National Guard Federal Scout Armory

Remedial Action Report

Savoonga, Alaska

Contract W911KB17D0020

ADEC File Number 670.38.002

ADEC Hazard ID 3099

June 2023

Prepared for:

U.S. Army Corps of Engineers

National Guard Federal Scout Armory

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Prepared for:

U.S. Army Corps of Engineers

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
%	percent
AAC	Alaska Administrative Code
ACL	alternative cleanup level
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AKARANG	Alaska Army National Guard
AST	aboveground storage tank
bgs	below ground surface
Brice	Brice Engineering, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
btoc	below top of casing
CDQR	Chemical Data Quality Review
COC	contaminant of concern
CSM	conceptual site model
cy	cubic yard
DGI	data gap investigation
DL	detection limit
DoD	Department of Defense
EPH	extractable petroleum hydrocarbons
foc	fraction of organic carbon
FD	field duplicate
FSA	Federal Scout Armory
GAC	granular activated carbon
GNSS	Global Navigation Satellite System
GRO	gasoline range organics
IDW	investigative derived waste
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
NGS	National Geodetic Survey
OPUS	Online Positioning User System
PAH	polycyclic aromatic hydrocarbon
PAL	project action limit
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QC	quality control

ACRONYMS AND ABBREVIATIONS (CONTINUED)

RA	Remedial Action
RI	Remedial Investigation
RRO	residual range organics
RTK	real-time kinematic
SDG	sample delivery group
TPH	total petroleum hydrocarbons
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
USACE	U.S. Army Corps of Engineers
VOA	volatile organic analysis
VPH	volatile petroleum hydrocarbons

EXECUTIVE SUMMARY

This report was prepared to detail the Remedial Action (RA) performed at the Alaska Army National Guard Federal Scout Armory (FSA) in Savoonga, Alaska by Brice Engineering, LLC (Brice) between 12 July and 19 July 2022.

Thirty cubic yards of contaminated soil was excavated from the source area where contaminants of concern (COCs) were present in concentrations above Alaska Department of Environmental Conservation-approved alternative cleanup levels. The excavation was approximately 15 feet by 14 feet and was advanced to the depth of frozen soils at approximately 3 feet below ground surface (bgs). Seven primary samples and one field duplicate were collected from the excavation base and sidewalls. Concentrations of diesel range organics greater than the project action limit (PAL) of 3,000 milligrams per kilograms (mg/kg) were observed in the base of the excavation and the northern, eastern, and southern sidewalls. Field screening results from a series of test pits advanced outside of the excavation in the southeast quadrant of the property provided evidence that contamination may not be contained to the initial area of concern.

Five temporary monitoring wells were excavation-installed to a depth of approximately 5 feet bgs east and south of the source area. Supra-permafrost porewater samples were collected from two of the temporary monitoring wells; the remaining three wells were dry and could not be sampled. Two primary samples and one field duplicate were collected from WP-01 and WP-05. Diesel range organics, residual range organics, and benzene concentrations exceeded the PALs in WP-01, and residual range organics exceeded the PAL in WP-05. All other analytes were either less than the PAL or non-detect.

A Data Gap investigation is recommended to further delineate the contamination. Future soil sampling should be conducted using equipment capable of advancing through the frozen silt active layer, such as an excavator. It is recommended that an additional attempt be made to sample porewater to the east, which was not sampled during this investigation because wells were dry. Additional supra-permafrost porewater sampling will delineate the extent of porewater impacts at the site. Any future work will need to be coordinated with Kukulget, Inc. because ownership of the building transferred in 2018.

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1.0 INTRODUCTION

This report presents the Remedial Action (RA) performed at the Alaska Army National Guard Federal Scout Armory (FSA) in Savoonga, Alaska by Brice Engineering, LLC (Brice) for the U.S. Army Corps of Engineers (USACE), under Contract W911KB-17-D-0020, Task Order W911KB-18-F-0155. Figure 1 presents the site location and vicinity.

The field activities documented in this report were conducted from 12 to 19 July 2022 in accordance with the Alaska Department of Environmental Conservation (ADEC)-approved *Remedial Action, National Guard Federal Scout Armory Work Plan Uniform Federal Policy Quality Assurance Project Plan* (Brice 2022), hereafter referred to as the Work Plan. This report is supported by six appendixes: Appendix A includes the field logbook, Appendix B contains a photograph log, Appendix C presents the Chemical Data Quality Review, Appendix D includes survey data, Appendix E contains the Conceptual Site Model, and Appendix F presents regulatory correspondence.

1.1 Project Objectives

The primary project objectives were to remove remaining soil containing concentrations of contaminants of concern (COC) above the project action limits (PAL) and install temporary monitoring wells to characterize the eastern lateral extent of supra-permafrost porewater impacted by historical petroleum releases.

To accomplish these objectives, the following was planned:

- Excavation and removal of up to 25 cubic yards (cy) of impacted soil
- Confirmation soil sampling from excavation boundaries to determine presence/absence of contaminated soil with chemical concentrations greater than the PALs
- Supra-permafrost porewater sampling from newly installed temporary monitoring wells located east of the source area to determine presence/absence of contamination in supra-permafrost porewater at concentrations greater than the ADEC Table C groundwater cleanup levels

1.2 Site Background

The village of Savoonga lies on the north-central tip of St. Lawrence Island in the Bering Sea, approximately 164 miles west of Nome, Alaska. The Savoonga FSA is an active contaminated site in the ADEC Contaminated Sites Program database with File Number 670.38.002, Hazard ID 3099, and site name "AKARNG Savoonga FSA".

According to the 2010 Census, Savoonga, Alaska has a population of 671. The only other community on St. Lawrence Island is Gambell (population 681), located approximately 39 miles west of Savoonga. Beyond local access, Savoonga is only accessible by air and boat.

Historically, residents have relied on a subsistence lifestyle consisting of fish, wildlife, and plants from the region. In addition, many migratory birds pass through the area on a seasonal basis.

There are four active contaminated sites in Savoonga, including the Savoonga FSA. The closest active contaminated site is immediately adjacent to and uphill from the Savoonga FSA property line and is listed in the ADEC Contaminated Sites Program database with File Number 670.38.008, ADEC Hazard ID 25444, and site name "ADOT&PF SREB – Savoonga Airport (New)". Several residential buildings not associated

with the FSA are located within the property boundary. A former tank farm was located approximately 150 feet from the property boundary's western edge. Figure 2 presents these site features.

1.2.1 Climate

Savoonga has a subarctic maritime climate with some continental influences during winter. Summer temperatures average 40 degrees Fahrenheit (°F) to 51°F. Winter temperatures average -7°F to 11°F. Average annual precipitation is 10 inches, with 58 inches of snowfall (Western Regional Climate Center, 2019). St. Lawrence Island is subject to prevailing winds averaging 18 miles per hour. Typically, the Bering Sea freezes around St. Lawrence Island in mid-November, with breakup of sea ice occurring in late May. (Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs 2022).

1.2.2 Geology

The dominant soil lithology is a clayey silt containing boulders of bedrock material with most areas featuring a 1-foot layer of peat and organic material above the soil (Ogden 1998). During a 1998 RI, soil was assessed for physical properties including grain size analysis. It was determined that the material in the active layer is a slightly clayey, silty, gravelly sand with a hydraulic conductivity of approximately $2x10^{-3}$ centimeters per second (ERM West, Hart Crowser 1999). The bedrock is Quaternary-age basalt resulting from a large shield volcano that extends over most of the central part of the island (Waller 1959; Patton et al. 2011). Well logs from 1966 and 1972 document igneous rock at depths of 11 feet below ground surface (bgs) and 17 feet bgs, respectively (Alaska Department of Natural Resources [ADNR] 1966, 1972). Permafrost is continuous in the subsurface below Savoonga and lies anywhere between 0.5 feet bgs to 4 feet bgs (Ogden 1998; ERM West, Hart Crowser 1999; North Wind, Inc. 2009; Clarus 2006; CH2M HILL 2013; Eagle Eye 2017).

1.2.3 Hydrogeology

Permafrost is present at the site at depths of 2 to 4 feet bgs. An active, seasonally thawed groundwater layer is present above the permafrost layer but is not encountered at all times of the year (Ogden 1998).

Drinking water is currently obtained from a 195-foot-deep well located a half-mile southeast (upgradient) of the FSA on the northeast end of the air strip (Ogden 1998) (Figure 3). Water is pumped from the well to a 100,000-gallon storage tank (Clarus 2006). The well was installed in 1972 and advanced through a known thaw bulb associated with Sivuungaq River (Figure 4). The closest extent of the thaw bulb is approximately 1,500 feet from the FSA facility (ERM West, Hart Crowser 1999).

1.3 Site History

The Savoonga FSA lies adjacent to the main beach access road on the northwestern side of the city, approximately 200 feet south of the Bering Sea. The beach access road acts as the southeastern boundary of the property. The following infrastructure is situated on a gravel pad:

- A 20-foot by 60- foot, wood-framed building constructed in 1960 (the old FSA building)
- A 30-foot by 40-foot wood-framed building constructed in 1985 (the new FSA building)
- An elevated walkway connecting the old and new FSA buildings
- A 1,500-gallon aboveground storage tank (AST) near the new FSA
- Two 1,500-gallon ASTs near the old FSA

In 1985, 200 gallons of Jet A fuel leaked from drums stored near the AST. In 1992, a leak of an unknown quantity of heating oil from a fuel line. In 1993, two 1,500-gallon ASTs replaced one 3,000-gallon AST near the old FSA building. In 1994, the FSA was deactivated. In 2002, the 3,000-gallon AST near the new FSA was removed and was replaced by the 1,500-gallon AST near the new FSA (Eagle Eye 2017). All three 1,500-gallon ASTs are currently active. Multiple investigations have been completed at the site to determine the nature and extent of contamination (Figure 5). The following subsections present a summary of investigations.

1.3.1 1996 Preliminary Assessment/Site Investigation

In 1996, a Preliminary Assessment/Site Investigation included sampling in potentially contaminated areas (Ogden 1998). Seven locations were chosen for field screening around areas of suspected or potential contamination; soil was collected from 0.5 feet bgs and screened using an infrared spectrophotometry field screening tool for total petroleum hydrocarbons (TPH). Results of field screening guided selection of analytical sampling locations. Five locations were selected for analytical sampling just outside of areas where field screening indicated contamination. The locations are displayed on Figure 5 and are labeled as "SV" with three digits (e.g., SV021).

Analytical soil samples were collected from 0.5 feet bgs and analyzed for diesel range organics (DRO) and TPH. A DRO concentration of 160 milligrams per kilogram (mg/kg) was detected near the shed between the old and new FSA buildings at SV051 (Figure 5). The four remaining samples, collected from the perimeter around the site, showed a maximum concentration of DRO at 23 mg/kg and all results for TPH were non-detect. No Further Action was recommended for the site because contaminant concentrations were below the ADEC cleanup criteria applicable at the time.

1.3.2 1998 Remedial Investigation

In September 1998, to further characterize the site, a remedial investigation (RI) was conducted for the Alaska Army National Guard (AKARNG) (ERM West, Hart Crowser 1999). A total of 19 boreholes were hand-augered within the extent of the gravel pad and one location was advanced west of the gravel pad in the marshy area. An objective of the hand-auger boreholes was to determine the extent and depth of permafrost. Within the gravel pad, the advancement of boring holes was limited due to frozen soil and extended to a maximum depth of 2 to 2.5 feet. The borehole advanced west of the gravel pad encountered permafrost at 3.5 feet bgs.

From the 20 locations, 42 soil samples were analyzed for DRO and a select few were analyzed for gasoline range organics (GRO); residual range organics (RRO); benzene, toluene, ethylbenzene, and xylenes (BTEX); and polycyclic aromatic hydrocarbons (PAHs). Soil samples were collected from the surface, below the organic layer, at a depth of approximately 0.5 feet bgs and at the bottom of the borehole. Additionally, the one active, seasonal water sample was to be collected near the northernmost 1,500-gallon AST; however, refusal was met at 2.5 feet bgs and recovery was insufficient. Soil samples from the 1998 RI are presented on Figure 5 and are labeled as "B-" with two digits (e.g., B-01).

Analytical soil sample results indicated contamination was present at the south corner of the old FSA building near the ASTs and downgradient (north and west) of the 3,000-gallon AST by the new FSA building. Near the southern corner of the old FSA, DRO concentrations greater than 1,000 mg/kg were present in two borings with a concentration of 1,100 mg/kg in surface soil and 11,000 mg/kg in subsurface soil in borehole B-12; and a concentration of 17,000 mg/kg in surface soil and 8,900 mg/kg in subsurface soil in boreholeB-13. These samples were also submitted for PAH analysis; no PAH compounds were detected at concentrations greater than the Arctic Zone risk-based cleanup levels applicable at the time

of the investigation. These two locations were bounded by samples with concentrations of DRO less than 1,000 mg/kg (B-10, B-14, and B-17). Adjacent to the AST on the north side of the new FSA building, DRO concentrations of 1,300 mg/kg and 1,500 mg/kg were detected in the subsurface in boreholes B-05 and B-06, respectively. Downgradient along the edge of the gravel pad at borehole B-18, DRO concentrations were less than 30 mg/kg in subsurface soil.

The RI Report recommended that DRO be considered the primary contaminant of concern (COC) at this site (ERM West, Hart Crowser 1999). The highest concentration of RRO was 380 mg/kg, GRO was 27 mg/kg, total BTEX was 0.35 mg/kg, and benzene was non-detect.

