE of 16GAMMW03. Water present @ 10'. Install well 16 GAMMW~~03~~ 04.
1830	Drillers begin drilling at location ~30' NW of 16GAMMW01. Water present @ 10'. Install well 16 GAMMW05.
1900	Drillers begin drilling at location ~40' E of 16GAMMW05. Water present @ 10'. Install well 16GAMMW06.
1930	Drillers are done for the night. C. Johnson & M. Helms stay on site to continue developing wells. Finish developing 16GAMMW02 @ 1932. Move over to 16GAMMW03 to develop.
1950	Begin pumping for developing 16GAMMW03.
2018	Well ran dry. ~~@~~ Finished developing 16GAMMW03.
2030	Begin De-Mobe from the site for the day.
2100	Back at lodge. Complete daily Report. Done for the Day

Rite in the Rain — Michael W. Helms 6/30/16 — 1 of 1

45°; Clear/Sunny
Slight Breeze

Gambell
M. Helms, C. Johnson

July 1, 2016

0700	M. Helms & C. Johnson meet for daily safety meeting. The drillers are done drilling so they are starting later today. Will go over safety meeting w/ them when they arrive on site for de-mobe of drilling equipment.
0725	Begin moving gear to project site. Set up at 16GAMMW04 to develop well.
0750	Begin developing 16GAMMW04. Run buckets full of water from June 30 through GAC for discharge on site. No sheen present in discharge.
0915	Max purge volume reached at 16GAMMW04. Move to 16GAM MW05.
0940	Begin developing 16GAMMW05. Run additional buckets of water from this morning through GAC for discharge on site. No sheen present in discharge. Drillers on site. No water is present at or around the proposed location of the well closest to the Old Scout building have them move to a location ~30' SW of 11GAMW006. Water is present at 10'. Install well 16GAMMW07.
1035	Finish developing 16GAMMW05. All stabilization parameters met. Move to 16GAMMW06.
1050	Begin developing 16GAMMW06.
1202	Finish developing 16GAMMW06, Brian, the Sheipa pilot calls, has questions about gear staged on the Gambell runway. Go to runway w/ drillers and stage gear how the pilot wants it. Move gear to 16GAMMW07 to develop well.
1345	Begin developing 16GAMMW07.
1425	Finish developing 16GAMMW07. Max purge volume reached. Move to 16GAMMW01 to water sample
1500	Set up at 16GAMMW01 and begin purging.
(1545)	Collect sample 16GAM01MW01. MS/MSD collected at this location. See Well Purge and Sampling Form for more information
1655	Set up at 16GAMMW02 and begin purging.
(1735)	Collect sample 16GAM02MW02. After Sample ~~16GAM08MW~~ 16GAM08FD01 was collected as a field duplicate at this location @ 1745
1830	Start purging at 16GAMMW03
(1900)	Collect sample 16GAM03MW03.
1930	Depart site. Done for the day. Prepare and send daily re

7/1/16

Michael W. Helms

45°F, Mostly Sunny
10-15mph winds

Gambell
M. Helms, C. Johnson

July 2, 2016

0700	Conduct safety meeting w/ MH & CJ. Topic of the day: Proper Ergonomics. Gather gear and consolidate for transport from the site.
0715	Talked to the Sherpa pilot. ETA is 0900 for Sherpa.
0750	Begin purging @ 16GAMMW04.
0815	Max Volume purged at 16GAMMW04. Collect sample 16GAM04MW04.
0835	Begin purging @ 16GAMMW05.
0900	Max Volume purged at 16GAMMW05. Collect sample 16GAM05MW05.
0910	Begin purging @ 16GAMMW06.
0935	Max Volume purged at 16GAMMW06. Collect sample 16GAM06MW06.
0955	Begin purging @ 16GAMMW07.
1025	Max Volume purged at 16GAMMW07. Collect sample 16GAM07MW07. For more details on monitoring well samples, see Well Purging & Sampling Forms. Run all remaining purge water through the GAC system and discharge on site. No sheen present in discharge.
1100	Sherpa arrives on site. Help pilots load gear.
1210	Sherpa departs w/ first load to Savoonga.
1245	Back on site for Swing ties: 16GAMMW01: From NW corner of shed: 29.8' From NE corner of shed: 35.6' 16GAMMW02: NW corner of Shed: 16.1' NE corner of Shed: 28.0' 16GAMMW03: NW corner of shed: 36.0' NE corner of shed: 32.6' 16GAMMW04: NW corner of shed: 47.6' NE corner of shed: 43.2' 16GAMMW05: NW corner of shed: 61.3' NE corner of shed: 66.3' 16GAMMW06: NW corner of shed: 65.0' NE corner of shed: 59.9' 16GAMMW07: NW corner of shed: 34.1' NE corner of shed: 46.0' All measurements for swing ties taken off shed are taken from the bottom corner of the metal siding.

Rite in the Rain Michael W. Helms 7/2/16

July 2, 2016

Gambell
Mt, CJ

1300	Done on site. Take gear back to housing. Will pack gear for Sherpa and finish labeling jars if time allows.
1450	Load up Sherpa for second load to Savoonga
1630	Sherpa departs. Continue to pack gear. Transport gear down to airport.
1800	Sherpa headed to Nome for fuel.
1915	Sherpa back on site for last gear haul
2030	Depart Gambell for Savoonga
2050	Land in Savoonga. Unload gear and transport to site & housing. Complete daily report & send off.

7/2/16

Michael W. Hall

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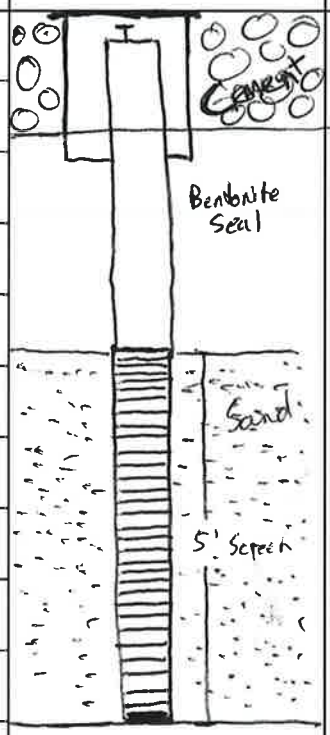
B-2 MONITORING WELL INSTALLATION AND SAMPLE FORMS

EAGLE EYE
A Bering Straits Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: 1145019	Client: Alaska Army National Guard	Boring No. 16GAMMW01
Address, City, State: Gambell, AK		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auger	
Drill Crew: Gary & Loki	Date Completed: 6/30/16		
	Groundwater Depth: 7.30'	Elevation: N/A	Total Depth: 10.0'

Depth (feet)	Diagram	Field Installation Information
1		8" Flush Mount Surface Monument (material _____)
2		~~Well Plug~~ MT 1.5' Cement Surface Seal
3		3.0 ~~5~~ MW Feet Bentonite Seal
4		~~None~~ 5' Casing (material 2" PVC)
5		5' Screen (material Slotted PVC)
6		Silica Sand 5' Screen Filter (material Silica Sand)
7		N/A Surface Elevation
8		N/A Casing Elevation
9		N/A Casing Stickup
10		9.95' Depth of Well
11		MT 9 10.0' Depth of Boring
12		7.30 Depth to Groundwater from TOC on (date) 6/30/16
13		Development Method Purging w/ Peri Pump
14		Development Time & Purge Volume 77 minutes, 36-L

Checked: Michael W. Hanlon 7/4/16

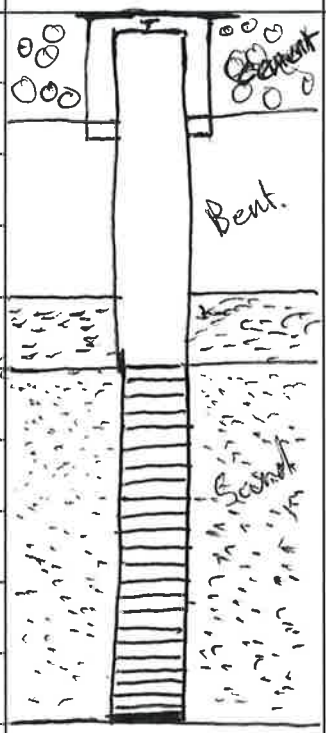
EAGLE EYE
A Hearing Shots Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: 1145019	Client: Alaska Army Nat. Guard	Boring No. 16GAMMW02
Address, City, State: Gambell, AK		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auguer & Geoprobe	
Drill Crew: Gary & Loki	Date Completed: 6/30/16		
	Groundwater Depth: 8.30	Elevation: N/A	Total Depth: 10.0'

Diagram



Field Installation Information

Flush Mount Surface Monument (material 8")

1.5' Cement ~~Well Plug~~ Surface Seal

2.5' Bentonite Seal

5' Casing (material 2" PVC)

5' Screen (material Slotted PVC)

6' Screen Filter (material Silica Sand)

N/A Surface Elevation

N/A Casing Elevation

N/A Casing Stickup

10.0' Depth of Well

10.0' Depth of Boring

8.30 Depth to Groundwater from TOC on (date) 6/30/16

Development Method Purging w/ Peri Pump

Development Time & Purge Volume 102 minutes, 23.47-L

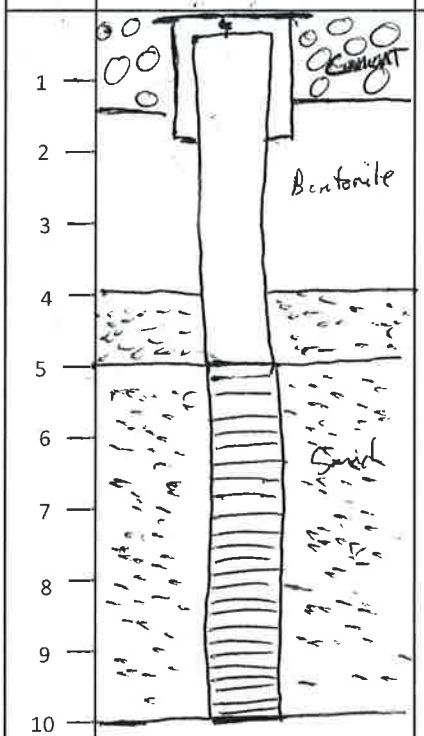
Checked: Michael W. Helms 7/4/16

EAGLE EYE
A Leading Shields Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: 1145019	Client: Alaska Army Nat. Guard	Boring No. 16GAMMW03
Address, City, State: Gambell, AK		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auger/Geoprobe	
Drill Crew: Gary & Loki	Date Completed: 6/30/16		
	Groundwater Depth: 8.0'	Elevation: N/A	Total Depth: 10.0'



Field Installation Information

- Flush Mount Surface Monument (material 8")
- ~~Well Plug~~ 1.5' Cement Surface Seal
- 2.5' Bentonite Seal
- 5' Casing (material 2" PVC)
- 5' Screen (material 2" Slotted PVC)
- 6' Screen Filter (material Silica sand)
- N/A Surface Elevation
- N/A Casing Elevation
- N/A Casing Stickup
- 10.0' Depth of Well
- 10.0' Depth of Boring
- 8.0' Depth to Groundwater from TOC on (date) 6/30/16
- Development Method Purging w/ PeriPump
- Development Time & Purge Volume 28 minutes, 15.0-L

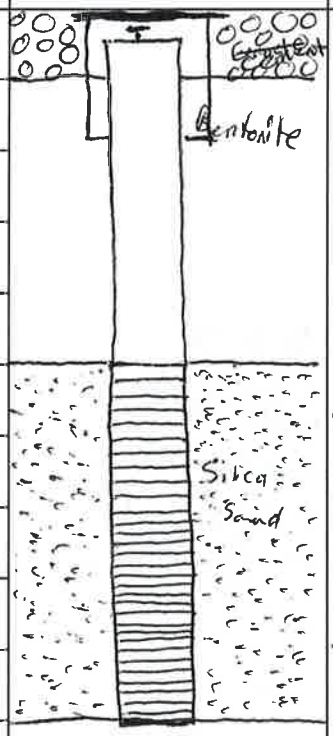
Checked: Michael W. Helms 7/1/16

EAGLE EYE
A Reilly Sports Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: Alaska Army Nat. Guard	Client: 1145019	Boring No. 16GAMMW04
Address, City, State: Gambell, AK		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auger/Geoprobe	
Drill Crew: Gary & Loki	Date Completed: 7/01/16		
	Groundwater Depth: 7.00	Elevation: N/A	Total Depth: 10.05



Field Installation Information

- 8" Surface Monument (material Flush Mount)
- ~~Well Plug~~ 1.0' Cement Surface Seal
- 4.0' Bentonite Seal
- 5' Casing (material 2" PVC)
- 5' Screen (material 2" Slotted PVC)
- 5' ~~N/A~~ MT Screen Filter (material Silica Sand)
- N/A Surface Elevation
- N/A Casing Elevation
- N/A ~~10.05~~ Casing Stickup
- 10.05 Depth of Well
- 10.05 Depth of Boring
- 7.00 Depth to Groundwater from TOC on (date) 7/1/16
- Development Method: Purging w/ Peri Pump
- Development Time & Purge Volume: 85 minutes, 41.95-L

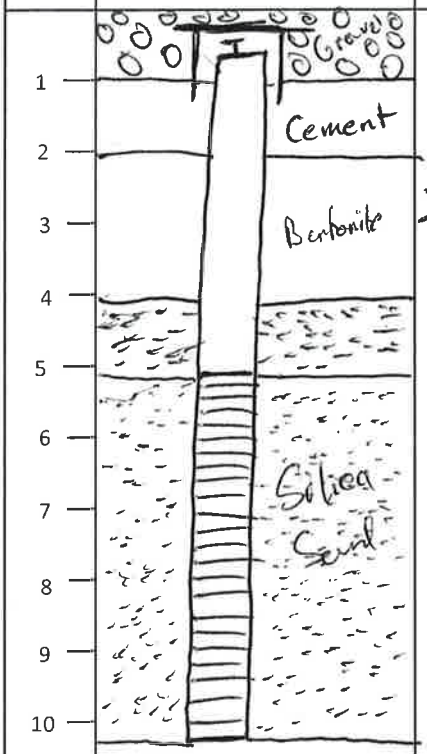
Reviewed: Michael W. Hart 7/4/16

EAGLE EYE
A Bering Straits Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: 114 5019	Client: Alaska Army Nat. Guard	Boring No. 16GAMMW05
Address, City, State: Gambell, AK		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auger on Geoprobe	
Drill Crew: Gary & Loki	Date Completed: 7/1/16		
	Groundwater Depth: 7.2	Elevation: N/A	Total Depth: 10.2



Field Installation Information

- 8" Surface Monument (material Flush Mount)
- ~~Well Plug~~ 1.0' Cement Surface Seal
- 2 ft Bentonite Seal
- 5' Casing (material 2" PVC)
- 5' Screen (material Slotted 2" PVC)
- 1 ft Screen Filter (material Silica Sand)
- N/A Surface Elevation
- N/A Casing Elevation
- N/A Casing Stickup
- 10' Depth of Well
- 10' Depth of Boring
- 7.2' Depth to Groundwater from TOC on (date) 7/1/16
- Development Method: Purging w/ Peri Pump
- Development Time & Purge Volume: 55 minutes, 30.0-L

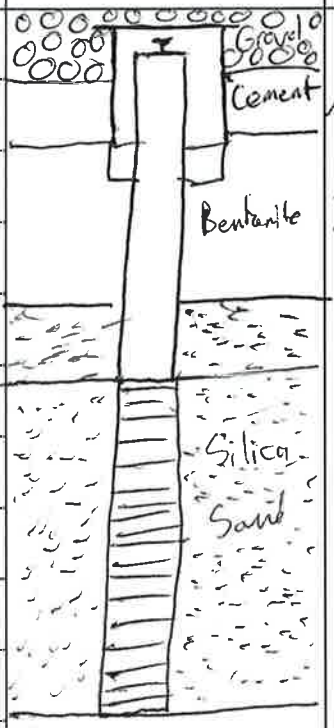
Reviewed: Michael W. Helms 7/4/16

EAGLE EYE
A Bering Straits Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: 114501	Client: Alaska Army National Guard	Boring No. 166AMMW05
Address, City, State: Gambell, AK		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auger & GeoProbe	
Drill Crew: Gary & Loki	Date Completed: 7/1/16		
	Groundwater Depth: 6.70	Elevation: N/A	Total Depth: 9.90



Field Installation Information

- 6" Surface Monument (material Flush Mount)
- ~~Well Plug~~ NF 1.0' Cement Surface Seal
- ~~2~~ NF 1' Bentonite Seal
- 5' Casing (material 2" PVC)
- 5' Screen (material Slotted 2" PVC)
- 5' Screen Filter (material Silica Sand)
- N/A Surface Elevation
- N/A Casing Elevation
- N/A Casing Stickup
- ~~10~~ NF 9.9' Depth of Well
- 9.9' Depth of Boring
- 6.7' Depth to Groundwater from TOC on (date) 7/1/16
- Development Method: Purging w/ Peri Pump
- Development Time & Purge Volume: 77 minutes, 43.52-L

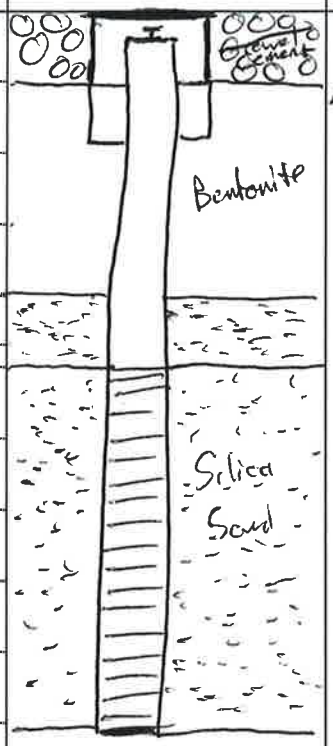
Reviewed: Michael W. Hudson 7/4/16

EAGLE EYE
A Boring Studs Company

RECORD OF WELL CONSTRUCTION

Sheet 1 of 1

Project: Gambell	Project Number: 1145019	Client: Alask Army Nat. Guard	Boring No. 16GAMW07
Address, City, State: Gambell, Ak		Drilling Contractor: Discovery	
Logged By: M. Helms	Date Started: 6/30/16	Drilling Method and Equipment Used: Hollow Stem Auger on Geoprobe	
Drill Crew: Gary & Loki	Date Completed: 7/1/16		
	Groundwater Depth: 8.40	Elevation: N/A	Total Depth: 10.0'



Field Installation Information

- 8" — Surface Monument (material: Flush Mount)
- ~~Well Plug~~ 1.0' Cement — Surface Seal
- 3.4' — Bentonite Seal
- 5' — Casing (material: 2" PVC)
- 5' — Screen (material: Slotted 2" PVC)
- 6' — Screen Filter (material: Silica Sand)
- N/A — Surface Elevation
- N/A — Casing Elevation
- N/A — Casing Stickup
- 10' — Depth of Well
- 10' — Depth of Boring
- 8.40 — Depth to Groundwater from TOC on (date) 7/1/16
- Development Method: Purging w/ Peri Pump
- Development Time & Purge Volume: 40 minutes, 22.0L

Reviewed: Michael W. Hicks 7/4/16

EAGLE EYE
A Bering Straits Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMW01

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	Gambell Scout Readiness	MF
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
Sunny 55°F	Ambient 0 Breathing Zone 0 In Well ____	6/30/16	1625/1742

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
PVC / 2 SS / 2	None	9.95	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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	7.30	9.95	N/A

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 = (9.95 ft – 7.30 ft) * 0.362 gal/ft = 0.95 gal (* 3.785 L/gal = 3.59 L)

Min Purge Vol. = 2 * ~~0.95~~ gal + 3 * 0.95 gal = ~~4.75~~ gal (* 3.785 L/gal = ~~17.98~~ L)

Max Purge Vol. = 2 * ~~0.95~~ gal + 10 * 0.95 gal = ~~13.3~~ gal (* 3.785 L/gal = ~~99.62~~ L) 35.95L

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
16:25	1742	9.95	sprinkler pump w/ surge block submersible pump peristaltic pump

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
Clear Cloudy Brown Other:	None Moderate Faint Strong	Yes No	Yes No	YSI Multi Meter Hach Turbidimeter	9.60 (during stabilization)

Purging reached: Stability Max Vol. Purge water was: Treated Stored Other Note:

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)	
1630	0.0	0.0	4.95	383	11.46	6.16	148.2	373.2	7.30
1635	2.5	2.5	3.69	361	11.74	6.23	132.3	727.7	7.30
1640	~~5.5~~	5.0	2.06	317	12.62	6.31	127.1	734.3	7.30
1645	2.5	7.5	1.64	304	13.10	6.37	124.5	717.5	7.30
1650	2.5	10.0	1.54	295	13.23	6.38	122.6	1001	7.30
1655	2.5	12.5	1.50	277	13.44	6.45	120.0	994.9	7.30
1700	2.5	15.0	1.43	254	13.96	6.51	118.9	992.3	7.30
1705	2.5	17.5	1.32	243	14.30	6.52	116.7	875.0	7.30
1710	2.5	20.0	1.34	233	14.34	6.52	119.5	665.1	7.30
1715	2.5	22.5	1.46	224	14.56	6.51	119.3	893.1	7.30
1720	2.5	25.0	1.35	215	14.95	6.52	120.9	472.8	7.30
1725	2.5	27.5	1.35	208	14.71	6.52	122.0	358.0	7.30
1730	2.5	30.0	1.34	204	14.73	6.53	123.0	435.0	7.30
1735	2.5	32.5	1.27	199	14.75	6.53	124.8	585.0	7.30
1740	2.5	35.0	1.27	196	14.82	6.55	125.9	463.1	7.30
1742	1.0	360	MAX PURGE VOL.			Reached			

Michael W. Hutchison 6/30/16

EAGLE EYE
A Bering Straits Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMMW02

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	Gambell	MF/CJ
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
Sunny / 55°F	Ambient 0 Breathing Zone 0 In Well 0	6/30/15	1750/1932

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
(PVC / 2) SS / 2	None	10.0'	(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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	8.30	10.0'	N/A

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 = (10.0 ft – 8.30 ft) * 0.362 gal/ft = 0.62 gal (* 3.785 L/gal = 2.32 L)

Min Purge Vol. ~~= 2 *~~ ____ ~~gal~~ + 3 * 0.62 gal = 1.86 gal (* 3.785 L/gal = 7.04 L)

Max Purge Vol. = ~~2 *~~ ____ ~~gal~~ + 10 * 0.62 gal = 6.20 gal (* 3.785 L/gal = 23.47 L)

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
1750	1932	10.0	sprinkler pump w/ surge block; submersible pump; (peristaltic pump)

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
(Clear) Cloudy Brown Other:	(None) Moderate Faint Strong	Yes (No)	Yes (No)	YSI Multi Meter; Hach Turbidimeter	9.70 (during stabilization)

Purging reached: Stability (Max Vol.) Purge water was: (Treated) Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters) Change	Volume Total	Acceptable Range to Demonstrate Stability: ± 1.0 °C Temperature (°C)	± 3% Conductivity (µS/cm)	± 10% or 0.3 mg/L (whichever is greater) DO (mg/L)	± 0.1 pH (std units)	± 10 mV ORP (mV)	± 10% or ±1 NTU Turbidity (NTU)	Water Level (feet btoc)
1805	1.15	1.15	2.61	1003	9.72	6.55	70.1	249.4	8.75
1810	1.15	~~1.15~~ 3.30	2.28	812	10.49	6.58	69.5	189.2	8.8
1815	1.15	~~3.45~~ 4.75	2.37	660	11.00	6.60	71.3	628.6	8.5
1820	1.15	~~4.60~~ 5.95	2.31	633	10.89	6.56	73.3	336.5	8.9
1825	1.15	5.75	2.69	671	10.14	6.55	76.7	423.8	8.9
1830	1.15	6.90	2.59	759	9.25	6.52	81.9	332.5	8.9
1835	1.15	8.05	2.34	871	8.74	6.49	84.8	68.01	8.9
1840	1.15	9.20	2.26	935	8.07	6.48	82.9	120.9	8.9
1845	1.15	10.35	2.53	988	7.26	6.49	72.3	52.11	9.0
1850	1.40	11.75	2.25	1006	6.86	6.49	60.3	45.84	9.1
1855	1.40	13.15	2.34	1038	6.25	6.48	51.7	80.51	9.1
1900	1.40	14.55	2.38	1065	9.30	6.46	41.9	230.0	9.1
1905	1.40	15.95	2.24	1092	5.67	6.47	37.9	31.72	9.1
1910	1.40	17.35	2.29	1113	5.58	6.46	36.0	29.33	9.1
1915	1.40	18.75	2.24	1139	5.35	6.46	34.3	27.07	9.1
1920	1.40	20.15	2.19	1157	5.40	6.46	33.4	25.99	9.1
1925	1.40	21.55	2.12	1172	5.33	6.46	33.1	23.99	9.1
1930	1.40	22.95	2.21	1189	5.03	6.46	33.1	21.66	9.1
1932	0.56	23.47	MAX PURGE VOL. Reached						

Michael W. Hunter 6/30/15

EAGLE EYE
A Bering Straits Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMWO3

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	Gambell	CJ
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
50°F/Sunny	Ambient 0 Breathing Zone 0 In Well 0	6/30/16	1950/2018

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
(PVC / 2) SS / 2	None.	10.0	(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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	8.00	10.0	N/A

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 = (10 ft – 8 ft) * 0.362 gal/ft = 0.724 gal (* 3.785 L/gal = 2.74 L)

Min Purge Vol. = ~~2 *~~ ~~gal~~ + 3 * 0.724 gal = 2.17 gal (* 3.785 L/gal = 8.21 L)

Max Purge Vol. = ~~2 *~~ ~~gal~~ + 10 * 0.724 gal = 7.24 gal (* 3.785 L/gal = 27.40 L)

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
1950	2018	10.05	sprinkler pump w/ surge block submersible pump peristaltic pump

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
(Clear) Cloudy Brown Other:	(None) Moderate Faint Strong	Yes (No)	(Yes) No	YSI Multi Meter Hach Turbidimeter	9.80' (during stabilization)

Purging reached: Stability Max Vol. | Purge water was: (Treated) Stored Other Note: Purged Dry

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)	
2000	5.0	5.0	1.09	464	19.22	7.10	103.3	590.5	8.75
2005	2.5	7.5	0.99	403	18.83	7.06	108.9	589.4	9.1
2010	2.5	10.0	1.0	327	18.88	7.02	104.1	485.0	9.6
2015	2.5	12.5	1.34	325	17.66	6.91	102.1		
2020	2.5	15.0	Purged Dry						
2025	2.5	17.5							
2030	2.5	~~20.0~~							
~~2035~~	~~2.5~~	22.5							
2040	2.5	25.0							
~~2045~~	2.5	27.5							

CJ

Michael W. Hulse 6/30/16

EAGLE EYE
A Bering Straits Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMWO4

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	Gambell	JE CS
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
45° / Sunny	Ambient 0 Breathing Zone 0 In Well 0	7/1/16	07:50 / 09:15

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
PVC / 2 SS / 2	None	10.05	(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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	7.00	10.05	N/A

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 = (10.05 ft – 7.00 ft) * 0.362 gal/ft = 1.10 gal (* 3.785 L/gal = 4.16 L)

Min Purge Vol. = ~~2~~ gal + 3 * 1.10 gal = 3.30 gal (* 3.785 L/gal = 12.49 L)

Max Purge Vol. = ~~2~~ gal + 10 * 1.10 gal = 11.00 gal (* 3.785 L/gal = 41.64 L)

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
07:50	09:15	10.05	sprinkler pump w/ surge block; submersible pump; peristaltic pump

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
(Clear) Cloudy Brown Other:	(None) Faint Moderate Strong	Yes (No)	Yes (No)	YSI Multi Meter; Hach Turbidimeter	9.70 (during stabilization)

Purging reached: Stability (Max Vol.) Purge water was: (Treated) Stored Other Note:

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 (uS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	
08:00	4.0	4.0	1.15	~~1035~~	22.61	6.38	163.8	84.91	7.7
08:05	2.0	6.0	0.69	949	14.80	6.57	161.7	106.6	7.9
08:10	2.0	8.0	0.55	930	14.22	6.64	160.3	74.78	8.0
08:15	2.0	10.0	0.51	900	13.95	6.67	158.9	77.61	8.0
08:20	2.0	12.0	0.61	919	13.64	6.69	157.8	47.94	8.0
08:25	2.5	14.5	0.34	1045	13.36	6.63	158.4	32.48	7.95
08:30	2.5	17.0	0.31	1153	12.80	6.58	160.6	22.19	8.0
08:35	2.75	19.75	0.30	1398	12.22	6.52	164.3	16.98	8.1
08:40	2.75	22.50	0.28	1589	11.0	6.50	164.9	15.1	8.1
08:45	2.75	25.25	0.27	1758	10.52	6.49	165.5	9.02	8.2
08:50	2.75	28.0	0.28	1872	9.51	6.49	166.0	8.62	8.2
08:55	2.75	30.75	0.33	1990	8.74	6.48	166.8	5.97	8.2
09:00	2.75	33.50	0.29	2078	13.21	6.48	166.7	49.33	8.2
09:05	2.75	36.25	0.30	2147	7.77	6.48	167.0	5.09	8.3
09:10	2.75	39.0	0.28	2205	7.37	6.48	166.9	85.63	8.3
09:15	2.75	41.75	MAX PURGE VOL. Reached						

Reviewed Michael W. Hahn 7/4/16

EAGLE EYE
A Battelle Shotts Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMMW05

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	GAM	JC CS
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
45° / Sunny	Ambient 0 Breathing Zone 0 In Well 0	7/1/16	09:40 DT / 1035

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
PVC / 2 SS / 2	None	10.2	(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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	7.2	10.2	N/A

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 = (10.20 ft – 7.20 ft) * 0.362 gal/ft = 1.086 gal (* 3.785 L/gal = 4.11 L)

Min Purge Vol. = ~~2 * ____ gal~~ + 3 * 1.086 gal = 3.26 gal (* 3.785 L/gal = 12.30 L)

Max Purge Vol. = ~~2 * ____ gal~~ + 10 * 1.086 gal = 10.86 gal (* 3.785 L/gal = 41.11 L)

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
0940	1035	10.2	sprinkler pump w/ surge block submersible pump peristaltic pump

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
(Clear) Cloudy Brown Other:	(None) Moderate Faint Strong	Yes (No)	Yes (No)	YSI Multi Meter Hach Turbidimeter	10.0 (during stabilization)