Due to the presence of continuous permafrost, the contractor recommended that the site satisfied the Arctic Zone criteria, specifically citing the following:

- Via personal communication, the opinion of Mr. Pierre Costello of the U.S. Public Health Service, a design engineer responsible for the sewer and water upgrades completed in Savoonga around 1998 (ERM West, Hart Crowser 1999).
- A subsurface investigation conducted by Clarke Engineering in 1994 related to utility upgrades. This investigation completed 11 borings across Savoonga, including two near the FSA indicating permafrost was between 1 and 3 feet bgs.
- A groundwater investigation by Terrasat in 1996.
- The RI background boring located approximately 15 feet south of the new armory building.

One soil sample collected during the RI exceeded the current Arctic Zone cleanup level for DRO of 12,500 mg/kg, and it was estimated that 10 to 20 cubic yards (cy) of soil contained DRO concentrations greater than 12,500 mg/kg.

1.3.3 2004 Alternate Cleanup Level Demonstration Project

In August 2004, on behalf of AKARNG, an investigation was completed to demonstrate the validity of a proposed alternative cleanup level (ACL) (Clarus 2006). The investigation included soil and porewater sampling. Twelve hand-augered soil borings were advanced to refusal at a depth of 4.5 feet bgs, and two drive-point well points with 2-foot screens were installed to approximate depths of 4.5 feet bgs. The soil and porewater sample locations are displayed on Figure 5 and are labeled by “SAV-ACL-” followed by three digits (e.g., SAV-ACL-006).

Seven soil samples were collected from locations upgradient from the source area. All soil samples were analyzed for DRO, and five samples collected from locations closest to the source area were also analyzed for GRO, BTEX, and Synthetic Precipitation Leaching Procedure-DRO. Analytical soil sample results for DRO ranged from 33.4 mg/kg to 233 mg/kg, is below the current ADEC Method Two Arctic Migration to Groundwater soil cleanup level.

Two porewater samples were collected from well points near the former shed and near the old FSA ramp were analyzed for DRO and GRO. Porewater collected from the well point near the former shed (SAV-ACL-016) exhibited a petroleum odor and a slight sheen. The porewater samples indicated elevated DRO concentrations in SAV-ACL-015 and -016 of with results of 30.2 milligrams per liter (mg/L) and 4.07 mg/L, respectively. Additionally, concentrations of GRO and BTEX were detected in sample SAV-ACL-015. However, the porewater samples contained significant amounts of suspended solids, which may have biased the contaminant concentrations high. No free product was noted during collection of the samples.

As part of the ACL Demonstration Project, it was proposed that supra-permafrost porewater was not a reasonable source of drinking water due to the limited quantity and presence of continuous permafrost. Additionally, it was recommended that porewater cleanup levels should be 10 times the ADEC Table C groundwater cleanup levels; however, based on this recommendation the DRO concentration in porewater at SAV-ACL-015 still exceeded the proposed ACL.

The following ACLs were recommended for soil:

- GRO based on the maximum concentration allowed in 18 Alaska Administrative Code (AAC) 75; 1,400 mg/kg
- DRO based on a Method Three calculated value based on the ingestion pathway: 10,000 mg/kg
- Total xylenes were based on Method Three calculations for inhalation: 844 mg/kg and
- Benzene, toluene, and ethylbenzene were based on Method Three calculations, Migration to Groundwater pathway, and the 10 times rule; 0.655 mg/kg, 361 mg/kg, and 490 mg/kg respectively.

1.3.4 2009 Secondary Site Characterization

In June 2009, a Site Characterization was conducted to both delineate the extent and determine the volume of DRO-contaminated soil above the ADEC Method Two Migration to Groundwater cleanup level (250 mg/kg; North Wind, Inc. 2009). A total of 48 borings were advanced using a gas-powered auger between two 5-foot grid patterns. Twenty-two borings in Grid 1 were advanced to 0.5 to 1.5 feet bgs to the west of the new FSA buildings, and 26 borings in Grid 2 were advanced to 0.7 to 2.0 feet bgs on the east and south ends of the old FSA. Frozen soil was encountered in every Grid 1 boring between 0.4 and 1.5 feet bgs. Frozen soil was encountered in Grid 2 borings in 10 of the 26 borings between 0.7 and 1.5 feet bgs. The remaining Grid 2 borings encountered refusal at 2.0 feet bgs.

During the field effort, 90 soil samples were field screened using a photoionization detector (PID) and 22 primary soil samples were collected based on the highest field screening results and submitted to the laboratory for DRO analysis. The analytical results showed DRO concentrations greater than 250 mg/kg in soil on the west side of the new FSA (Grid 1) and less than 250 mg/kg on the southern side of the old FSA (Grid 2). There was limited correlation between field screening and analytical results. The report conclusions included an estimated 11 cy of soil with DRO concentrations greater than 250 mg/kg were present at the site. The 2009 locations are presented on Figure 5 and are labeled “09SAV” followed by six digits (e.g., 09SAV-01-G100).

1.3.5 2011 Data Gap Investigation

In July 2011, a Data Gap Investigation (DGI) was conducted to delineate the extent of petroleum-contaminated soil and porewater and to support previous remediation recommendations. During the investigation, no new sources of contamination were identified, and no evidence of stained soil or recent spills was observed (CH2MHill 2013).

A total of 21 soil samples were collected from 12 locations at depths between 0 and 3 feet bgs. Initially, samples were to be collected at greater depths; however, permafrost or ground conditions prevented deeper advancement. Four porewater samples were collected from well points on the north and northwest side of the gravel pad. The 2011 locations are presented on Figure 5 and are labeled “11SAVSB” followed by three digits (e.g., 11SAVSB013) and for well points as “11SAVGW” with three digits (e.g., 11SAVGW001); 11SAVSB004 and 11SAVSB007 were soil and porewater sample points.

The soil samples were field screened using a PID prior to collection. Samples were collected from the locations with the highest field screening results and submitted to the laboratory for DRO analysis, with a subset analyzed for BTEX, PAHs, extractable petroleum hydrocarbons (EPH), and volatile petroleum hydrocarbons (VPH). Porewater samples were submitted for DRO analysis, and one sample was also analyzed for BTEX, PAHs, EPH, and VPH.

Analytical soil results confirmed petroleum-related contamination in the previously identified areas. Several analytes exceeding the ADEC Method Two Migration to Groundwater cleanup levels were observed, with maximum concentrations detected at sample location 11SAVSB001. Contaminants that exceeded cleanup levels at this location were: DRO (17,000 mg/kg), benzene (3.1 mg/kg), toluene (160 mg/kg), ethylbenzene (48 mg/kg), total xylenes (250 mg/kg), naphthalene (180 mg/kg), 1-methylnaphthalene (230 mg/kg), and 2-methylnaphthalene (360 mg/kg).

The analytical porewater results showed an elevated DRO concentration of 18 mg/L at location 11SAVSB004. The three remaining porewater samples had detected DRO concentrations of 0.6 mg/L, 0.81 mg/L and 1.1 mg/L, which were below the current ADEC Table C groundwater cleanup level of 1.5 mg/L.

In a 2017 letter from ADEC, the ACLs that were proposed for DRO and benzene in the 2011 DGI Report (CH2M HILL 2013) were not approved, and it was recommended that the ADEC Method Three ACL calculator be used to calculate soil ACLs.

1.3.6 2016 Site Characterization Investigation

In 2016, a Site Characterization Investigation was conducted (Eagle Eye 2017) to fill data gaps and evaluate the nature and extent of groundwater contamination. During the investigation, five monitoring wells were installed around the perimeter of the facility (Figure 5, MW-01 through MW-05). The monitoring wells were installed to maximum depths of 6.5 feet bgs. Permafrost was encountered at 2 to 4 feet bgs and ice was found in each boring.

Two of five wells (MW-04 and MW-05) were installed on the north and northwest side of the facility, and porewater was encountered in these wells after installation between 2.5 and 6.1 feet bgs. In the three wells installed on the south and east side of the facility (MW-01, MW-02, and MW-03), porewater was observed between 3.1 and 3.6 feet bgs. Wells MW-02, MW-03, and MW-04 contained DRO, RRO, and toluene concentrations greater than the ADEC Table C groundwater cleanup levels; DRO exceeded in MW-02 and MW-03, RRO exceeded in MW-04, and toluene exceeded in MW-02 and MW-04. The maximum DRO concentration was 2.9 mg/L in MW-03. As a result of the investigation, it was suggested that the extent of porewater contamination was not defined upgradient and crossgradient, particularly on the southeast side of the old FSA building.

1.3.7 2018 Transfer of Ownership

The AKARNG lease for the FSA building from Kukulget, Inc. expired in 2018 and the site reverted to the corporation's ownership. Official documentation is pending.

1.3.8 2020 Alternative Cleanup Levels Summary

In 2020, soil ACLs for petroleum hydrocarbons, including DRO, RRO, GRO, BTEX, and PAHs were calculated using the most current ADEC Method Three Calculator and petroleum cleanup levels calculator (Brice 2021). Site-specific input values for fraction of organic carbon (foc) and hydraulic conductivity were used to calculate the soil ACLs. All other inputs were the ADEC default values. The foc input value was derived

by calculating the 95 percent (%) lower confidence level of the mean of total organic carbon samples collected outside of contaminant source zones during the 1998 Remedial Investigation (ERM West, Hart Crowser 1999) and the 2004 ACL Demonstration Project investigation (Clarus 2006). When using the 10 previous foc values and excluding one outlier result, the calculated site-specific foc value is 0.01278 grams carbon per gram soil.

A site-specific hydraulic conductivity value was derived from the 1998 Remedial Investigation (ERM West, Hart Crowser 1999). Results for grain size analysis performed on a soil sample collected from boring location B-13 at a depth of 1.5 to 2 feet bgs were used in the Hazen equation to calculate a site-specific hydraulic conductivity value of $2x10^{-3}$ centimeters per second. This boring was chosen to be representative of the conditions in the active layer.

AKARNG submitted the ACL Summary and approval request to ADEC on 25 June 2020. ADEC approved the ACLs in a 30 July 2020 letter. Table 1 presents the soil ACLs.

Table 1 ADEC-Approved Soil ACLs

COC	ADEC-APPROVED ACLS (mg/kg)[1]
GRO	1,400
DRO	3,000
RRO	10,000
Benzene	0.13
Toluene	47
Ethylbenzene	1.2
Total Xylenes	13
Chrysene	1,200
Fluorene	460
Naphthalene	0.43
Pyrene	1,100
1-Methylnaphthalene	4.9
2-Methylnaphthalene	15

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] Approved by ADEC on 30 July 2020

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2.0 REGULATORY CRITERIA

The PALs for GRO, DRO, RRO, BTEX, chrysene, fluorene, naphthalene, pyrene, 1-methylnaphthalene, and 2-methylnaphthalene are defined by the ADEC-approved ACLs calculated in 2020 (Brice 2021). Analytes not included in the ACLs are defined by 18 AAC 75 Method Two, Table B1 Soil Cleanup Levels (ADEC 2021). The PALs for supra-permafrost porewater are defined by the ADEC-approved ACLs calculated in 2020 (Brice 2021), which are equivalent to 18 AAC 75 Table C Groundwater Cleanup Levels (ADEC 2021). Table 2 presents the PALs and laboratory-specific limits for soil and Table 3 presents the PALs and laboratory-specific limits for supra-permafrost porewater.

Table 2 Project Action Limits and Laboratory-Specific Limits by Analyte – Soil

ANALYTE	METHOD	CAS NUMBER	ADEC[1] (mg/kg)	ACL[2] (mg/kg)	PAL[3] (mg/kg)	LABORATORY LIMITS[4] (mg/kg)		
						DL	LOD	LOQ
DRO	AK102	NS	250	3000	3000	9.0	10	20
Benzene	SW8260D	71-43-2	0.022	0.13	0.13	0.0039	0.00625	0.0125
Ethylbenzene	SW8260D	100-41-4	0.13	1.2	1.2	0.0078	0.0125	0.025
Xylenes (total)	SW8260D	1330-20-7	1.5	13	13	0.0228	0.0375	0.075
Toluene	SW8260D	108-88-3	6.7	47	47	0.0078	0.0125	0.025
1-Methylnaphthalene	SW8270D SIM	90-12-0	0.41	4.9	4.9	0.00625	0.0125	0.025
2-Methylnaphthalene	SW8270D SIM	91-57-6	1.3	15	15	0.00625	0.0125	0.025
Acenaphthene	SW8270D SIM	83-32-9	37	NS	37	0.00625	0.0125	0.025
Acenaphthylene	SW8270D SIM	208-96-8	18	NS	18	0.00625	0.0125	0.025
Anthracene	SW8270D SIM	120-12-7	390	NS	390	0.00625	0.0125	0.025
Benzo(a]anthracene	SW8270D SIM	56-55-3	0.7	NS	0.7	0.00625	0.0125	0.025
Benzo(a]pyrene	SW8270D SIM	50-32-8	1.9	NS	1.9	0.00625	0.0125	0.025
Benzo(b)fluoranthene	SW8270D SIM	205-99-2	20	NS	20	0.00625	0.0125	0.025
Benzo(g,h,i)perylene	SW8270D SIM	191-24-2	15000	NS	15000	0.00625	0.0125	0.025
Benzo(k)fluoranthene	SW8270D SIM	207-08-9	190	NS	190	0.00625	0.0125	0.025
Chrysene	SW8270D SIM	218-01-9	600	NS	600	0.00625	0.0125	0.025
Dibenzo(a,h)anthracene	SW8270D SIM	53-70-3	6.3	NS	6.3	0.00625	0.0125	0.025
Fluoranthene	SW8270D SIM	206-44-0	590	NS	590	0.00625	0.0125	0.025
Fluorene	SW8270D SIM	86-73-7	36	NS	36	0.00625	0.0125	0.025
Indeno(1,2,3-cd) pyrene	SW8270D SIM	193-39-5	65	NS	65	0.00625	0.0125	0.025
Naphthalene	SW8270D SIM	91-20-3	0.038	0.43	0.43	0.005	0.01	0.02
Phenanthrene	SW8270D SIM	85-01-8	39	NS	39	0.00625	0.0125	0.025
Pyrene	SW8270D SIM	129-00-0	87	NS	87	0.00625	0.0125	0.025