Purging reached: (Stability) Max Vol. Purge water was: (Treated) Stored Other Note:

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)	
0950	5.50	5.50	0.48	162	12.96	7.11	125.0	469.0	7.2
0955	2.75	8.25	0.44	157	12.66	6.96	125.1	734.4	7.2
10:00	2.75	11.00	0.41	155	12.69	6.83	125.2	364.2	7.2
1005	2.75	13.75	0.41	152	12.61	6.74	125.1	564.0	7.2
1010	2.75	16.25	0.42	150	12.74	6.70	125.3	304.0	7.2
1015	2.75	19.0	0.43	149	12.43	6.67	125.3	280.9	7.2
1020	2.75	21.75	0.43	149	12.50	6.65	125.3	267.2	7.2
1025	2.75	24.50	0.44	147	12.56	6.62	125.6	258.4	7.2
1030	2.75	27.25	0.43	145	12.57	6.60	125.8	236.4	7.2
1035	2.75	30.0	0.43	143	12.48	6.59	126.2	233.0	7.2
			Stabilization parameters reached						

Reviewed: Michael W. Hunter 7/4/16

EAGLE EYE
A Bering Straits Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMMW06

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	Gambell	CJ
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
Sunny / 50°F	Ambient 0 Breathing Zone 0 In Well 0	7/1/16	1050 / 1202

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
PVC / 2 SS / 2 ___/___	None	9.90	(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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	6.70	9.90	N/A

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 = (9.90 ft – 6.70 ft) * 0.362 gal/ft = 1.15 gal (* 3.785 L/gal = 4.35 L)

Min Purge Vol. ~~= 2 * ___ gal~~ + 3 * 1.15 gal = 3.45 gal (* 3.785 L/gal = 13.06 L)

Max Purge Vol. = ~~2 * ___ gal~~ + 10 * 1.15 gal = 11.5 gal (* 3.785 L/gal = 43.52 L)

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
1050	1202	9.90	sprinkler pump w/ surge block submersible pump peristaltic pump

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
(Clear) Cloudy Brown Other:	(None) Moderate Faint Strong	Yes (No)	Yes (No)	YSI Multi Meter Hach Turbidimeter	9.60 (during stabilization)

Purging reached: Stability (Max Vol.) Purge water was: (Treated) Stored Other Note:

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)	
11:00	6.0	6.0	0.64	231	50.33	7.11	139.0	824.5	7.0
11:05	3.0	9.0	0.47	227	18.52	7.15	138.8	630.9	7.0
11:10	3.0	12.0	0.42	212	17.62	7.10	137.7	352.6	7.0
11:15	3.0	15.0	0.44	191	17.06	7.03	136.1	241.6	7.0
11:20	3.0	18.0	0.40	175	16.33	6.94	135.1	179.1	7.0
11:25	3.0	21.0	0.43	163	15.96	6.87	135.0	142.4	7.0
11:30	3.0	24.0	0.43	157	15.79	6.83	135.1	120.9	7.0
11:35	3.0	27.0	0.43	150	15.82	6.78	135.8	97.17	7.0
11:40	3.0	30.0	0.43	146	15.46	6.75	136.8	83.9	7.0
11:45	3.0	33.0	0.43	142	15.57	6.72	139.2	73.35	7.0
11:50	3.0	36.0	0.43	140	15.46	6.69	139.1	67.45	7.0
11:55	3.0	39.0	0.44	138	15.28	6.67	141.2	62.1	7.0
12:00	3.0	42.0	0.46	136	15.35	6.65	140.6	55.1	7.0
12:02	1.5	43.52	MAX Purge Vol. Reached						

Reviewed: [signature] 7/4/16

EAGLE EYE
A Boeing Straits Company

WELL DEVELOPMENT DATA SHEET

WELL ID: 16GAMMW07

PROJECT NAME	CLIENT	SITE	Developer Initials
Gambell	Alaska Army National Guard	Gambell	CJ
WEATHER/TEMPERATURE	**PID Readings of Total VOCs (ppm)**	**DATE**	**Start/End Times**
Sunny 55°F	Ambient 0 Breathing Zone 0 In Well 0	7/1/16	1345/1425

Well Information

Well Material / Size (in)	Drilling Water Added (gal)	As-Built TD of Casing (ft)	Borehole Diameter(in) / Gallons per linear foot (gal/ft)
PVC / 2 SS / 2 /	None	10.0	(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)**	**Initial TD of Casing (ft)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	8.4	10.0	N/A

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 = (10.0 ft – 8.4 ft) * 0.362 gal/ft = 0.579 gal (* 3.785 L/gal = 2.19 L)

Min Purge Vol. = 2 * ~~____~~ gal + 3 * 0.579 gal = 1.73 gal (* 3.785 L/gal = 6.57 L)

Max Purge Vol. = 2 * ~~____~~ gal + 10 * 0.579 gal = 5.79 gal (* 3.785 L/gal = 21.91 L)

Well Purging Information

Start Time	Finish Time	Final TD of Casing (ft)	Equipment Used for Purging
1345	1425	10.0	sprinkler pump w/ surge block submersible pump peristaltic pump

Color	Odor	Sheen	Purged Dry	Stabilization Meters	Pump Intake Depth (ft btoc)
(Clear) Cloudy Brown Other:	(None) Moderate Faint Strong	Yes (No)	Yes (No)	YSI Multi Meter Hach Turbidimeter	9.7 (during stabilization)

Purging reached: Stability (Max Vol.) Purge water was: (Treated) Stored Other Note:

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)	
1345	4.4	4.4	0.88	212	38.05	5.42	169.5	73.12	8.4
1350	2.2	6.6	0.68	212	16.52	5.75	163.1	38.49	8.4
1355	2.2	8.8	0.59	213	16.04	5.94	158.0	23.54	8.4
1400	2.2	11.0	1.70	224	20.42	6.12	152.0	16.37	8.4
1405	2.2	13.2	1.05	217	17.34	6.13	153.6	16.06	8.4
1410	2.2	15.4	0.68	215	15.80	6.17	153.9	13.04	8.4
1415	2.2	17.6	0.65	214	15.45	6.18	152.1	9.07	8.4
1420	2.2	19.8	0.59	213	15.45	6.17	150.9	9.3	8.4
1425	2.2	22.0	Max Purge Vol.			Reached			

Reviewed: Michael W. Hulse 7/4/16

EAGLE EYE
A Sterling Solutions Company

WELL PURGE AND SAMPLING FORM

WELL ID: 16GAMMW01 SHEET: 1 of

PROJECT NAME	Gambell	WELL CONDITION	New	DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
CLIENT	Alaska Army National Guard	DAMAGE PRESENT	None	2"	2.375"	2.067"	0.17
SITE	Gambell	DEPTH TO WATER (FROM TOC)	7.3	3"	3.5"	3.068"	0.38
SAMPLER	CJ/MH	DEPTH TO BASE (FROM TOC)	10.0	4"	4.5"	4.026"	0.66
WEATHER/ TEMPERATURE	Sunny / 55°F	HEIGHT OF WATER COLUMN	2.7	6"	6.625"	6.065"	1.5
DATE	07/01/16	WELL VOLUME	0.46	8"	8.625"	7.981"	2.6
START TIME	15:00						
END TIME	1535						

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Grand water

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

MADE OF: ____ Stainless Steel NA PVC ____ Teflon X Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) clear no odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
1510	0.68	7.3	0.0	1.45	6.72	204	122.7		16.65	24.1	Light Brw	None
1515	1.36	7.3	0.0	1.36	6.67	200	126.3		16.90	15.85	Light Brw	None
1520	2.04	7.3	0.0	1.39	6.65	197	128.1	120.4	16.91	10.92	Clear	None
1525	3.4	7.3	0.0	1.23	6.61	191	131.9	121.9	17.07	9.78	clear	None
1530	4.1	7.3	0.0	1.23	6.60	188	133.3	122.2	17.26	7.88	clear	None
1535	4.8	7.3	0.0	1.24	6.58	186	135.3	122.7	17.32	8.59	clear	None
1540		Stabilization parameters reached										

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification	Additional Sample	Time	Identification
DRO/RRO	1545	16GAM01MW01MS/MSD	Duplicate		
GRO/BTEX	1545	16GAM01MW01MS/MSD			
EPH/VPH					
PAH	1545	16GAM01MW01MS/MSD			
Other					

Michael N. [illegible] 7/1/16

EAGLE EYE

WELL PURGE AND SAMPLING FORM

WELL ID: 16/GAM.MW02 SHEET: 1 of 1

PROJECT NAME	Gambell
CLIENT	Alaska Army National Guard
SITE	Gambell
SAMPLER	MH/CJ
WEATHER/ TEMPERATURE	Sunny 55°F
DATE	07/07/16
START TIME	1655
END TIME	1720

WELL CONDITION	New
DAMAGE PRESENT	None
DEPTH TO WATER (FROM TOC)	8.24
DEPTH TO BASE (FROM TOC)	10.0
HEIGHT OF WATER COLUMN	1.76
WELL VOLUME	0.30

DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
2"	2.375"	2.067"	0.17
3"	3.5"	3.068"	0.38
4"	4.5"	4.026"	0.66
6"	6.625"	6.065"	1.5
8"	8.625"	7.981"	2.6

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Ground water

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

MADE OF: ___ Stainless Steel X PVC ___ Teflon X Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) Clean no odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
1700	1.32	9.0	0.76	1.69	6.710	248	130.1	97.1	13.52	30.16	clear	none
1705	1.69	9.1	0.86	1.91	6.68	243	127.8	97.2	13.39	44.17	clear	none
1710	1.95	9.2	0.96	2.17	6.63	247	126.3	94.2	13.00	55.33	clear	none
1715	2.21	9.2	0.96	2.02	6.61	276	125.9	93.2	12.86	60.03	clear	none
1720	2.47	9.25	1.01	1.77	6.54	380	132.1	83.6	11.49	50.68	clear	none
		MAX		Purged Vol. Reached								

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification	Additional Sample	Time	Identification
DRO/RRO	1735	16GAM02MW02	Duplicate	1745	16GAM08FD01
GRO/BTEX	1735	16GAM02MW02		1745	16GAM08FD01
EPH/VPH					
PAH	1735	16GAM02MW02		1745	16GAM08FD01
Other					

Michael Walker 7/11/16

EAGLE EYE
A Sterling Infosystems Company

WELL PURGE AND SAMPLING FORM

WELL ID: 16GAMMW03 SHEET: 1 of 1

PROJECT NAME	Gambell
CLIENT	Alaska Army National Guard
SITE	Gambell
SAMPLER	MH/CS
WEATHER/ TEMPERATURE	Sunny 55°F
DATE	07/01/16
START TIME	1830
END TIME	1915
WELL CONDITION	New
DAMAGE PRESENT	None
DEPTH TO WATER (FROM TOC)	8.0
DEPTH TO BASE (FROM TOC)	10.0
HEIGHT OF WATER COLUMN	2.0
WELL VOLUME	0.34

DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
2"	2.375"	2.067"	0.17
3"	3.5"	3.068"	0.38
4"	4.5"	4.026"	0.66
6"	6.625"	6.065"	1.5
8"	8.625"	7.981"	2.6

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Ground water

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

MADE OF: ___ Stainless Steel X PVC ___ Teflon X Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) Clear no odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
1835	0.42	8.4	0.4	2.67	7.16	465	149.0	290.9	3411	203.6	light brw	none
1840	0.84	8.8	0.8	1.45	7.16	381	138.4	141.7	19.81	75.26	light brw	none
1845	1.27	9.1	1.1	1.42	7.02	383	142.2	138.4	19.43	62.96	clear	none
1850	1.64	9.5	1.5	1.46	6.97	327	140.0	138.2	19.37	64.0	clear	none
		MAX PURGE VOL Reached										

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification
DRO/RRO	1900	16GAM03MW03
GRO/BTEX	1900	16GAM03MW03
EPH/VPH		
PAH	1900	16GAM03MW03
Other		

Additional Sample	Time	Identification
Duplicate		

Michael W. Hutchins 7/1/16

EAGLE EYE
A Sterling Stoops Company

WELL PURGE AND SAMPLING FORM

WELL ID: 16GAMW04 SHEET: 1 of 1

PROJECT NAME	Gambell	WELL CONDITION	New
CLIENT	Alaska Army National Guard	DAMAGE PRESENT	None
SITE	Gambell	DEPTH TO WATER (FROM TOC)	7.0
SAMPLER	MF/CJ	DEPTH TO BASE (FROM TOC)	10.0
WEATHER/ TEMPERATURE	50° F / Mostly Sunny	HEIGHT OF WATER COLUMN	3.0
DATE	7/2/16	WELL VOLUME	0.51
START TIME	0750		
END TIME	0835		

DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
2"	2.375"	2.067"	0.17
3"	3.5"	3.068"	0.38
4"	4.5"	4.026"	0.66
6"	6.625"	6.065"	1.5
8"	8.625"	7.981"	2.6

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Ground Water

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

MADE OF: ___ Stainless Steel X PVC ___ Teflon X Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) Clear, No Odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
0805	0.49	8.3	1.3	0.98	6.35	421	155.5	100.4	14.27	30.89	clear	none
0810	0.98	8.4	1.4	0.91	6.38	485	157.8	100.1	14.25	29.78	clear	none
0815	1.47	8.5	1.5	0.79	6.40	643	159.7	98.0	13.84	35.36	clear	none
		Max Purge Vol. Reached										

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification
DRO/RRO	0815	16GAM04MW04
GRO/BTEX	0815	16GAM04MW04
EPH/VPH		
PAH	0815	16GAM04MW04
Other		

Additional Sample	Time	Identification
Duplicate		

Michael W. Hudson 7/2/16

EAGLE EYE
A Joint Venture Company

WELL PURGE AND SAMPLING FORM

WELL ID: 16GAMMW05 SHEET: 1 of 1

				DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
PROJECT NAME	Gambell	WELL CONDITION	New	2"	2.375"	2.067"	0.17
CLIENT	Alaska Army National Guard	DAMAGE PRESENT	None	3"	3.5"	3.068"	0.38
SITE	Gambell	DEPTH TO WATER (FROM TOC)	7.20	4"	4.5"	4.026"	0.66
SAMPLER	MH/CJ	DEPTH TO BASE (FROM TOC)	10.20	6"	6.625"	6.065"	1.5
WEATHER/ TEMPERATURE	Sunny/50°F	HEIGHT OF WATER COLUMN	3.0	8"	8.625"	7.981"	2.6
DATE	7/2/16	WELL VOLUME	0.5				
START TIME	0835						
END TIME	0905						

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Groundwater

SAMPLE COLLECTED WITH: ___ Bailer ___ Submersible ___ Bladder [X] Peristaltic ___ Other (specify)

MADE OF: ___ Stainless Steel [X] PVC ___ Teflon [X] Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) clear, no odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
0840	0.59	7.2	0.0	0.99	6.96	158	137.8	98.6	14.09	156.6	clear	none
0845	1.58	7.2	0.0	0.85	6.74	152	139.6	97.4	13.85	139.5	clear	none
0850	2.17	7.2	0.0	0.94	6.66	149	142.7	97.0	13.83	114.9	clear	none
		Max	Purge	Vol.	Reached							

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification	Additional Sample	Time	Identification
DRO/RRO	0900	16GAM05MW05	Duplicate		
GRO/BTEX	0900	16GAM05MW05			
EPH/VPH					
PAH	0900	16GAM05MW05			
Other					

Michael W. Hu 7/2/16

EAGLE EYE
A Tetra Tech Company

WELL PURGE AND SAMPLING FORM

WELL ID: 16GAM06MW06 SHEET: 1 of 1

PROJECT NAME	Gambell
CLIENT	Alaska Army, National Guard
SITE	Gambell
SAMPLER	MH/CJ
WEATHER/ TEMPERATURE	Sunny, 10-15mph wind, 50°F
DATE	7/2/16
START TIME	0910
END TIME	0945
WELL CONDITION	New
DAMAGE PRESENT	None
DEPTH TO WATER (FROM TOC)	6.70
DEPTH TO BASE (FROM TOC)	10.04
HEIGHT OF WATER COLUMN	3.34
WELL VOLUME	0.57

DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
2"	2.375"	2.067"	0.17
3"	3.5"	3.068"	0.38
4"	4.5"	4.026"	0.66
6"	6.625"	6.065"	1.5
8"	8.625"	7.981"	2.6

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Ground water

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

MADE OF: ___ Stainless Steel X PVC ___ Teflon X Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) clear, no odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
0915	0.57	6.95	0.25	1.32	6.79	144	150.8	290.0	35.22	107.4	clear	none
0920	1.14	7.0	0.30	1.60	6.84	139	152.0	120.8	17.14	57.67	clear	none
0925	1.71	7.0	0.30	0.92	6.81	136	151.4	118.7	16.84	41.03	clear	none
0930	2.28	7.0	0.30	0.83	6.77	135	150.3	116.4	16.59	42.09	clear	none
		Max Purge Vol. Reached										

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification
DRO/RRO	0935	16GAM06MW06
GRO/BTEX	0935	16GAM06MW06
EPH/VPH		
PAH	0935	16GAM06MW06
Other		

Additional Sample	Time	Identification
Duplicate		

Michael W. Hess 7/2/16

EAGLE EYE

WELL PURGE AND SAMPLING FORM

WELL ID: 16GAMW07 SHEET: 1 of 1

PROJECT NAME	Gambell	WELL CONDITION	New
CLIENT	Alaska Army National Guard	DAMAGE PRESENT	None
SITE	Gambell	DEPTH TO WATER (FROM TOC)	8.4
SAMPLER	MH / CS	DEPTH TO BASE (FROM TOC)	10.0
WEATHER/ TEMPERATURE	Sunny wind 10-15 50°F	HEIGHT OF WATER COLUMN	1.6
DATE	07/02/16	WELL VOLUME	0.27
START TIME	0955		
END TIME	1035		

DIAMETER	O.D.	I.D.	VOLUME (GAL/LIN FT)
2"	2.375"	2.067"	0.17
3"	3.5"	3.068"	0.38
4"	4.5"	4.026"	0.66
6"	6.625"	6.065"	1.5
8"	8.625"	7.981"	2.6

SAMPLING DATA

SAMPLE TYPE (GW, PRODUCT, OTHER): Grand water

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

MADE OF: ___ Stainless Steel X PVC ___ Teflon X Disposable LDPE

SAMPLING DECON PROCEDURE:

SAMPLE DESCRIPTION: (color, free product thickness, odor, turbidity) clear, no odor

CRITERIA FOR STABLE PARAMETERS:

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

SAMPLING NOTES:

FIELD WATER QUALITY PARAMETERS

Time	Purged Volume (Gallon)	Water Level	Draw Down	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP	D.O. (%)	D.O. (mg/L)	Turbidity	Color	Odor
10:00	0.4	8.4	0.0	3.88	6.51	215	168.4	133.3	17.30	37.17	clear	none
10:05	0.8	8.4	0.0	3.09	6.44	209	161.3	119.6	16.06	7.17	clear	none
10:10	1.2	8.4	0.0	2.54	6.40	209	159.8	118.4	16.13	3.0	clear	none
10:15	1.6	8.4	0.0	2.23	6.39	211	157.9	119.5	16.39	1.56	clear	none
		Max Purge Vol. Reached										

ANALYTICAL SAMPLE INFORMATION

Analyte	Time	Identification
DRO/RRO	1025	16GAM07MW07
GRO/BTEX	1025	16GAM07MW07
EPH/VPH		
PAH	1025	16GAM07MW07
Other		

Additional Sample	Time	Identification
Duplicate		

Michael W. Hutchison 7/2/16

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APPENDIX C

LABORATORY REPORTS AND CHECKLISTS

C-1 LABORATORY DATA TABLES

C-2 ADEC LABORATORY DATA REVIEW CHECKLISTS

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C-1 LABORATORY DATA TABLES

Chain-of-Custody Report

Collection Organization: Eagle Eye Electric **Chain-of-Custody:** 71503 **Cooler ID:** Cooler #1-6 **NPDL Number:** N/A

Project Number: 1145019-Gambell **Laboratory:** ALS Environmental **Bill To:** Eagle Eye Electric **Report To:** Eagle Eye Electric