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] The most stringent of 18 AAC 75 Method Two Table B1 and B2, Under 40 Inch Human Health and Migration to Groundwater cleanup levels (ADEC 2021).
[2] ACLs are defined by the Soil Contaminants of Concern and Cleanup Goals, as approved by ADEC on 30 July 2020.
[3] PALs are defined by the ACLs or ADEC 18 AAC 75 Method Two Migration to Groundwater cleanup levels when there is no ACL in place.
[4] Laboratory limits for all methods from SGS - Anchorage, AK

Table 3 Project Action Limits and Laboratory-Specific Limits by Analyte – Supra-permafrost Porewater

ANALYTE	METHOD	CASRN	PAL[1] (µg/L)	LABORATORY-SPECIFIC RLS[2] (µg/L)		
				DL	LOD	LOQ
DRO	AK102 LV	NS	1500	200	300	600
RRO	AK103 LV	NS	1100	200	250	500
Benzene	SW8260D	71-43-2	4.6	0.12	0.2	0.4
Ethylbenzene	SW8260D	100-41-4	15	0.31	0.5	1.0
Toluene	SW8260D	108-88-3	1100	0.31	0.5	1.0
Xylenes (total)	SW8260D	1330-20-7	190	1.0	1.5	3.0
1-Methylnaphthalene	SW8270D SIM LV	90-12-0	11	0.015	0.025	0.05
2-Methylnaphthalene	SW8270D SIM LV	91-57-6	36	0.015	0.025	0.05
Acenaphthene	SW8270D SIM LV	83-32-9	530	0.015	0.025	0.05
Acenaphthylene	SW8270D SIM LV	208-96-8	260	0.015	0.025	0.05
Anthracene	SW8270D SIM LV	120-12-7	43	0.015	0.025	0.05
Benzo(a)anthracene	SW8270D SIM LV	56-55-3	0.3	0.015	0.025	0.05
Benzo(a)pyrene	SW8270D SIM LV	50-32-8	0.25	0.0062	0.01	0.02
Benzo(b)fluoranthene	SW8270D SIM LV	205-99-2	2.5	0.015	0.025	0.05
Benzo(g,h,i)perylene	SW8270D SIM LV	191-24-2	0.26	0.015	0.025	0.05
Benzo(k)fluoranthene	SW8270D SIM LV	207-08-9	0.8	0.015	0.025	0.05
Chrysene	SW8270D SIM LV	218-01-9	2	0.015	0.025	0.05
Dibenzo(a,h)anthracene	SW8270D SIM LV	53-70-3	0.25	0.0062	0.01	0.02
Fluoranthene	SW8270D SIM LV	206-44-0	260	0.015	0.025	0.05
Fluorene	SW8270D SIM LV	86-73-7	290	0.015	0.025	0.05
Indeno(1,2,3-cd)pyrene	SW8270D SIM LV	193-39-5	0.19	0.015	0.025	0.05
Naphthalene	SW8270D SIM LV	91-20-3	1.7	0.031	0.05	0.1
Phenanthrene	SW8270D SIM LV	85-01-8	170	0.015	0.025	0.05
Pyrene	SW8270D SIM LV	129-00-0	120	0.015	0.025	0.05

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] PALs are defined by 18 AAC 75 Table C Groundwater cleanup levels (ADEC 2021).
[2] Laboratory limits for all methods from SGS - Anchorage, AK

3.0 FIELD ACTIVITIES

This section presents the 2022 RA fieldwork. Appendix A includes the field logbook and Appendix B includes a photograph log of field activities.

3.1 Mobilization

Fieldwork was conducted between 12 and 19 July 2022. Two environmental scientists, one operator, and the AKARNG archaeologist mobilized from Anchorage to Nome via commercial air, and then to Savoonga via charter flight.

3.2 Site Preparation

General utility locates were performed by calling the Alaska Digline at 811 prior to drilling tasks and contacting the village council office to request utility maps and onsite consultation. In addition to the general area utility locating process, screening for buried utilities onsite was completed using a Schondstedt magnetometer. Site drawings and owner knowledge were also used in line locating activities. During buried utility locating, a visual reconnaissance was conducted to identify any surface features that may have impeded the main project objectives or impact contaminant evaluation.

Two disconnected 1,500-gallon ASTs were present in the proposed excavation footprint. Prior to excavation activities, the ASTs were relocated using a mini excavator.

3.3 Field Screening

Field screening was conducted using a PID and headspace screening procedures. PID field screening was conducted to identify potential petroleum contamination and to guide the excavation and collection of analytical samples. Field screening samples were placed in a resealable plastic bag for a period of at least 10 minutes, but no more than 1 hour, at an approximate temperature of 40°F to 60°F, allowing hydrocarbons to volatilize and accumulate in the headspace of the bag. The bag was agitated for 15 seconds to further promote volatilization. The PID probe was inserted into the bag to measure the organic or combustible vapor concentration in parts per million (ppm). The PID was calibrated daily in accordance with manufacturer instructions and included a fresh air calibration to determine the zero point of the sensor calibration curve followed by a span calibration using a standard reference gas (100 ppm Isobutylene) to determine a second point of the sensor calibration.

3.4 Soil Investigation

A Komatsu PC40 mini excavator, with an arm reach of 18 feet, was used to remove approximately 30 cy of contaminated soil from the source area. Excavated soil was placed into 1 cy supersacks for transport and disposal. The excavation was advanced to the depth of frozen soil at approximately 3 feet bgs. During the soil removal supra-permafrost water with a sheen and POL odor was observed inside the excavation. Soil samples were collected from the base and sidewalls of the excavation using disposable or clean, decontaminated stainless steel tools, and submitted for the analysis of DRO, BTEX, and PAHs. Soil samples were collected at locations in the excavation that appeared to be the most contaminated based on field screening results, field observations including olfactory and visual indications of contamination, and previous analytical sample results. Samples were collected in laboratory-provided sample containers. To minimize volatilization during soil sampling for volatiles (BTEX), approximately 25 grams of soil was placed

in a pre-weighed 4-oz sample jar with Teflon-lined lid and septum as soon as possible. Immediately after collection, approximately 25 mL of methanol was added so the sample was submerged. Samples for DRO and PAHs were collected in a 4-oz, unpreserved sample jar. One field duplicate sample was collected for every 10 primary grab samples collected for each analytical method. The final dimensions of the excavation were 3 feet by 15 feet by 14 feet and extended under a corner of the Old Savoonga FSA building (Figure 6).

During installation of temporary monitoring wells, a series of 10 test pits were advanced to depths of frozen soil at approximately 3 feet bgs outside of the excavation in the southeast quadrant of the property to delineate contamination (Figure 6). Field screening samples were collected from soil in the center of the excavator bucket. PID readings were elevated from these areas. Additional evidence of contamination, in the form of hydrocarbon odor and/or sheening, was observed in test pits and low-lying areas to the south and west of the Savoonga FSA buildings.

3.5 Supra-permafrost Porewater Investigation

Monitoring wells were installed, developed, and sampled to evaluate the nature and extent of contamination in supra-permafrost porewater.

3.5.1 Monitoring Well Construction

Five temporary monitoring wells were excavation-installed to the east and south of the source area in accordance with the Work Plan. Wells were installed to approximately 3 feet bgs and were screened to capture the supra-permafrost porewater layer, found at 1 and 2.4 feet below top of casing (btoc). Water was observed sporadically as a perched layer above frozen soil. The temporary monitoring wells were installed on 16 July. Water levels were measured on 17 July. Water was present in WP-01 and WP-05; WP-02, WP-03, and WP-04 were dry.

3.5.2 Monitoring Well Development

The temporary monitoring wells were developed approximately 24 hours after installation using a peristaltic pump. Dedicated tubing was used for each well to minimize the potential for cross-contamination. The two temporary monitoring wells with water (WP-01 and WP-05) were developed by purging the well until the water became less turbid. Upon completion of well development, the well was allowed to return to within approximately 80% of the initial measured water level, prior to sampling.

3.5.3 Supra-permafrost Porewater Sampling

After installation and development, samples were collected using a pneumatic bladder pump with a dedicated bladder and tubing; however, due to technical difficulties, sampling for non-volatiles was conducted using the peristaltic pump with dedicated tubing, and volatiles were collected with disposable bailers. A YSI meter with flow-through cell was used to collect measurements of dissolved oxygen (DO), specific conductance, temperature, pH, and oxidation-reduction potential (ORP). A turbidimeter was used to monitor turbidity. Purging continued until three (or four if temperature was used as an indicator) of the parameters were stable. Samples were collected in laboratory-provided sample containers in order of volatility and analyzed for DRO, RRO, BTEX, and PAHs.

3.6 Decontamination

Equipment was decontaminated between sample locations using a water and Alconox mixture. Decontamination water was treated through granular activated carbon (GAC) filter and was discharged onsite a minimum of 100 feet away from any drinking water wells and/or surface waters.

3.7 Waste Management

Purge and decontamination water was treated with an onsite GAC filter, visually inspected for sheen, and discharged onsite a minimum of 100 feet away from any drinking water wells and/or surface waters. Spent GAC material was transported with the soil cuttings for offsite disposal.

Solid wastes generated during the field effort were stored in plastic trash bags and transported to the Savoonga landfill for disposal as non-regulated waste. Waste characterization samples were collected and analyzed for Toxicity Characteristic Leaching Procedure Resource Conservation and Recovery Act metals. Analytical results were below the U.S. Environmental Protection Agency allowable limits. Contaminated soil was transported offsite for disposal at the Columbia Ridge Landfill in Arlington, Oregon.

3.8 Survey

On 19 July 2022 survey fieldwork occurred at the Alaska National Guard Federal Scout Armory in Savoonga, Alaska. The following features were measured during the survey: seven confirmation samples, five temporary well points, ten test pits, Armory building corners, six aerial ground control targets, an excavation boundary extent, and a supersack stockpile extent. Elevation and position were measured using real-time kinematic (RTK) Global Navigation Satellite System (GNSS) relative geopositioning techniques. Elevations of the PVC riser of temporary well points were intended to be measured using third-order differential leveling techniques; however, well points were removed prior to the surveyor arriving on-site. Instead, only the ground elevation and position of the remaining holes were measured, with the PVC riser elevation later computed by adding the measured stick-up elevation. Survey equipment consisted of a Trimble R10-2 GNSS base receiver, R12i GNSS rover receiver, and TSC5 data collector.

Horizontal and vertical control values from a 2011 OPUS shared solution of monument “RPK A” (NGS PID BBCN80) were held fixed for this survey. To verify the monument’s suitability for use a static occupation of “RPK A” more than four hours in duration was measured during this survey. The raw GNSS data was submitted to the National Geodetic Survey (NGS) Online Positioning User System (OPUS). The resulting solution was compared to the shared solution, and it was determined the 2011 values were suitable. The horizontal datum is NAD83 ([2011] Epoch 2010.0000) and the coordinate system is Alaska State Plane System Zone 9. The vertical datum is NAVD88, with orthometric elevations derived from a separation offset applied from Geoid 12B to the measured ellipsoid height. The unit of measurement is U.S. Survey Foot.

Horizontal precisions from the GNSS RTK survey ranged from 0.01 feet to 0.10 feet and vertical precisions ranged from 0.02 feet to 0.09 feet. These precision ranges can be considered a measure of accuracy, relative to control monument “RPK A”. These estimates can be expressed at the 95% statistical confidence level by scaling by a factor of approximately 2. Well elevations could not be measured to the required level of vertical accuracy due to vandalization. Measurements on all other features meet survey data quality requirements outlined in Table 4-3 of the USACE Alaska District Manual for Electronic Deliverables (USACE 2017). Appendix D presents the survey data in tabular format.

3.9 Site Restoration

The excavation was backfilled with clean material from a local borrow source and compacted to match the existing grade and surrounding material. The local borrow source is located outside of Savoonga and is commonly used by the City of Savoonga for construction projects. The AKARNG archaeologist was onsite during backfill collection to ensure no artifacts were dug up and confirmed there was no prehistoric or modern site use at the borrow source. Visual and olfactory indicators presented no signs of contamination in the backfill soil. The backfill was mounded slightly to allow for settling and then contoured in a way to prevent water accumulation and promote drainage. Temporary monitoring wells were removed from the ground after sampling and survey were complete, and soil was returned to the excavated well hole of origin as backfill. The ASTs were returned to their approximate original location, immediately outside the perimeter of the backfilled area. Temporary monitoring wells were decommissioned, and lathe was placed at boreholes for the surveyor. The lathe was removed by residents prior to the survey; however, locations were still able to be surveyed because locations also had been spray painted.

3.10 Work Plan Deviations

The following Work Plan deviations occurred:

- Due to technical difficulties encountered with the bladder pump, a peristaltic pump with dedicated tubing was used for porewater sampling; samples for volatile analysis were collected using disposable hand bailers.
- Well stick-up heights recorded in the field logbook were added to the survey measurement of the ground elevation at each well location instead of surveying the top of each well casing.
- Temporary monitoring wells WP-02, WP-03, and WP-04 were unable to be sampled because they were dry.

4.0 ANALYTICAL RESULTS

All samples collected during this project were submitted to SGS of Anchorage, Alaska for analysis. SGS Anchorage holds current ADEC laboratory approval and Department of Defense (DoD) Environmental Laboratory Accreditation Program certifications for all requested analyses. Chemical analyses for all parameters were performed in accordance with the DoD Quality Systems Manual for Environmental Laboratories, Version 5.3 (DoD 2019).

Soil and water samples collected during this project were analyzed using some or all of the following methods:

- DRO – AK102
- RRO – AK103
- BTEX – SW8260D
- PAHs – SW8270D SIM

The following section presents analytical results for soil and supra-permafrost porewater samples. Soil analytical result exceedances are summarized in Table 4. Supra-permafrost porewater sample results are summarized in Table 5. Appendix C presents all analytical data.

4.1 Soil Analytical Results

Seven primary soil samples and one field duplicate were collected from the excavation base and sidewalls. Concentrations of DRO above the PAL ranged from 4,030 mg/kg to 20,900 mg/kg; benzene exceedances ranged from 0.138 mg/kg to 2.08 mg/kg; ethylbenzene ranged from 1.79 mg/kg to 13.7 mg/kg; and a total xylenes exceedance was observed with a result of 63.3 mg/kg. The following PAHs were observed above PALs: 1-methylnaphthalene exceedances ranged from 5.02 mg/kg to 51.2 mg/kg; 2-methylnaphthalene exceedances were 51.9 mg/kg and 73.9 mg/kg; and naphthalene exceedances ranged from 4.77 mg/kg to 47.1 mg/kg. All other analytes were non-detect or below PALs. The analytical result for benzene in sample 22SAV-SW01-1.5, was non-detect; however, the limit of detection exceeded the PAL.

4.2 Supra-permafrost Porewater Analytical Results

Two primary supra-permafrost porewater samples and one field duplicate were collected from WP-01 and WP-05. DRO, RRO, and benzene concentrations exceeded the PALs in WP-01 with concentrations of 5.89 mg/L, 1.63 mg/L, and 0.016 mg/L, respectively. RRO exceeded the PAL in WP-05 with a concentration of 1.27 mg/L. All other analytes were non-detect or below PALs.

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Table 4 Summary of Soil Analytical Results

SAMPLE ID					22SAV-B01-3	22SAV-B02-3	22SAV-B03-3	22SAV-SW01-1.5	22SAV-SW02-2.5	22SAV-SW03-2	22SAV-SW04-2
ANALYTE	**ADEC[1]**	**ACL[2]**	**PAL[3]**	**UNITS**							
DRO	250	3,000	3,000	mg/kg	**20,900**	1,860	1,120	**12,500**	**4,030**	191	404
Benzene	0.022	0.13	0.13	mg/kg	**2.08**	**0.138**	0.0550	ND [0.199] U	0.0513	ND [0.0112]	ND [0.0106]
Ethylbenzene	0.13	1.2	1.2	mg/kg	**13.7**	**2.22**	**1.83**	**1.79**	0.384	ND [0.0225]	ND [0.0211]
Xylenes (total)	1.5	13	13	mg/kg	**63.3**	9.73	8.49	11.3	2.24	ND [0.0675]	ND [0.0635]
1-Methylnaphthalene	0.41	4.9	4.9	mg/kg	**51.2**	**5.02**	**8.48**	**38.7**	**9.72**	0.0463	0.473
2-Methylnaphthalene	1.3	15	15	mg/kg	**73.9**	7.09	12.3	**51.9**	11.5	0.0570	0.461
Naphthalene	0.038	0.43	0.43	mg/kg	**47.1**	**4.77**	**9.54**	**30.9**	**5.19**	0.0237 J	0.120
PID Result	--	--	--	ppm	>15,000	>15,000	>15,000	>15,000	9,900	222.2	226.1

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] The most stringent of 18 AAC 75 Method Two Table B1 and B2, Under 40 Inch Human Health and Migration to Groundwater Cleanup levels (ADEC 2021).
[2] ACLs are defined by the Soil Contaminates of Concern and cleanup Goals, as approved by ADEC on 30 July 2020.
[3] PALs are defined by the ACL or ADEC 18 AAC 75 Method Two Migration to Groundwater cleanup levels when there is no ACL in place.
For field duplicate locations, the highest detected result between the original and the field duplicate is presented.
Bold/red indicates that a detected result exceeds PAL.
Yellow highlight indicates the LOD for a non-detect results exceeds PAL.
LOD shown in brackets [ ]
J – the result is an estimated value greater than or equal to the detection limit and below the limit of quantitation
ND – The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

Table 5 Summary of Supra-Permafrost Porewater Analytical Results

		SAMPLE ID	22SAV-WP01	22SAV-WP05
		LOCATION ID	WP-01	WP-05
ANALYTE	**PAL[1]**	**UNITS**		
DRO	1.5	mg/L	**5.89**	1.12
RRO	1.1	mg/L	**1.63**	**1.27 QN**
Benzene	0.0046	mg/L	**0.0160**	0.00244

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] The 18 AAC 75 Method Two Table C, Groundwater cleanup levels (ADEC 2021).
For field duplicate locations, the highest detected result between the original and the field duplicate is presented.
Bold/red indicates that a detected result exceeds PAL.
LOD shown in brackets [ ]
J – the result is an estimated value greater than or equal to the detection limit and below the limit of quantitation
QN – the result is an estimated value, bias indeterminate, due to a QC failure

5.0 QUALITY ASSURANCE

Fieldwork was completed by ADEC-qualified environmental professionals and qualified samplers. A chemical data quality review (CDQR) and ADEC Laboratory Data Review Checklists are provided in Appendix C, and laboratory reports are in Attachment C-4.

The analytical data presented in this report were reviewed and validated in accordance with the QA/QC criteria defined in the Work Plan (Brice 2022). All data are considered usable as qualified, and no data were rejected. The 90% completeness goals of this project were met. Data usability is further discussed in the CDQR (Appendix C) and summarized in this section.

The quality of the project data was acceptable and completeness goals were met. Qualified data are considered acceptable for use, with the limitations discussed within the CDQR and the ADEC Laboratory Data Review Checklists regarding the qualifiers applied to the results.

A small portion of the results had quality control (QC) issues which required qualification of project data. Most significantly the LOD exceedance noted in CDQR Section 3.4. Analytical results for benzene cannot be used to determine whether the analyte is present at a concentration greater than or less than the PALs.

The following QC issues in SDG 1224072 required qualification and explanation:

- The lack of a soil matrix VOA trip blank
- MS/MSD recovery failures
- Surrogate recovery failures

The following quality control samples were collected and/or submitted to the laboratory along with field samples:

- **Field duplicates (FD):** The overall project-required frequency of one FD for every 10 or fewer primary samples, per analyte, per matrix, was met.
- **Matrix spike/matrix spike duplicates (MS/MSDs):** MS/MSDs were collected and submitted to the laboratory at the project-required frequency of one set for every 20 or fewer project samples (5%) and one for every preparatory batch (designated MS/MSD samples were included with each shipment).
- **Trip blanks (TB):** A water TB was included with the cooler containing volatile samples, as required. There were no detections for BTEX in this sample.
  - The chain-of-custody documented a soil (22SAV-TB01) and water (22SAV-TB02) trip blank for the 8260 BTEX; However, there was no soil container that was received at the lab and the water trip blank was added by the laboratory. The volatile organic analysis (VOA) soil data quality is affected by the lack of a soil trip blank. It is impossible to determine if any low-level reportable VOA results in the sample delivery group (SDG) may be due to potential cross contamination during transport. Data is still considered usable for making project decisions as all results will be assumed to be unaffected by cross contamination.

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6.0 HUMAN HEALTH CONCEPTUAL SITE MODEL

This section describes the COCs, contamination sources and release mechanisms, potentially impacted media, potential contaminant transport mechanisms, and exposure routes and pathways. The preliminary Conceptual Site Model (CSM) used data gathered from previous investigations to assess the potential receptors and exposure pathways at the Savoonga FSA; the CSM was updated following fieldwork and receipt of analytical results.

A CSM is a tool used to describe and evaluate how human receptors might contact site chemicals under current and likely future conditions. The CSM was prepared in accordance with the ADEC *Guidance on Developing Conceptual Site Models* (ADEC 2017). The preliminary human health graphic and scoping forms are provided in Appendix E.

6.1 Sources and Type of Chemicals

Contaminant sources are associated with leaks and spills from ASTs and discarded drums. Based on the analytical results from this investigation, DRO, benzene, ethylbenzene, xylenes, 1- and 2-methylnaphthalene, naphthalene, and phenanthrene have been identified as COCs for soil; DRO, RRO, and benzene have been identified as COCs for supra-permafrost porewater, however, the supra-permafrost porewater to the east was not characterized because the wells were dry.

6.2 Affected Media

Affected media includes surface soil, subsurface soil, and supra-permafrost porewater. Potentially affected media includes surface water, indoor and outdoor air, sediment, and biota. Supra-permafrost porewater at the property has been encountered at depths as shallow as 1.1 feet bgs; in the absence of a Groundwater Determination in accordance with 18 AAC 75.350, supra-permafrost porewater could be considered a potential future source of drinking water in Savoonga.

6.3 Chemical Release and Transport Mechanisms

Compounds released to the environment may undergo physical and chemical processes that can alter their chemical makeup or properties. The fate of metals is influenced by pH, oxygen content, salinity, and the presence of other metals. Interactions can result in both beneficial or adverse effects on ecological receptors and antagonistic or additive effects when it is present with other elements. Petroleum products released to the environment migrate through soil as bulk oil flow infiltrating the soil and/or as individual compounds separating from the bulk petroleum mixture and dissolving in air or water. DRO and PAHs are more likely to biodegrade and adsorb to soil or sediment than inorganic chemicals. The primary fate and transport processes that are of concern for chemicals are: adsorption to soil/sediment, leachability/water solubility, surface runoff/groundwater migration, and bioconcentration/bioaccumulation potential.

Adsorption and/or Leaching. DRO and PAHs are COCs. These compounds adsorb to soil or sediment and may leach to supra-permafrost porewater.

Surface Runoff/Groundwater Migration. Supra-permafrost porewater is perched on top of permafrost, making supra-permafrost porewater migration/runoff a potential transport mechanism. Surface water is also present; therefore, surface water migration/runoff may also be a potential transport mechanism.

Partitioning to Air. Volatile compounds, including BTEX, have been detected in soil and supra-permafrost porewater; therefore, volatilization of these compounds may be a potential transport mechanism.

Bioconcentration/Bioaccumulation. Contaminants have the potential to bioaccumulate and have been detected in soil and supra-permafrost porewater.

6.4 Human Receptors

Access to the Savoonga FSA property is not restricted. The site is located within the Village of Savoonga; the property boundaries abut to residential lots (toward the east, west, and north), and a road (toward the south). Current receptors include residents, construction workers, site visitors, trespassers, recreational users, and subsistence harvesters and consumers.

6.5 Exposure Pathways

An exposure pathway describes how contaminants move through the environment from a source to a point of contact with a person, including the specific exposure route (e.g., through the skin, lungs, or digestive tract). Exposure pathways are considered complete if the following four elements exist:

- A source
- A mechanism of release, retention, or transport of a given chemical in a given medium
- A point of contact with the affected medium
- An exposure route at the point of contact (e.g., ingestion, dermal absorption, or inhalation)

If any of these elements is missing, the pathway is considered incomplete and thus does not present a means of exposure. The potentially complete exposure pathways to COCs are described in the following paragraphs.

6.5.1 Soil

Direct releases to soil have occurred, and historical and current project data indicate that soil has been impacted by fuel releases.

Incidental Ingestion. Current and future recreational and subsistence users may potentially ingest soil by consuming fine particles that adhere to skin surfaces, particularly on the hands. Hypothetical future construction workers are likely to be engaged in soil-moving activities; therefore, exposure to COCs through incidental ingestion of soil is considered a potentially complete exposure pathway. Likewise, residents and commercial/industrial workers may incidentally ingest soil from outdoor exposure around their home or workplace.

Dermal Contact. The dermal contact exposure pathway is considered a potentially complete exposure pathway for all receptors. Current and future residents, construction workers, site visitors, trespassers, and subsistence harvesters and consumers may potentially come into contact with soil; thus, the dermal pathway would be considered potentially complete. Appendix B of the ADEC *Guidance on Developing Conceptual Site Models* (ADEC 2017) lists chemicals that should be considered for the dermal pathway.

Inhalation of Fugitive Dust. Inhalation of particulates by all receptors is considered a potentially complete exposure pathway. Soil disturbance could re-suspend dust that may be inhaled, rendering this exposure pathway potentially complete. However, it should be noted that under current and likely future conditions, the climate and vegetation minimize this potential exposure pathway.

Inhalation of Soil Vapor. Inhalation of vapors in outdoor air by current and future receptors is considered potentially complete. Savoonga has a cold climate, and most buildings are elevated off the ground surface, which reduces the potential effects of outdoor and indoor air inhalation. Appendix C of the ADEC *Guidance on Developing Conceptual Site Models* (ADEC 2017) lists which chemicals are considered volatile for the purposes of this exposure pathway.