COC Sample ID	Loc ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Volume	Preservative	Matrix	Analyses Requested Group	QC	TAT	Notes:
16GAM01MW01	MW01	7/1/2016	1545	MH/CJ	18	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101	MS/MSD	15 day	
16GAM01MW01	MW01	7/1/2016	1545	MH/CJ	6	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103	MS/MSD	15 day	
16GAM01MW01	MW01	7/1/2016	1545	MH/CJ	6	1-L Amber		4° +/- 2°C	GW	SW8270D SIM	MS/MSD	15 day	
16GAM02MW02	MW02	7/1/2016	1735	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM02MW02	MW02	7/1/2016	1735	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM02MW02	MW02	7/1/2016	1735	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAM03MW03	MW03	7/1/2016	1900	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM03MW03	MW03	7/1/2016	1900	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM03MW03	MW03	7/1/2016	1900	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAM04MW04	MW04	7/2/2016	0815	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM04MW04	MW04	7/2/2016	0815	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM04MW04	MW04	7/2/2016	0815	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAM05MW05	MW05	7/2/2016	0900	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM05MW05	MW05	7/2/2016	0900	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM05MW05	MW05	7/2/2016	0900	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAM06MW06	MW06	7/2/2016	0935	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM06MW06	MW06	7/2/2016	0935	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM06MW06	MW06	7/2/2016	0935	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAM07MW07	MW07	7/2/2016	1025	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM07MW07	MW07	7/2/2016	1025	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM07MW07	MW07	7/2/2016	1025	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAM08FD01	MW02	7/1/2016	1745	MH/CJ	6	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	
16GAM08FD01	MW02	7/1/2016	1745	MH/CJ	2	250-mL Amber		HCL, 4° +/- 2°C	GW	AK102/AK103		15 day	
16GAM08FD01	MW02	7/1/2016	1745	MH/CJ	2	1-L Amber		4° +/- 2°C	GW	SW8270D SIM		15 day	
16GAMTB001		7/1/2016	0900	MH/CJ	3	40-mL VOAs		HCL, 4° +/- 2°C	GW	SW8260C, AK101		15 day	

Special Instructions:

Relinquish By: _____ Signature/Printed Name _____ Date/Time

Relinquish By: _____ Signature/Printed Name _____ Date/Time

Received By: _____ Signature/Printed Name _____ Date/Time

Received By: _____ Signature/Printed Name _____ Date/Time

2016 GAMBELL FSRC SITE CHARACTERIZATION
ANALYTICAL RESULTS

Method	Analyte	TableC	Units	K1607616-001 16GAM01MW01 7/1/16	K1607616-002 16GAM02MW02 7/1/16	K1607616-003 16GAM03MW03 7/1/16	K1607616-004 16GAM04MW04 7/1/16	K1607616-005 16GAM05MW05 7/1/16
8260C	Benzene	4.6	ug/L	0.1 UJ	0.07 J	0.1 UJ	0.1 UJ	0.1 UJ
8260C	Ethylbenzene	15	ug/L	0.1 UJ	3.6 J-	0.1 UJ	0.1 UJ	0.1 UJ
8260C	m,p-Xylenes	190	ug/L	0.2 UJ	7.7 J-	0.2 UJ	0.2 UJ	0.2 UJ
8260C	o-Xylene	190	ug/L	0.2 UJ	0.67 J-	0.2 UJ	0.2 UJ	0.2 UJ
8260C	Toluene	1100	ug/L	0.13 J-	9.5 J-	0.95 J-	0.1 UJ	0.1 UJ
8270D SIM	2-Methylnaphthalene	36	ug/L	0.04 J-	12 J	0.0054 UJ	0.0052 UJ	0.0047 J-
8270D SIM	Acenaphthene	530	ug/L	0.005 UJ	0.68 J	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Acenaphthylene	260	ug/L	0.0047 J-	0.37 UJ	0.011 J-	0.0052 UJ	0.0051 UJ
8270D SIM	Anthracene	43	ug/L	0.043 J-	0.1 J	0.025 J-	0.0052 UJ	0.0051 UJ
8270D SIM	Benz(a)anthracene	0.12	ug/L	0.0033 J-	0.005 UJ	0.0071 J-	0.0052 UJ	0.0051 UJ
8270D SIM	Benzo(a)pyrene	0.034	ug/L	0.005 UJ	0.005 UJ	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Benzo(b)fluoranthene	0.8	ug/L	0.005 UJ	0.005 UJ	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Benzo(g,h,i)perylene	0.26	ug/L	0.005 UJ	0.005 UJ	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Benzo(k)fluoranthene	0.8	ug/L	0.005 UJ	0.005 UJ	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Chrysene	2	ug/L	0.005 UJ	0.005 UJ	0.015 J	0.0052 UJ	0.0051 UJ
8270D SIM	Dibenz(a,h)anthracene	0.034	ug/L	0.005 UJ	0.005 UJ	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Dibenzofuran	7.9	ug/L	0.005 UJ	0.72 J	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Fluoranthene	260	ug/L	0.02 UJ	0.014 J	0.022 UJ	0.021 UJ	0.021 UJ
8270D SIM	Fluorene	290	ug/L	0.005 UJ	1.2 J	0.055 J-	0.0052 UJ	0.0059 J-
8270D SIM	Indeno(1,2,3-cd)pyrene	0.19	ug/L	0.005 UJ	0.005 UJ	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Naphthalene	1.7	ug/L	0.03 J	**11 J**	0.0054 UJ	0.0052 UJ	0.0051 UJ
8270D SIM	Phenanthrene	170	ug/L	0.005 UJ	0.11 J-	0.14 J-	0.0052 UJ	0.0051 UJ
8270D SIM	Pyrene	120	ug/L	0.0064 J-	0.015 J	0.0093 J-	0.011 UJ	0.011 UJ
AK 102.0/103.0	C10 - C25 DRO	1500	ug/L	1300 J-	**14000 J-**	1100 J-	980 J-	270 J-
AK 102.0/103.0	C25 - C36 RRO	1100	ug/L	170 J-	360 J	280 J-	320 J-	180 J-
AK101	C6 - C10 GRO	2200	ug/L	60 J-	310 J-	30 J-	25 UJ	25 UJ

Notes:

Bold red indicates that the result exceeds the18 AAC 75 Table C groundwater cleanup level (ADEC 2016).
ug/L = microgram(s) per liter
(-) = indicates that the result is potentially biased low
DRO = diesel-range organics
GRO = gasoline-range organics

J = estimated; the value is greater than or equal to the MDL and less than the LOQ, or or the quantitation is an estimation due to discrepances in meeting certain analyte-specific quality control criteria.

NA = not analyzed
RRO = residual-range organics
U = nondetect; the value shown is the limit of detection (LOD).

2016 GAMBELL FSRC SITE CHARACTERIZATION
ANALYTICAL RESULTS

Method	Analyte	TableC	Units	K1607616-006 16GAM06MW06 7/1/16	K1607616-007 16GAM07MW07 7/1/16	K1607616-008 16GAM08FD01 7/1/16 Dup of 16GAM02MW02	K1607616-009 16GAMTB001 7/1/16
8260C	Benzene	4.6	ug/L	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ
8260C	Ethylbenzene	15	ug/L	0.1 UJ	0.08 J	3.7 J-	0.1 UJ
8260C	m,p-Xylenes	190	ug/L	0.2 UJ	0.18 J	8 J-	0.2 UJ
8260C	o-Xylene	190	ug/L	0.2 UJ	0.2 UJ	0.66 J-	0.2 UJ
8260C	Toluene	1100	ug/L	0.1 UJ	0.1 UJ	10 J-	0.1 UJ
8270D SIM	2-Methylnaphthalene	36	ug/L	0.005 UJ	0.0083 J	0.15 J	NA
8270D SIM	Acenaphthene	530	ug/L	0.005 UJ	0.005 UJ	0.34 J	NA
8270D SIM	Acenaphthylene	260	ug/L	0.005 UJ	0.005 UJ	0.11 UJ	NA
8270D SIM	Anthracene	43	ug/L	0.005 UJ	0.065 J	0.049 J	NA
8270D SIM	Benz(a)anthracene	0.12	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Benzo(a)pyrene	0.034	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Benzo(b)fluoranthene	0.8	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Benzo(g,h,i)perylene	0.26	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Benzo(k)fluoranthene	0.8	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Chrysene	2	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Dibenz(a,h)anthracene	0.034	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Dibenzofuran	7.9	ug/L	0.005 UJ	0.005 UJ	0.29 J	NA
8270D SIM	Fluoranthene	260	ug/L	0.02 UJ	0.02 UJ	0.013 J	NA
8270D SIM	Fluorene	290	ug/L	0.005 J-	0.005 UJ	0.59 J	NA
8270D SIM	Indeno(1,2,3-cd)pyrene	0.19	ug/L	0.005 UJ	0.005 UJ	0.005 UJ	NA
8270D SIM	Naphthalene	1.7	ug/L	0.005 UJ	0.0088 J	1.1 J	NA
8270D SIM	Phenanthrene	170	ug/L	0.005 UJ	0.005 UJ	0.096 J	NA
8270D SIM	Pyrene	120	ug/L	0.01 UJ	0.0067 J	0.022 J	NA
AK 102.0/103.0	C10 - C25 DRO	1500	ug/L	160 J-	970 J-	**14000 J-**	NA
AK 102.0/103.0	C25 - C36 RRO	1100	ug/L	170 J-	140 J-	510 J	NA
AK101	C6 - C10 GRO	2200	ug/L	25 UJ	86 J-	340 J-	25 UJ

Notes:

Bold red indicates that the result exceeds the18 AAC 75 Table C groundwater cleanup level (ADEC 2016).
ug/L = microgram(s) per liter
(-) = indicates that the result is potentially biased low
DRO = diesel-range organics
GRO = gasoline-range organics

J = estimated; the value is greater than or equal to the MDL and less than the LOQ, or or the quantitation is an estimation due to discrepances in meeting certain analyte-specific quality control criteria.

NA = not analyzed
RRO = residual-range organics
U = nondetect; the value shown is the limit of detection (LOD).

C-2 ADEC LABORATORY DATA REVIEW CHECKLISTS

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Laboratory Data Review Checklist

Completed by: Kelly Janukajtis

Title: Project Chemist Date: 30 August 2016

CS Report Name: Gambell FSRC Site Characterization Report Date:

Consultant Firm: Eagle Eye Electric, LLC

Laboratory Name: ALS Environmental Laboratory Report Number: K1607616

ADEC File Number: ADEC RecKey Number:

1. Laboratory
   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?
      ☒ Yes ☐ No ☐ NA (Please explain.) Comments:

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?
      ☐ Yes ☐ No ☒ NA (Please explain.) Comments:

      All project samples were analyzed by ALS Environmental in Kelso, Washington.