6.5.2 Groundwater

Data indicates that supra-permafrost porewater has been impacted by fuel releases. Also, sheen was observed on the supra-permafrost water inside the excavation. For purposes of this CSM, the supra-permafrost porewater is being evaluated relative to the "groundwater" exposure pathways referred to in the ADEC *Guidance on Developing Conceptual Site Models* (ADEC 2017).

Ingestion and Dermal Contact. Supra-permafrost porewater is not currently used for domestic purposes at the Savoonga FSA and cannot support domestic use. Domestic water for the Village of Savoonga is provided by a well. For the purposes of this CSM, future receptors are not assumed to utilize supra-permafrost porewater for domestic purposes. In the absence of a Groundwater Determination in accordance with 18 AAC 75.350, supra-permafrost porewater could be considered a potential future drinking water source; therefore, the ingestion of groundwater is a potentially complete exposure pathway for future receptors. Receptors could contact the supra-permafrost porewater during construction activities; therefore, dermal contact with supra-permafrost porewater is considered a potentially complete exposure pathway.

Inhalation of Groundwater Vapor. Currently, this is not a complete exposure pathway; however, future receptors could potentially be exposed to volatile COCs in indoor air from the supra-permafrost porewater if residences or buildings are constructed on or near the FSA property that do not use elevated building techniques. Supra-permafrost porewater could be considered a potential future drinking water source; therefore, there is a complete current or future inhalation of tap water vapor pathway. Future construction workers could potentially be exposed to COCs through excavation activities.

6.5.3 Sediment and Surface Water

Impacted soil on the FSA property could potentially migrate/runoff to offsite surface water and sediment.

Incidental Ingestion and Dermal Contact. Current and future receptors could be exposed to chemicals in sediment or surface water via incidental ingestion or dermal contact with both surface water and sediment during recreation activities or subsistence harvesting.

Inhalation of Vapor. Savoonga is in a cold climate; therefore, exposure to chemicals volatilizing from surface water is minimal and infrequent. Surface water is not used currently for domestic purposes. However, for purposes of this CSM, this pathway is considered potentially complete for future receptors due to the presence of volatile compounds in surface soil that could migrate to surface water.

6.5.4 Biota

Contaminants from soil, sediment, surface water, or other plant and animal life can accumulate in plants and animals that are eaten by people. The detected bioaccumulating COCs (phenanthrene in soil and benzo[a]anthracene in supra-permafrost porewater) are present in concentrations below 1/10 of the screening levels; therefore, although the exposure pathway is potentially complete, it is considered insignificant.

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7.0 CONCLUSIONS AND RECOMMENDATIONS

Soil contamination at concentrations above the PAL remains at the Savoonga FSA. Much of the contamination appeared to have settled into the active layer 3 feet bgs due to seasonal freeze-thaw action in a hard packed silt layer above the permafrost. Concentrations of DRO greater than the PAL of 3,000 mg/kg were observed in the base of the excavation and the northern, eastern, and southern sidewalls. Porewater contamination at concentrations above the PAL was observed at temporary monitoring wells to the south and northwest of the excavation. Field-screening results from test pits provided evidence that contamination may not be contained to the initial area of concern. A Data Gap investigation is recommended to further delineate the contamination up to the boundary of the property line. It is recommended that an additional attempt be made to sample porewater to the east, which was not sampled during this investigation because wells were dry. Additional supra-permafrost porewater sampling will delineate the extent of porewater impacts at the site. If the area continues to be dry during future sampling attempts, supra-permafrost porewater may not be an affected media at these locations.

It is recommended that future soil sampling be conducted using equipment capable of advancing through the frozen silt active layer, such as an excavator. A larger excavator with a longer arm reach may be able to penetrate the active zone or the excavation could be secured for a period of time to allow the frozen soil to thaw. If necessary, alternative equipment may need to be barged to Savoonga or planned maintenance actions take place on city-owned equipment before any additional field activities take place. Any future work will need to be coordinated with Kukulget, Inc. because ownership of the building transferred in 2018.

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8.0 REFERENCES

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FIGURES

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1 INCH

NATIONAL GUARD FEDERAL SCOUT ARMORY
REMEDIAL ACTION REPORT
SAVOONGA, ALASKA

LOCATION AND SITE VICINITY

DATE: 6/30/2023

PROJECT No.: 550501

DRAWN: T.A.

FIGURE: 1

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1 INCH

NATIONAL GUARD FEDERAL SCOUT ARMORY REMEDIAL ACTION REPORT

SAVOONGA, ALASKA

SITE FEATURES

Legend

- Federal Scout Armory Property Line
- Federal Scout Armory Buildings
- Residential Buildings
- Tanks
- AST

Abbreviations:

AST ..... aboveground storage tank
bgs ..... below ground surface
DRO ..... diesel-range organics
mg/kg ..... milligrams per kilogram
mg/L ..... milligrams per Liter
RRO ..... residual range organics

Notes:

1. Location of historical samples are approximate based on historical figures and on orthophotography courtesy of Alaska Department of Commerce, Division of Community & Regional Affairs (DCRA), 1-foot pixels.
2. All wells established prior to 2016 have been abandoned/removed.
3. Only porewater sample results with Table C exceedances are shown on figure.
4. Property boundary displayed is approximate.

Chemistry Notes:

1. J = estimated; the value is greater than or equal to the MDL and less than the LOQ, or the quantitation is an estimation due to discrepancies in meeting certain analyte-specific QC criteria
2. (+) = indicates that the result is potentially biased high
3. (–) = indicates that the result is potentially biased low

References:

1. Map produced using ESRI ArcMap v. 10.7.1.
2. Base imagery from ESRI (WV02, 50cm, 7/11/2014).

ALASKA STATE PLANE ZONE 9
HORIZONTAL DATUM: NAD83 (2011)
VERTICAL DATUM: NAVD88

70 35 0 70

SCALE IN FEET

PROJECT No.:	DATE:	FIGURE:
550501	6/30/2023	2
P.M.: MO	DRAWN: T.A.	

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1 INCH

NATIONAL GUARD FEDERAL SCOUT ARMORY REMEDIAL ACTION REPORT

SAVOONGA, ALASKA

Savoonga Drinking Water Source

Legend

- Water line
- Federal Scout Armory Building
- Community Water Supply Well

Notes:

1. Location of water line is approximate.

References:

1. Map produced using ESRI ArcMap v. 10.7.
2. Image provided by Digiglobe, 07/11/2014.
3. Map produced using ESRI ArcMap v. 10.7.

ALASKA STATE PLANE ZONE 9
HORIZONTAL DATUM: NAD83 (2011)
VERTICAL DATUM: NAVD88

350 175 0 350

SCALE IN FEET

PROJECT No.:	DATE:	FIGURE:
550501	6/30/2023	3
P.M.: MO	DRAWN: T.A.	

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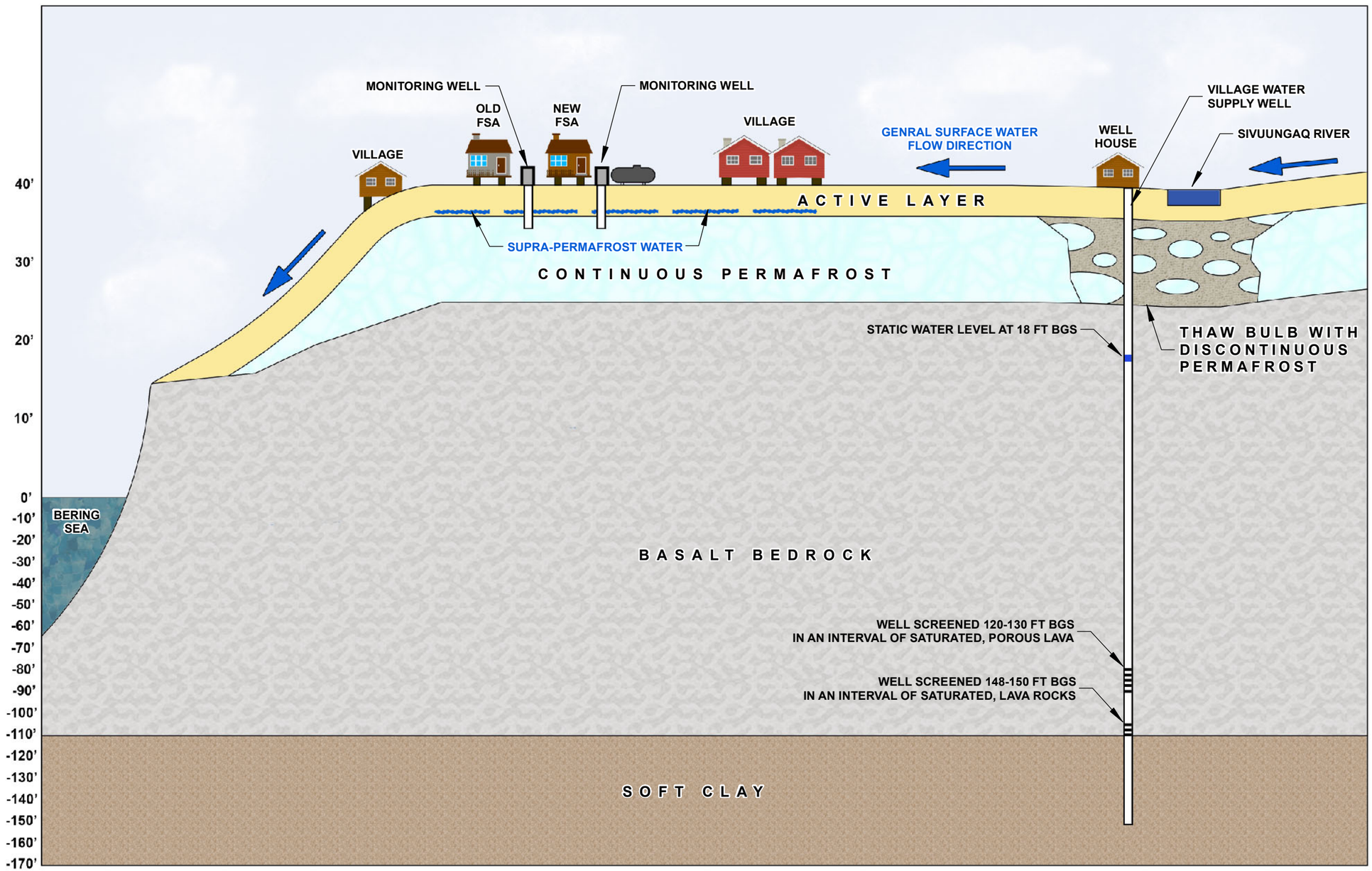

NATIONAL GUARD FEDERAL SCOUT ARMORY
REMEDIAL ACTION REPORT
SAVOONGA, ALASKA

SAVOONGA CONCEPTUAL HYDROLOGY MODEL

Abbreviations:

ft bgs ..... feet below ground surface

Notes:

1. Map not to scale.
2. This conceptual hydrology model is based on a composite of soil borings logs, supra-permafrost water monitoring wells, and historic investigation information, which is provided in Section 7.2 of the Decision Document. Logs from the 1972 village water supply well installation and a 1966 well installation attempt provided information about regional geology and depth to bedrock.

PROJECT No.:	DATE:	FIGURE:
550501	6/30/2023	4
P.M.: MO	DRAWN: JC	

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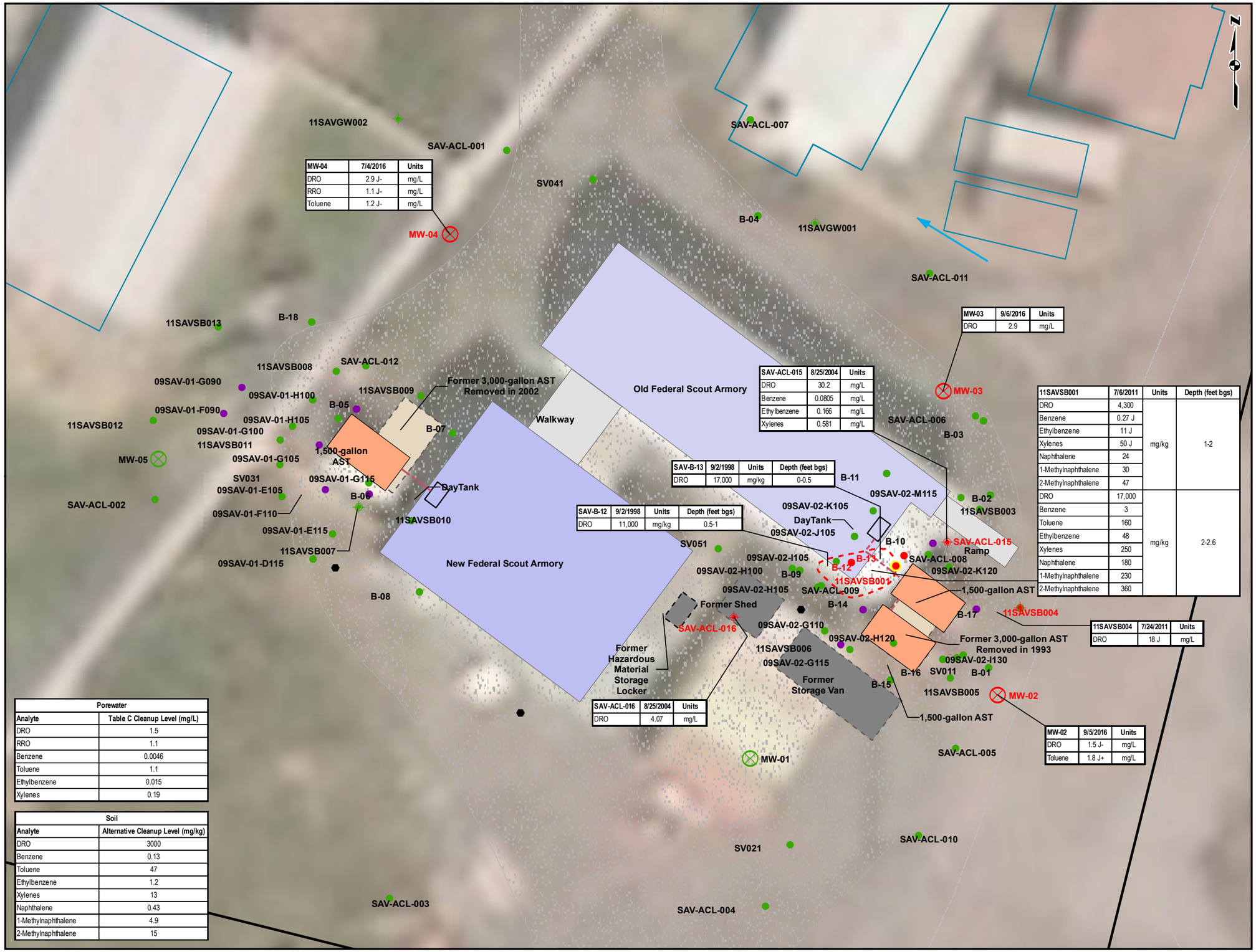
1 INCH

NATIONAL GUARD FEDERAL SCOUT ARMORY REMEDIAL ACTION REPORT

SAVOONGA, ALASKA

PREVIOUS SOIL AND POREWATER SAMPLE LOCATIONS AND EXCEEDANCES



Porewater	
Analyte	Table C Cleanup Level (mg/L)
DRO	1.5
RRO	1.1
Benzene	0.0046
Toluene	1.1
Ethylbenzene	0.015
Xylenes	0.19

Soil	
Analyte	Alternative Cleanup Level (mg/kg)
DRO	3000
Benzene	0.13
Toluene	47
Ethylbenzene	1.2
Xylenes	13
Naphthalene	0.43
1-Methylnaphthalene	4.9
2-Methylnaphthalene	15

LEGEND:

- Property Line
- Federal Scout Readiness Center (FSRC)
- Old FSRC
- Former Structures
- Former AST
- AST
- Day Tank
- Gravel Pad
- Soil concentrations exceeding ADEC-approved Alternative Cleanup Levels
- Tank Piping
- Other Building
- Unpaved Road
- Presumed Groundwater Flow Direction
- Former Drum Location

Porewater Sample Location

- All results less than Table C cleanup levels
- One or more result greater than Table C cleanup level

Soil Sample Location

- DRO < 250 mg/kg
- DRO ≥ 250 mg/kg, but < 3,000 mg/kg
- DRO ≥ 3,000 mg/kg
- DRO, BTEX, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene exceed alternative cleanup levels

Monitoring Well Locations Installed/Sampled in 2016

- All results less than Table C cleanup levels
- One or more result greater than Table C cleanup level

Abbreviations:

AST ..... aboveground storage tank
bgs ..... below ground surface
DRO ..... diesel-range organics
mg/kg ..... milligrams per kilogram
mg/L ..... milligrams per Liter
RRO ..... residual range organics

Notes:

1. Location of historical samples are approximate based on historical figures and on orthophotography courtesy of Alaska Department of Commerce, Division of Community & Regional Affairs (DCRA), 1-foot pixels.
2. All wells established prior to 2016 have been abandoned/removed.
3. Only porewater sample results with Table C exceedances are shown on figure.
4. Property boundary displayed is approximate.

Chemistry Notes:

1. J = estimated; the value is greater than or equal to the MDL and less than the LOQ, or the quantitation is an estimation due to discrepancies in meeting certain analyte-specific QC criteria
2. (+) = indicates that the result is potentially biased high
3. (–) = indicates that the result is potentially biased low

References:

1. Map produced using ESRI ArcMap v. 10.7.1.
2. Base imagery from ESRI (WV02, 50cm, 7/11/2014).

ALASKA STATE PLANE ZONE 9
HORIZONTAL DATUM: NAD83 (2011)
VERTICAL DATUM: NAVD88

15 7½ 0 15

SCALE IN FEET

PROJECT No.:	DATE:	FIGURE:
550501	6/30/2023	5
P.M.: MO	DRAWN: T.A.	

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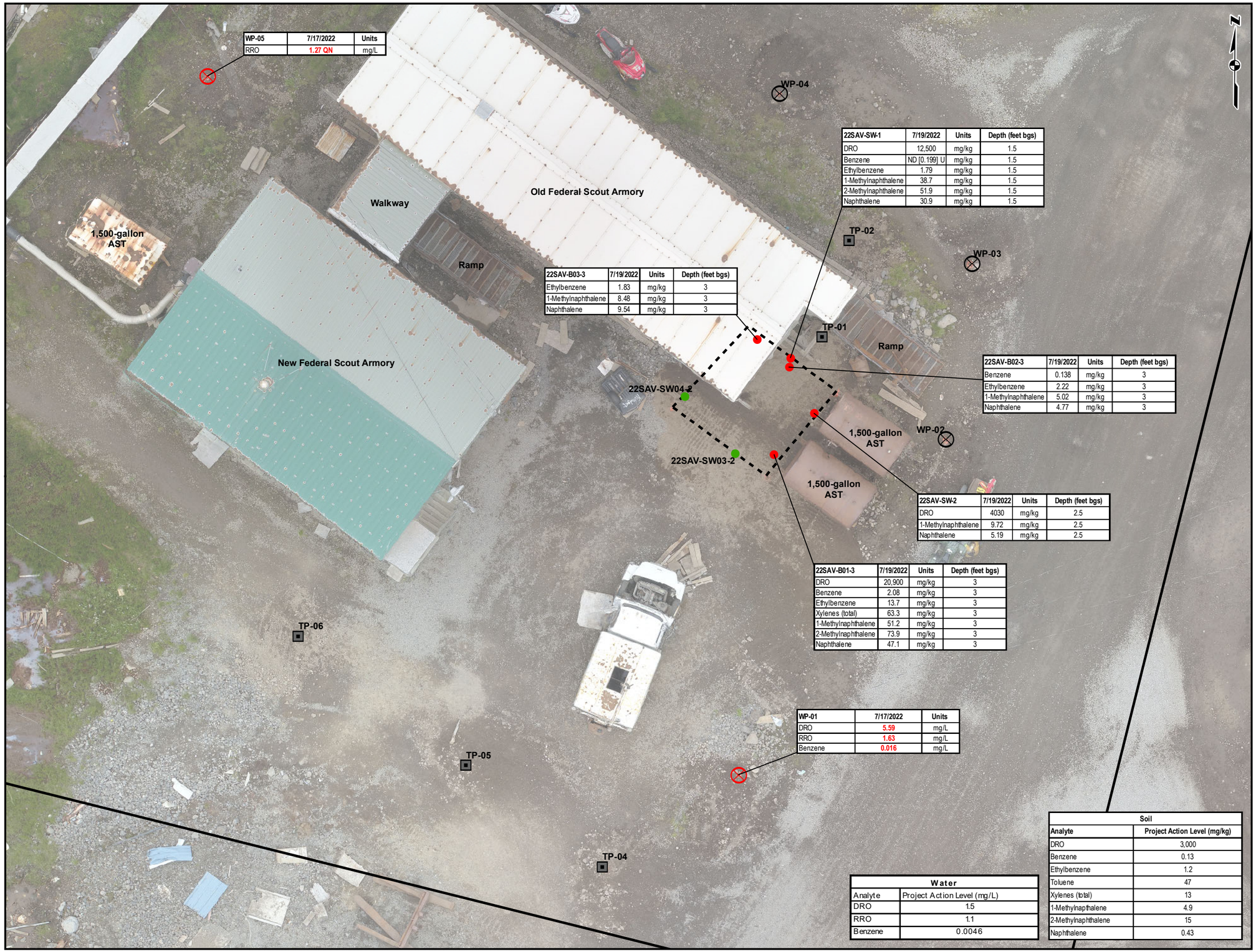

NATIONAL GUARD FEDERAL SCOUT ARMORY REMEDIAL ACTION REPORT

SAVOONGA, ALASKA

2022 REMEDIAL ACTION ANALYTICAL RESULTS

LEGEND:

Soil Sample Location

- Test Pit
- Property Line
- Excavation Boundary
- Sample Result(s) < Project Action Level
- Sample Result(s) ≥ Project Action Level

Monitoring Well Locations Visited/Sampled in 2022

- Sample Result(s) > Project Action Level
- Not Sampled - Dry Well

Abbreviations:

DL ····· detection limit
DRO ····· diesel range organics
LOD ····· limit of detection
mg/kg ····· milligrams per kilogram
mg/L ····· milligrams per liter
ND ····· not detected
PAL ····· project action level
ROD ····· record of decision
RRO ····· residual range organics
U ····· result is below detectable limits

Notes:

1. Property boundary displayed is approximate.

Chemistry Notes:

1. Only contaminant concentrations that exceed the PAL, or the LOD for a ND result exceeds the PAL, are presented. For full results, refer to Tables 4 and 5.
2. ACLs are defined by the Soil Contaminants of Concern and Cleanup Goals, as approved by ADEC on 30 July 2020 (ROD). PALs are defined by the ACL or the most conservative of the ADEC 18 AAC 75 Method Two Tables B1 and B2 Soil Cleanup Levels for the Under 40-Inch Zone Human Health and Migration to Groundwater (2021) when there is no ACL in place.
3. The higher result of the primary and field duplicate sample pair is presented, when applicable.
4. LOD shown in brackets [ ].

References:

1. Map produced using ESRI ArcMap v. 10.7.1.
2. Imagery source: Brice Engineering, LLC, 07/19/2022.

ALASKA STATE PLANE ZONE 9
HORIZONTAL DATUM: NAD83 (2011)
VERTICAL DATUM: NAVD88

12 6 0 12

SCALE IN FEET

PROJECT No.:	DATE:	FIGURE:
550501	6/30/2023	6
P.M.: MO	DRAWN: T.A.	

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APPENDIX A
FIELD LOGBOOK

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Brice Engineering
Savoonga FSA
Contract # W911KB17D0020

Rite in the Rain®
ALL-WEATHER
UNIVERSAL
№ 371FX

Book 1 of 1

7/12/22 - 7-19-22

CONTENTS

PAGE	REFERENCE	DATE

Savoonga FSA RA
Crew:

Michael Williams - Environmental Scientist
Mike Griggs - Operator / Mechanic
Alex Garhart - SSHO, FTL
Tom Wolforth - Archaeologist
- AK National Guard

Level D PPE

July 12th, 2022 Weather: 40-50°, cloudy, lt breeze

0800 Pre-MOB meeting w/ Savoonga Crew
0900 Mobilize to Nome airport for Bering Air charter Flight, weather delay due to poor visibility in Savoonga.
1520 Mobilize to Savoonga on Bering Air
1610 Arrive in Savoonga, transfer equipment to City Lodge; meet w/ Tribal President Ben. Tour work location and town. Mini-Excavator located at IRA garage, AST's at Armory already ~~disconne~~ to disconnected.
~~1945~~ 1944 Photo # 0752, CAM5, Facing North, FSA site cardinal direction photo.
1944 Photo #0753, CAM5, Facing East, FSA site cardinal direction photo.
1945 Photo # 0754, CAM5, Facing south, FSA site cardinal direction photo.
1945 Photo # 0755, CAM5, Facing West, FSA site cardinal direction photo.
EOD

Alex Gerhardt

Scale: 1 square = _____

July 13th, 2022 Weather: 43-53°, cloudy, drizzle, 10-15 mph Wind

0800 Safety & logistics meeting for tank removal at FSA
0900 Meet with Tribal Council at City Hall to procure equipment.
1030 Arrive at IRA garage and drop gear, mobilize Mini-ex to FSA buildings
1140 CAM 5 Photo # 0756, Facing SW, AST's disconnected From 1" lines.
~~to~~ 1144 CAM 5, Photo # 0757, Facing West, Moving AST's to SW For removal action.
- Note Photo #'s 0756 & 0757 are 1 hr behind, ~~sate~~ corrected at 1145.
1258 PID BESC 045 Calibration Calibrated at 0 & Span 100 ppm Cal = 104.7 ppm
1310 Mini-Excavator broken down, Mike ~~Gibbs~~ to Griggs working on starter.
1348 CAM 5 Photo#0759, begin 25 ton excavation, strong hydro carbon odor.

Scale: 1 square = _____

Rite in the Rain

July 13th 2022

1350 Note: GPS camera will not synchronize w/ satellite, time in notes is accurate.

1400 1st super sack Fall SV-01 = 2150 lbs 1 yd

1422 2nd SS SV-02, 1930 lbs, 1yd

1443 3rd SS SV-03 2340 lbs, 1yd

1458 4th SS SV-04 2130 lbs, 1yd

1518 5th SS SV-05 1760 lbs, 1yd
- Direct read w/ PID 1500 ppm, very strong odor.