2. Chain of Custody (COC)
   a. COC information completed, signed, and dated (including released/received by)?
      ☒ Yes ☐ No ☐ NA (Please explain.) Comments:

   b. Correct analyses requested?
      ☒ Yes ☐ No ☐ NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation
   a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
      ☐ Yes ☒ No ☐ NA (Please explain.) Comments:

      Six coolers containing nine groundwater samples were received at the laboratory. All of the coolers were received with cooler temperatures/temp blanks outside the range of 4±2°C:

      - 6.0°C/7.3°C
      - 8.4°C/9.7°C
      - 8.6°C/15.1°C
      - 7.8°C/9.0°C
      - 5.7°C/8.4°C
      - 4.9°C/7.2°C

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

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

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

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

All samples were received in good condition.

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

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

The cooler temperatures/temp blanks were recorded on the cooler receipt form and the client was notified.

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

Comments:

All results have been qualified as estimated (J-/UJ) to indicate that the results may be potentially biased low.

4. Case Narrative

a. Present and understandable?

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

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

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

All QC items identified in the case narrative are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

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

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

Comments:

Effects on data quality/usability are discussed in the relevant sections of this checklist.

5. Samples Results

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

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

b. All applicable holding times met?

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

c. All soils reported on a dry weight basis?

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

No soil samples were submitted or analyzed for this SDG.

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

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

Several samples required dilutions during analysis for high concentrations of target analytes. All LODs/LOQs for nondetect results were below cleanup levels.

e. Data quality or usability affected?

Comments:

There was no effect on the data quality or usability.

6. QC Samples

a. Method Blank

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

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

ii. All method blank results less than PQL?

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

No analytes were detected above the LOQ in the MBs.

iii. If above PQL, what samples are affected?

Comments:

Not applicable.

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

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

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

Comments:

There was no effect on the data quality or usability.

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

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

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

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

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

No metals analyses were requested or performed for this SDG.

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

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

All LCS/LCSD recoveries were within control limits.
All MS/MSD recoveries were within control limits, with the following exceptions:

- SW8270D SIM – Recovery of naphthalene exceeded the upper control limit of 114% for the MS/MSD (120%/124%) performed for sample 16GAM01MW01. The associated sample result of 0.030 ug/L was qualified as estimated "J" because it falls between the MDL and the LOQ. A qualifier of "J+" would be applied and as this indicates a potential high bias and the result is well below the associated cleanup level, there is no effect on the data usability. This sample is affected by the cooler temperature/temperature blank exceedance discussed in Section 3.a. Therefore, the qualifier applied to the result is "J" (indeterminate bias).

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

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

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

Comments:

Not applicable.

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

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

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

There was no effect on data quality or usability.

Comments:

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?
☒Yes ☐ No ☐NA (Please explain.) Comments:

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

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

All surrogate recoveries were within control limits, with the following exceptions:

- AK102/103 – Recovery of surrogates n-triacontane (178%) and o-terphenyl (175%) exceeded the upper control limits of 150% in the LCS. MS/MSD surrogate recoveries and all sample surrogate recoveries were acceptable. No data flags were required and there was no effect on the data quality or usability.
- SW8260C
  - Recovery of one or more surrogates failed high in the method blank and LCS/LCSD. There were no associated detections in the MB and all recoveries were within control limits for the LCS/LCSD.
  - Recovery of one or more surrogates exceeded the upper control limit for samples 16GAM04MW04, 16GAM05MW05, and 16GAM06MW06. As this indicates a potential high bias and the associated sample results are nondetect, there is no effect on data quality or usability.
  - Recovery of toluene-d8 (116%) and 4-bromofluorobenzene (115%) exceeded the upper control limits of 112% and 114%, respectively, in sample 16GAM07MW07. Several associated sample results were nondetect and as this indicates a potential high bias, no data flags were required and there was no effect on data quality/usability. Sample results for ethylbenzene (0.080 ug/L) and m,p-xylenes (0.18 ug/L) were qualified "J+" to indicate a potential high bias. As this indicates a potential high bias and the results are significantly below the associated cleanup levels, there is no effect on data quality or usability. Both results are already flagged as estimated ("J") because the results fall between the MDL and the LOQ. These samples are also affected by the cooler temperature/temp blank exceedances discussed in Section 3.a. Therefore, the qualifier "J" (estimated, indeterminate bias) has been applied to the results.
- SW8270D SIM
  - Recovery of surrogate fluorene-d10 exceeded the upper control limit of 114% at 136% in sample 16GAM08FD01. Several associated sample results were nondetect and as this indicates a potential high bias, no data flags were required and there was no effect on data quality/usability. Associated results with positive detections would be qualified as estimated "J+" and considered potentially biased high. As all qualified results are below the associated cleanup levels, there is no effect on data quality or usability. These results are also affected by cooler temp/temp blank exceedances as discussed in Section 3.a., therefore positive results have been qualified as estimated "J" (indeterminate bias).
  - Recovery of surrogate terphenyl-d10 was less than the lower control limit of 58% at 44% in sample 16GAM02MW02. Associated sample results were qualified as estimated "J-/UJ" and may be considered potentially biased low. The other two surrogates were recovered within control limits.

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

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

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

Comments:

Effects on data quality/usability discussed in Section ii above.

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

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

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

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

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

iii. All results less than PQL?

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

No analytes were detected in the trip blanks.

iv. If above PQL, what samples are affected?

Comments:

Not applicable.

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

Comments:

There was no effect on data quality or usability.

e. Field Duplicate

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

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

One field duplicate was submitted for 7 primary samples.

ii. Submitted blind to lab?

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

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

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

Field duplicate pair 16GAM02MW02/16GAM08FD01 was analyzed for AK101, AK102/103, SW8260 BTEX, and SW8270D SIM. The RPD was calculated for pairs of results over the LOQ. Out of 26 pairs of duplicate results, 9 pairs had both results that were nondetect. Of the remaining 17 pairs of results, one pair of fluoranthene results and one pair of benzene results had both results less than the LOQ therefore no flags were required for failed RPDs. Of the remaining 15 pairs of results, one pair of SW8270D SIM pyrene results and one pair of AK103 RRO results had one result less than the LOQ and one result greater than the LOQ; both pairs of results were qualified as estimated "J" (indeterminate bias). The remaining 13 pairs had both results greater than the LOQ and the RPDs were calculated. Six pairs had results that were greater than the recommended 30% for waters and the results were qualified as estimated "J", indeterminate bias.

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

Comments:

In general, 8 pairs were in disagreement. This indicates a nonhomogeneity of the sample matrix. The higher of the two results will be used for decision-making. As one pair of results for DRO had both results over the cleanup level and all other results were below cleanup levels, there was no effect on data usability.

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

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

Decon/equipment blank not required for this project.

i. All results less than PQL?

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

ii. If above PQL, what samples are affected?

Not applicable.

Comments:

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

Comments:

There was no effect on data quality or usability.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)
   a. Defined and appropriate?
      ☐ Yes ☐ No ☒ NA (Please explain.) Comments:

No additional flags were required.

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APPENDIX D

CONCEPTUAL SITE MODELS

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Print Form

Appendix A - Human Health Conceptual Site Model Scoping Form and Standardized Graphic

Site Name: Gambell FSRC

File Number: 660.38.007

Completed by: Eagle Eye Electric, LLC

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

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

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

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

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

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

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

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

* bgs - below ground surface

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

a) Direct Contact -

1. Incidental Soil Ingestion

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

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

Comments:

DRO in soil

2. Dermal Absorption of Contaminants from Soil

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

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

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

Comments:

DRO in soil above ADEC Method Two, multiple PAHs detected below ADEC Method Two.

b) Ingestion -

1. Ingestion of Groundwater

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

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

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

Comments:

Concentrations of DRO and Napthalene were detected above cleanup levels in groundwater. Groundwater is used for drinking water in the community. Groundwater on site is a potential source of drinking water.

2. Ingestion of Surface Water

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

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

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

Comments:

Offsite migration is possible, however, surface water not used for drinking water. Likely too saline for drinking water.

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

DRO and naphthalene in groundwater above cleanup levels. Multiple other PAHs detected below cleanup levels in site soil and groundwater.

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

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

Comments:

DRO in soil. DRO listed in Appendix D.

2. Inhalation of Indoor Air

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

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

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

Comments:

Buildings are currently unoccupied but could be occupied in the future. DRO in soil. DRO listed in Appendix D.

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

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

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

Comments:

DRO and naphthalene in site groundwater greater than Table C.

Inhalation of Volatile Compounds in Tap Water

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

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

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

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

Comments:

Groundwater at the site is not used for tap water.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

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

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

Comments:

Nonvolatiles, including metals, aren't contaminants of concern at the site.

Direct Contact with Sediment

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

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

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

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

Comments:

There is no sediment at the site.

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

Print Form

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Gambell FSRC

Completed By: Eagle Eye Electric, LLC

Date Completed: 1/22/2016

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

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

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

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

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

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

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

Current & Future Receptors

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

Revised, 10/01/2010

Ecosystem Conceptual Site Model

Scoping Form

Site Name: Gambell FSRC
Completed by: Eagle Eye Electric
Date: 01/22/2016

Instructions: Follow the italicized instructions in each section below. "Off-ramps," where the evaluation ends before completing all of the sections, can be taken when indicated by the instructions. Comment boxes should be used to help support your answers.

1. Direct Visual Impacts and Acute Toxicity

Are direct impacts that may result from the site contaminants evident, or is acute toxicity from high contaminant concentrations suspected? C*heck the appropriate box.*

☐ Yes – *describe observations below and evaluate all of the remaining sections without taking any off-ramps.*
☒ No – *go to next section.*

Comments:

2. Terrestrial and Aquatic Exposure Routes

Check each terrestrial and aquatic route that could occur at the site.