1520 Hard, gray clay exposed at 35", direct read on PID 28 ppm, Headspace above detection level of PID, < 15,000 ppm

1546 6th SS SV-06, 2120 lbs, 1yd
- Ambient air quality poor at work site, PID reading 10ppm 15' West of excavation.

1602 7th SS SV-07, 2000 lbs, 1yd

1617 8th SS SV-08, 2180 lbs, 1yd

1630 9th SS SV-09, 1560 lbs, 1yd

1640 Cam 5 Photo # 0760 Facing east, excavation currently 10 yards, clock on camera will not synchronize w/ sat.

Scale: 1 square = _____

July 13th, 2022

1648 SV-10, 2260 lbs, 1yd

1704 SV-11, 2280 lbs, 1yd

1719 SV-12, 2140 lbs, 1yd.

1817 CAM 5, Photo # 0761, facing North, current excavation is 12 yards, ~3' deep.
- Compact clay is impenetrable w/ mini-ex. (Photo clock off 1hr)

1820 Clean up site.

1900 EOD

Alex Gunkel

Scale: 1 square = _____

Rite in the Rain

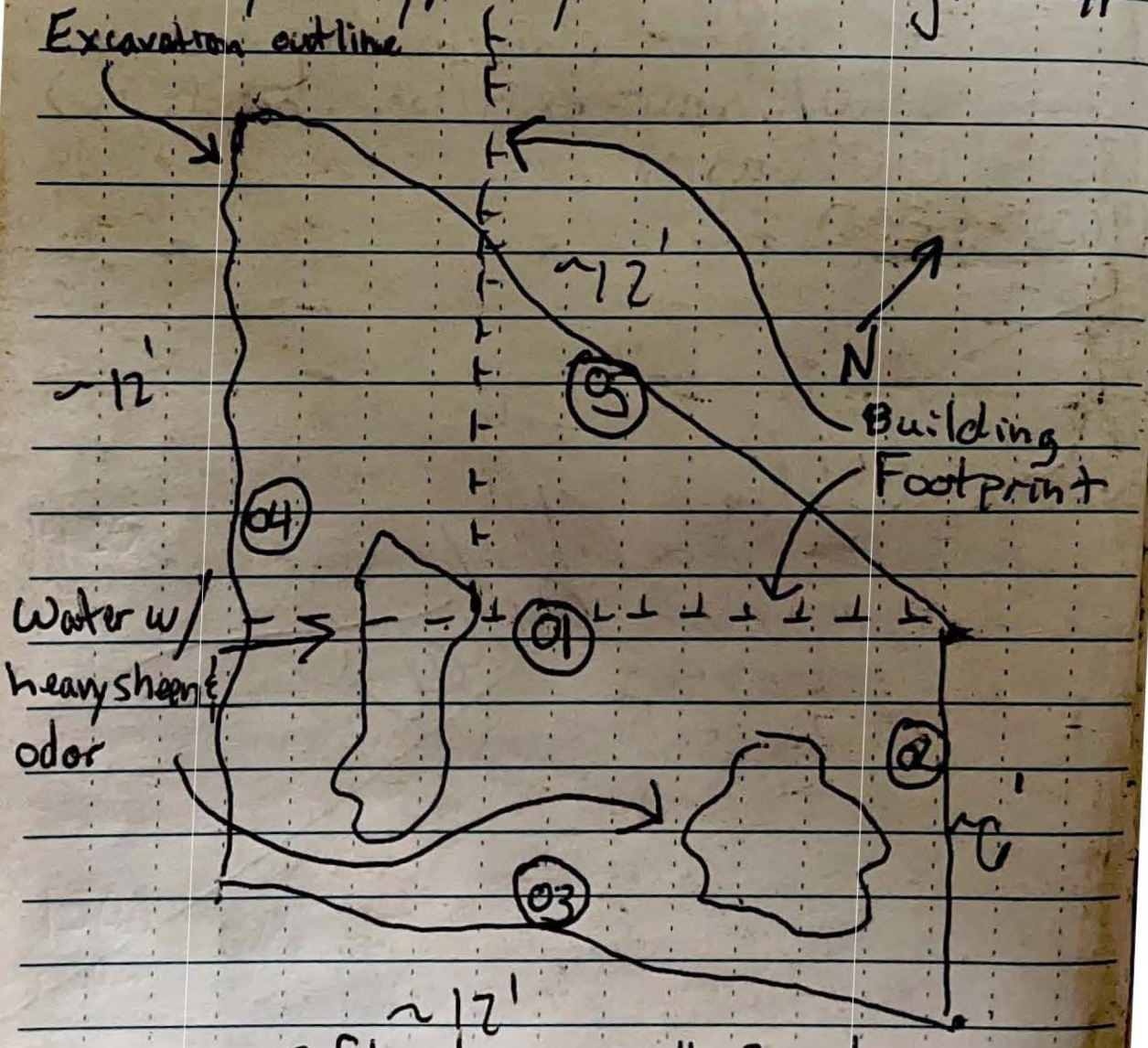
6 July 14th, 2022

Weather: 41-51°, cloudy, lt rain, NNE wind @ 10-20

0730 Tailgate safety meeting For excavation, supersack handling, refueling and soil sampling.

0815 Mobilize equipment to FSA.

0900 PID BESC045 calibration 0ppm & 100 ppm span. Reading: 99.1ppm



~3 ft deep, ~2" of water in southeastern end of excavation w/ heavy sheen & odor.

July 14th, 2022

PID Headspace:
01 floor: 4,319 ppm
02 SW: > 15,000 ppm
03 SW: 1260 ppm
04 SW: 81.6 ppm
05 SW: 71.1 ppm

0927 CAM 5, Photo # 0762, Facing east, water in excavation w/ thick POL sheen. Photo time 1hr slow oncame
0956 SV-13, 2250 lbs, 1yd
1013 SV-14, 2120 lbs, 1yd
1033 SV-15, 2210 lbs, 1yd
1035 CAM 5, Photo # 0763, Facing North, Intermediate supersack staging area 50ft west of excavation.
1048 SV-16, 2060 lbs, 1yd
1102 SV-17, 1810 lbs, 1yd.
1127 SV-18, 1920 lbs, 1yd
1129 PID headspace from NE sidewall = > 15,000 ppm after ~ 15 inches removed to NE.
1149 SV-19, 2040 lbs, 1yd

Scale: 1 square = _____

July 14th, 2022

1207 SV-20, 1820 lbs, 1yd
1223 SV-21, 2320 lbs, 1yd
1407 PID headspace on West sidewall = 175.5 ppm
1410 Test pit 1 dug 3' east of excavation margin adjacent to entrance. ~2' deep
PID headspace readings:
floor = 193.8
SW = 64.4 @ 1 Foot bgs
1415 Test Pit 2 dug ~15 east of excavation margin to 2' deep.
PID headspace readings
Floor = 44.4
SW = 48.4
1425 SV-22, 2020 lbs, 1yd
1443 SV-23, 2360 lbs, 1yd
1451 Test Pit 1 deepened to ~3ft.
PID headspace reading:
floor = > 15,000 ppm
SW = 2365 ppm
1503 SV-24, 2340 lbs, 1yd
1504 Per conversation w/ M. Oakley, all 30 1yd supersacks will be filled due to additional contamination

Scale: 1 square = _____

July 14th, 2022

1516 SV-25, 1860 lbs, 1yd
1533 SV-26, 1980 lbs, 1yd
1605 SV-27, 2150 lbs, 1yd
1632 SV-28, 2140 lbs, 1yd
1656 SV-29, 2060 lbs, 1yd
1715 SV-30, 2080 lbs, 1yd
1720 CAM 5, Photo # 0763, Facing E. GPS camera time will not synch w/ sat jt 5 1hr slow. Showing completed excavation of 30 yards.

Headspace Field screenings For completed excavation: (ppm)

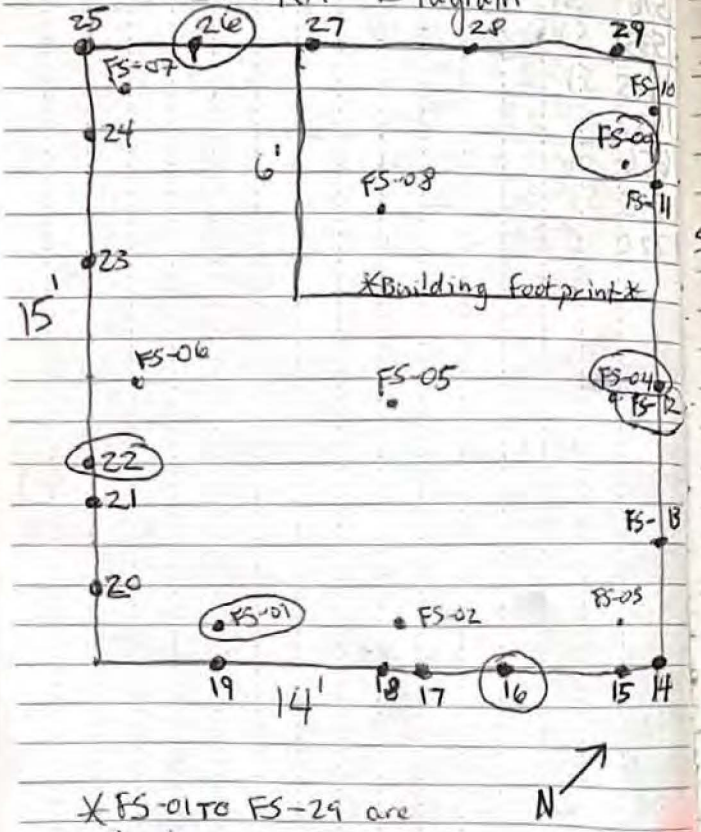
Base
FS-01 = > 15,000 ppm (BO1/B91)
FS-02 = > 15,000 ppm
FS-03 = > 15,000 ppm
FS-04 = > 15,000 ppm (BO2)
FS-05 = 3436 ppm
FS-06 = 2120 ppm
FS-07 = 267.3 ppm
FS-08 = 116.2 ppm
FS-09 = > 15,000 ppm (BO3)

SW FS-10 = > 15K 2' BGS
SW FS-11 = > 15K 1.5' BGS

Scale: 1 square = _____

July 14th, 2022

FSA RA Diagram



* FS-01 TO FS-29 are headspace field screening locations *

** Circled FS were sampled * *

Scale: 1 square = _____

July 14th, 2022

SW

FS-12	=> 15K	1.5' BGS	(SW-01/ MS/MSD)
FS-13	=> 15K	2.5' BGS	
FS-14	=> 15K	3' BGS	
FS-15	= 697.0	1.5' BGS	
FS-16	= 9,900	~~3.0~~ 2.5' BGS	(SW02)
FS-17	= 480.1	1.5' BGS	
FS-18	= 263.3	2.5' BGS	
FS-19	= 288.0	1.5' BGS	
FS-20	= 105.6	1' BGS	
FS-21	= 96.9	1.5' BGS	
FS-22	= 222.2	2' BGS	(SW03)
FS-23	= 80.9	1.5' BGS	
FS-24	= 55.6	1.5' BGS	
FS-25	= 102.7	1.5' BGS	
FS-26	= 226.1	2.0' BGS	(SW04)
FS-27	= 48.2	1.5' BGS	
FS-28	= 224.9	1.5' BGS	
FS-29	= 55.8	1' BGS	

1803 CAM5 Photo # 0765, facing NW, field screening pin flag grid in excavation

1810 CAM5, Photo # 0766, facing W, 29 headspace samples for PID analyses.

Scale: 1 square = _____

12 July 14th, 2022

1847 CAMS Photo # 0767 Facing N, Completed 30 ton excavation w/ caution tape.

1900 EOD

Scale: 1 square = _____

13 July 15th, 2022 Weather: 40-46° cloudy, NNE wind at 15-25 mph

0700 Safety tailgate for supersack transport, excavation backfill & sampling.

0930 Sample [22SAV-B01-3]
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH

0931 Sample [22SAV-B91-3]
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH

~~0935 Sample 22SAV-B0~~ AE AG 7/15/22

0935 Sample [22SAV-B02-3]
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH

0940 Sample [22SAV-B03-3]
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH

Note: Samples B01 = FS-01
B02 = FS-04
B03 = FS-09

1030 Sample [22SAV-SW01-1.5] MS/MSD
DRO, PAH X3 4oz
BTEX x 1 4oz w/MeOH
Sampled at FS-12

Scale: 1 square = _____

July 15th, 2022

1035 Sample 22SAV-SW02-2.5
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH
Sampled at FS-16

1040 Sample 22SAV-SW03-2
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH
Sampled at FS-22

1045 Sample 22SAV-SW04-2
DRO, PAH x 1 4oz
BTEX x 1 4oz w/MeOH
sampled at FS-26

~~10~~.

1150 Waste characterization sample 22SAV-WC01 collected 7/14/22 at 17:30 hrs. Supersacks SV-01 to SV-30.

1159 CAM 5, Photo # 0768, facing east, sample stake locations for excavation.

1202 CAM 5 Photo #0769, Facing North, sample stake locations for excavation.
-Note Camera will not synch time w/ satellites.