Terrestrial Exposure Routes

☐ Exposure to water-borne contaminants as a result of wading or swimming in contaminated waters or ingesting contaminated water

☐ Contaminant uptake in terrestrial plants whose roots are in contact with contaminated surface water

☒ Contaminant migration via saturated or unsaturated groundwater zones and discharge at upland "seep" locations (not associated with a wetland or water body)

☐ Contaminant uptake by terrestrial plants whose roots are in contact with soil moisture or groundwater present within the root zone (generally no more than 4 feet below ground surface)

☐ Particulates deposited on plants directly or from rain splash

☐ Incidental ingestion and/or exposure while animals grub for food, burrow (up to 2 feet for small animals or 6 feet for large animals), or groom

- ☐ Inhalation of fugitive dust or vapors disturbed by foraging or burrowing activities
- ■ Bioaccumulatives (other than PAHs, which bioaccumulate more readily in aquatic environments) taken up by soil invertebrates, which are in turn eaten by higher food chain organisms (see the Policy Guidance on Developing Conceptual Site Models)
- ☐ Other site-specific exposure pathways

Aquatic Exposure Routes

- ■ Contaminated surface runoff migration to water bodies through swales, drainage ditches, or overland flow
- ☐ Aquatic receptors exposed through osmotic exchange, respiration, or ventilation of surface waters
- ■ Contaminant migration via saturated or unsaturated groundwater zones and discharge at "seep" locations along banks or directly to surface water
- ☐ Deposition into sediments from upwelling of contaminated groundwater
- ☐ Aquatic receptors may be exposed directly to contaminated sediments through foraging or burrowing, or indirectly exposed due to osmotic exchange, respiration, or ventilation of sediment pore water.
- ☐ Aquatic plants rooted in contaminated sediments
- ■ Bioaccumulatives (see the Policy Guidance on Developing Conceptual Site Models) taken up by sediment invertebrates, which are in turn eaten by higher food chain organisms
- ☐ Other site-specific exposure pathways

If any of the above boxes are checked go on to the next section. If none are checked, end the evaluation and check the box below.

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

Site is nearly 1,200 feet from the nearest surface water body. Any contamination would likely filter into the soil before it is able to run off to nearby surface water bodies. PAHs present in soil.

3. Habitat

Check all that may apply. See Ecoscoping Guidance for additional help.

- ☐ Habitat that could be affected by the contamination supports valued species (i.e., species that are regulated, used for subsistence, have ceremonial importance, have commercial value, or provide recreational opportunity)
- ☐ Critical habitat or anadromous stream in an area that could be affected by the contamination
- ☐ Habitat that is important to the region that could be affected by the contamination

☐ Contamination is in a park, preserve, or wildlife refuge

If any of the above boxes are checked go on to the next scoping factor. If none are checked, end the evaluation and check the box below.

■ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

Suitable habitat not present at the site.

4. Contaminant Quantity

Check all that may apply. See Ecoscoping Guidance for additional help.

☐ Endangered-, threatened-, or species of special concern are present
☐ The aquatic environment is or could be affected
☐ Non-petroleum contaminants may be present, or the total area of petroleum-contaminated surface soil exceeds one-half acre

If any of the above boxes are checked go on to the next scoping factor. If none are checked, end the evaluation and check the box below.

■ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

Any contaminants detected at the site would likely not impact the offsite aquatic environment.

5. Toxicity Determination

Check all that apply.

■ Bioaccumulative chemicals are present (see Policy Guidance on Developing Conceptual Site Models)
☐ Contaminants exceed benchmark levels (see the Ecological Benchmark Tool in RAIS, available at: http://rais.ornl.gov/tools/eco_search.php)

If either box is checked complete a detailed Ecological Conceptual Site Model (see DEC's Conceptual Site Model Guidance) and submit it with the form to you DEC Project Manager.

If neither box is checked, check the box below and submit this form to your DEC Project Manager.

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

Bioaccumulative compounds present. No benchmarks exceeded.

Ecoscoping Graphic
Gambell FSRC

Primary Sources	Release Mechanisms	Secondary Sources	Transport Mechanisms	Exposure Media	Exposure Route	Ecological Receptors				
						Vegetation	Invertebrates	Reptiles and Amphibians	Fish	Birds and Mammals
Aboveground Storage Tanks Dispensers and Transfer Lines Vehicles	Historic releases (spills and discharges) Direct discharge	Contaminated surface and subsurface soils	Groundwater Flow/Seepage/ Runoff	Surface soil	Direct contact or Uptake	●	–	–	–	●
					Incidental ingestion	–	–	–	–	●
					Food chain	–	–	–	–	–
				Subsurface soil	Ingestion	●	–	–	–	●
					Food chain	–	–	–	–	–
				Surface water	Direct contact or Absorption	–	–	–	–	–
					Ingestion	–	–	–	–	–
					Food chain	–	–	–	–	–
				Sediment	Direct contact or Absorption	–	–	–	–	–
					Ingestion	–	–	–	–	–
					Food chain	–	–	–	–	–
				Biota	Food chain	–	–	–	–	●
				Groundwater	Evaluated as surface water at discharge points					
			Volatilization	Air	Inhalation	–	–	–	–	●

● Complete pathway
– Incomplete pathway

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APPENDIX E

ADEC CORRESPONDENCE

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RE W91ZRU-15-C-0003 Gambell Site Characterization Plan responses to comments
From: Duncan, Danielle L (DEC) <danielle.duncan@alaska.gov>
Sent: Thursday, June 02, 2016 12:31 PM
To: Jennifer Wehrmann
Cc: jennifer.n.nutt2.mil@mail.mil; Palmieri, Anne Marie G (DEC)
Subject: RE: W91ZRU-15-C-0003 Gambell Site Characterization Plan, responses to comments

Jennifer, due to the remoteness of the site, your proposal to develop and sample the wells without waiting 24 hours is approved. Please submit all water stabilization parameters etc. as usual. Thanks!

From: Jennifer Wehrmann [mailto:jwehrmann@beringstraits.com]
Sent: Thursday, June 02, 2016 11:53 AM
To: Duncan, Danielle L (DEC) <danielle.duncan@alaska.gov>
Cc: jennifer.n.nutt2.mil@mail.mil; Palmieri, Anne Marie G (DEC) <annemarie.palmieri@alaska.gov>
Subject: RE: W91ZRU-15-C-0003 Gambell Site Characterization Plan, responses to comments

Danielle,
We had an afterthought on the Gambell & Savoonga work plans. Would ADEC approve us to develop the wells sooner than 24 hours after installation with the direct push drill rig? Because both Gambell & Savoonga are so remote we are trying to overcome some of the logistical challenges with the drill rig and field crew. Monitoring well development is outlined in Section 4.3 of the work plans. We would also like approval to sample when development is complete, rather than waiting another 24 hours (outlined in Section 4.4).

Please advise.

Jennifer

From: Duncan, Danielle L (DEC) [mailto:danielle.duncan@alaska.gov]
Sent: Thursday, May 26, 2016 8:16 AM
To: Jennifer Wehrmann
Cc: jennifer.n.nutt2.mil@mail.mil; Palmieri, Anne Marie G (DEC)
Subject: RE: W91ZRU-15-C-0003 Gambell Site Characterization Plan, responses to comments

Greetings, please find the attached response to the comment responses. I look forward to receiving the final work plan. Please note: the (WORK PLAN/REPORT) may be submitted electronically. If your submittal exceeds 8 megabytes, you may submit it to me through the Alaska ZendTo “drop-off” option at https://drop.state.ak.us/drop/. The Division of SPAR/Contaminated Sites Program prefers and encourages electronic submittals.

I have sent the original in the mail, thanks and have a nice day!

From: Jennifer Wehrmann [mailto:jwehrmann@beringstraits.com]
Sent: Tuesday, May 10, 2016 1:21 PM
To: Duncan, Danielle L (DEC) <danielle.duncan@alaska.gov>
Cc: jennifer.n.nutt2.mil@mail.mil
Subject: W91ZRU-15-C-0003 Gambell Site Characterization Plan, responses to comments

Good afternoon, Danielle,
Please see attached for draft responses to comments and an updated figure showing the proposed well

RE W91ZRU-15-C-0003 Gambell Site Characterization Plan responses to comments
locations for your review. Please let us know if these revisions meet your approval. If so, we will revise
the site characterization plan accordingly. We also plan to revise the Savoonga Site Characterization Plan
and reissue that document (with the correct figure) for your review. I wanted your feedback on these
response to comments first though.

Thanks for your feedback,
Jennifer

Jennifer Wehrmann, PMP
Environmental Project Manager
Paragon Professional Services, LLC
A Bering Straits Company
4600 Debarr Road, Suite 200 | Anchorage, AK 99508
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Direct 907-334-8347 | Mobile 907-382-0146
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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

PO Box 111800
410 Willoughby Ave #303
Juneau, AK 99811-1800
Main: 907-465-5390
Fax: 907-465-5218
www.dec.alaska.gov

File No: 660.38.007

December 28, 2016

Sent via electronic mail only
2LT Jennifer Nutt
Alaska Army National Guard
Construction Facilities Management Office
PO Box 5800
JBER, AK 99505-0800

Re: *Draft* Gambell Site Characterization Report
Gambell Federal Scout Readiness Center (FSRC)
Gambell, Alaska
Alaska Army National Guard

Dear Ms. Nutt:

The Alaska Department of Environmental Conservation (ADEC) received a copy of the above referenced document by electronic mail. I have reviewed the document and provided the comments in the attached table. I look forward to the responses and/or a final draft of the report.

If you have any questions regarding this letter or concerns please feel free to contact me by telephone at 907-465-5207 or email at Danielle.Duncan@alaska.gov.

Sincerely,

Danielle Duncan
Project Manager

cc: Anne Marie Palmieri, Environmental Program Specialist IV, ADEC, via electronic mail

Danielle Duncan EPS III- Comments on:
Draft Site Characterization Report
Gambell Federal Scout Readiness Center, December 28, 2016

Comment No.	Page	Section	Comment / Recommendation
1.	2	1.5	Township should be 20 S and range should be 67 W
2.		Figures	Please add the location of the community groundwater drinking water well to the figures or add an additional figure showing its location relative to the site.
3.		C-1 Lab data tables	Note that the cleanup levels have been revised – update the analytical results tables. New cleanup levels can be found at: http://dec.alaska.gov/spar/regulation_projects/cs18AAC75.htm. Naphthalene in sample MW2 is in exceedance. The CSM will also require updating.
4.		C-1 Lab data tables	The table cuts off the sample description for the duplicate. 16GAM08FD01 7/1/16 Dup of ???
5.		CSM	Groundwater is used for drinking water in the community therefore, groundwater on site is a potential source of drinking water.
6.		CSM	The CSM indicates the presence of stained soil in several locations – is this still true?