Scale: 1 square = _____

July 15th, 2022

1403 CAM 5, Photo # 0770, Facing South, ground water infiltration at 2' BGS w/ heavy POL sheen.

1435 CAM 5, Photo # 0771, Facing south, backfilling excavation.

1438 CAM 5, Photo # 0772, facing East, recontouring excavation w/ fill from borrow source.

1540 Last load (2nd) of backfill arrives at FSA, Mike Griggs begins recontour

1639 CAM 5 Photo # 0773, Facing North, pulling ASTs back into position.

1757 CAM 5 Photo # 0774, Facing NE, recontoured excavation, post-, backfill. Tanks moved SW ~ 10 away from road. Unable to relocate tanks to original position due to soft fill.

1900 EOD

Alex Stanhope

Scale: 1 square = _____

July 16th, 2022 Weather: 37-52°, cloudy, calm

0700 Safety tailgate
0800 Mobilize ~~equipment~~ equipment to FSA for test piting / TWP install.
0900 PID BESC045 calibrated at 0 ppm & 100 ppm span. Reading = 92.8 ppm
0920 IP-03 dug to 3ft BGS where gray/brown clay encountered, very strong hydro carbon odor & gray Fdel lense w/ water from 2.5-3.0 BGS. PID headspace from 3.0 BGS = 297.4 ppm, product in water
0933 IP-04 dug to ~3 Ft BGS, gray/brown clay ~~encountered~~ encountered at base. Gray POL lense 2.5-3.0 BGS, saturated w/ water & POL, visible sheen & strong odor. PID head space reading =377.5 ppm

Scale: 1 square = _____

17

July 16th, 2022

1003 IP-05 dug to 3' BGS, gray/brown clay encountered at 3', building debris encounted at 2' BGS, strong hydrocarbon odor on base, bottom 4" saturated w/ water/POL in gray/brown mottled soil. PID head space reading = 134.4 ppm
1010 CAM 5 Photo # 0775, Digging test pit TP-06 Facing SE.
1015 IP-06 dug to 2.5', excavation stopped due to building debris associated w/ adjacent IRA building, saturated gray/brown mottled soil at 2.5' has hydrocarbon odor & sheen. PID headspace reading = 28.07
1035 TP-07/WP-02, dug to 3' BGS. gray/brown clay encountered at base, strong hydrocarbon odor, saturated organic lense @ 2.5-3.0 feet. PID headspace = 44.9 5' x 1" screen w/point installed @ 3' BGS

Scale: 1 square = 50 = 1'8", 150 Lb sack 10/20 sand

July 16, 2022

1059 WP-01/TP-03 1" PVC TWP installed to ~3'BGS, 5' screen w/point, 1 50lb bag 10/20 sand used as filter. SU = 2.0' ~4" of ground water infiltrated into pit prior to install, heavy POL sheen on water, strong hydrocarbon odor.

1115 TP-08, dug to 3' BGS, gray/brown clay encountered 2.0-3.0' BGS Faint hydrocarbon odor, moist-wet horizon above clay layer. No organic horizon noted. PID headspace reading = 51.0

1120 TP-09, dug to 3' BGS where gray brown clay encountered 2.0-3.0', very strong hydrocarbon odor, moist-wet horizon above clay at 2.0', ~~No organic~~, organic layer noted above clay. PID headspace => 15,000 ppm

Scale: 1 square =

July 16, 2022

1130 WP-05/TP-10 Dug to 3'8" BGS ground water infiltration at 18" along 6" thick organic mat From SE & NW filling pit. Clay lense ~2' BGS, POL sheen on water, moderate hydrocarbon odor. 1" PVC slotted TWP installed to 3'8" BGS, SU = 1'4". PID headspace reading = 88.3 ppm, saturated w/ H_2O 1 50lb bag sand used as filter pack (10/20)

1140 CAM 5 Photo# 0776, WP-05 facing East, ~1 foot of water in pit w/POL sheen.

1146 CAM 5 Photo# 0777 Facing N, ~10' west of WP-05 near utilidor, showing POL sheen on surface water of marsh.

1200 WP-04/TP-09, installed ~3'BGS, 1" slotted PVC, ~1' 50lb sack 10/20 sand used as filter pack, SU = 1'10"

Scale: 1 square =

July 16th, 2022

1207 WP-03/TP-08 1" slotted PVC installed to ~3' BGS, 1 50 lb sack 10/20 sand used as filter pack. SU = 1'8"

1400 Crew Finishing Back Fill of Test Pits.

1402 CAM 5 Photo# 0778, Facing NE, WP-01 & WP-02 visible in photo near road.

1404 CAM 5 Photo #0779, Facing NW, WP-03 & WP-04 ~~is~~ are as seen from road on east side of FSA.

1408 CAM 5, Photo #0780, Facing NE, WP-05 on North side of building.

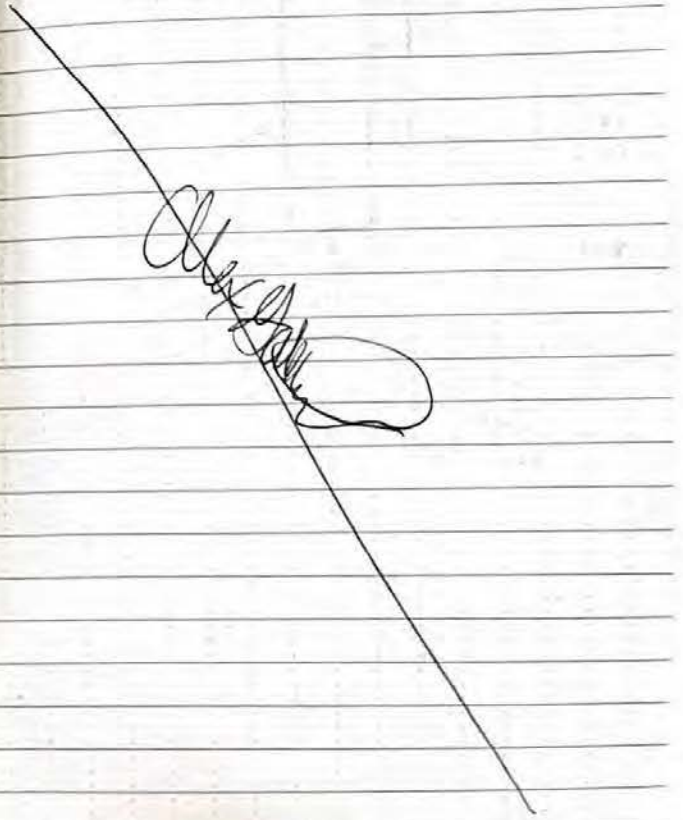
1511 CAM 5 Photo #0781 supersack SV-24 tore & broke strap off during transport, SS will be secured w/ straps and moved into loader bucket for transport to barge landing. Facing NW

1731 CAM 5, Photo # 0782 damaged supersack # SV-24 double wrapped in plastic liner, Facing S

Scale: 1 square = _____

July 16th, 2022

1734 CAM 5, Photo# 0783, Facing S, Barge Laydown w/ 30 supersacks for transport to mainland.

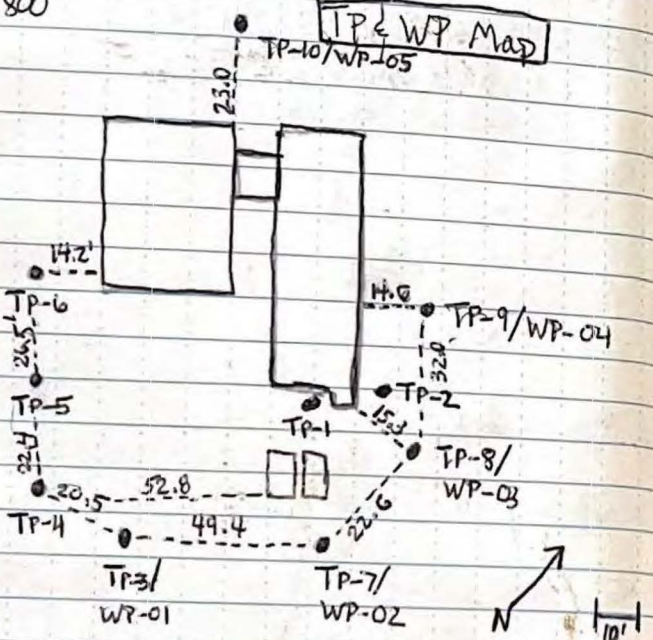


Scale: 1 square = _____

July 16th, 2022

1800

TP & WP Map



1900 EOD

Scale: 1 square = _____

July 17th, 2022

Weather: 7[illegible]. It rain, cloudy, SW wind 10-20 mph

23

0700 Safety tailgate for sampling, vehicle maintenance and demob.

0815 Calibrating YSI # 15E103128 for pH 4, 7, 10, conductivity, ORP. Refer to calibration log for details

1015 WP-01 TD = 5.0 from TOC SU = 2.0, WL = ~~4.8'~~ 4.4' From TOC

1020 Turbidimeter calibrated at 1000, 10, 0.02 NTU.

1026 WP-02, TD = 5.0 From TOC, SU = 1.7', WL = Dry

1030 WP-03 TD = 5.0 from TOC, SU = 1.7', WL = Dry

1035 WP-04 - TD = 4.9' From TOC, SU = 1.8', WL = Dry

1039 WP-05 TD = 5.0' From TOC, SU = 1.3' WL = 2.4' From TOC

~~1048~~ 1126 WP-01 Begin purging well. purge rate = 600 ml/minute 0.16 gpm. Water very turbid for ~ 10 seconds then clear. No visible sheen or odor. Pump speed ~~4.8~~ 4.83.

Scale: 1 square = _____

July 17, 2022

1145 WP-01, ~2.5 gallons purged, water clear, WL = 4.9' from TOC, allow well to recover.

1150 Run 2.5 gallons of purge water through portable GAC system, sheen visible on purge water when pouring into GAC. No sheen in collection bucket, water disposed of in vegetated area.

1155 WP-01 WL = 4.55 From TOC

1206 WP-05 purge well w/ peri pump. Pump speed = 48.3, water turbid. Flow rate = 650ml/minute 0.17 gpm. Water clear @ ~12:09 Purged 2.5 gallons, WL = 2.4' from TOC purged 12' minutes.

1225 Run 2.5 gallons of purge water through portable GAC system. Sheen on surface of water in purge bucket, No sheen noted after filtering. Water disposed of in vegetated area.

1422 CAM5 Photo #0784 facing NW, setting up tubing for bladder pump.

Scale: 1 square = _____

July 12, 2022

1515 WP-05, bladder pump not working, switch to peri & bailer for VOC's. Bladder pump producing ~3-5 ml per cycle & 1" bladder failing.

1517 WP-05 purging turbid water from well w/ peri pump. 650ml/min

1545 WP-05 5 gallons purged, water clear w/ yellowish tint. Begin parameters

1550 WC parameters WP-01

6.34 °C	6.48 pH
0.486 mS/cm	24.9 pH mV
313 µS/cm	124.3 ORP
189.5 DO%	170.7 NTU
23.41 DO mg/L	

1555 WC parameters WP-05

6.19 °C	6.47 pH
0.486 mS/cm	25.5 pH mV
312 mS/cm	121.7 ORP
182.0 DO%	128.5 NTU
22.47 DO mg/L	

Scale: 1 square = _____

July 17th, 2022

1600 WC parameters for WP-05
6.26°C 6.44 pH
0.485 mS/cm 26.6 pH mV
311 µS/cm 117.8 ORP
176.5 DO% 94.18 NTU
21.77 DO mg/l WL=2.4' from TOC.

1605 Sample 22SAV-WP05
MS/MSD 7 bottle set x3
Analytes = DRO, RRO 2x 250 ml, HCl
PAH 2x 250 ml
BTEX 3x 40mL VOA, HCL

1610 Sample 22SAV-WP95
Field duplicate, 7 bottle set x1
analytes = Same as 22SAV-W05

1645 7 gallons of purge water from WP-05 run through portable GAC system and disposed of in vegetated area.

1705 WP-01 sample prep. WL=4.45' from TOC.

1715 WP-01, purging well before collecting parameters. 350 ml/min flow rate.

Scale: 1 square = _____

July 17th, 2022

1720 WP-01 water clear, setting up YSI flow-through.

1727 CAM5 Photo # 07785, facing N, water-sampling at WP-01.

1730 WP-01 WC Parameters
Water clear, no odor.
4.11°C 6.64 pH
1.335 mS/cm 17.3 pH mV
800 µS 151.2 ORP
161.2 DO% 26.89 NTU
21.04 DO mg/L

1735 40 mph winds, flying debris.
WP-01 WC Parameters
4.17°C 6.62 pH
0.698 mS/cm 18.6 pH mV
3 mS/cm 148.5 ORP
151.1 DO% 23.95 NTU
19.69 DO
Note: Flow through ran empty, poor data for 1735.

Scale: 1 square = _____

July 17th, 2022

1741 WP-01 WC Parameters
5.07°C 6.60 pH
1.359 mS/cm² 19.1 pH mV
842 mS/cm 141.0 ORP
110.900 % 14.75 NTU
~~4,9~~ 13.91 DO mg/L ~~141~~

1748 WP-01 running dry, WL=4.9' from TOC allowing to recharge. WL=4.6' from toc

1809 WP-01
Sample ~~225AV6~~ 225AV-WP01
analytes: DRO, RRO 2x 250mL HCl
PAH 2x 250 mL
BTEX 3x 40mL VOA, HCL

1818 RUN 3 gallons purge water through portable G.A.C system. No sheen or odor.

1900 Pack up equipment, EOD

Scale: 1 square = _____

July 18th, 2022

weather, rain, wind 30-40 MPH WSW, gusts to 50+

0700 Safety tailgate for survey, demob, sample packing, weather.

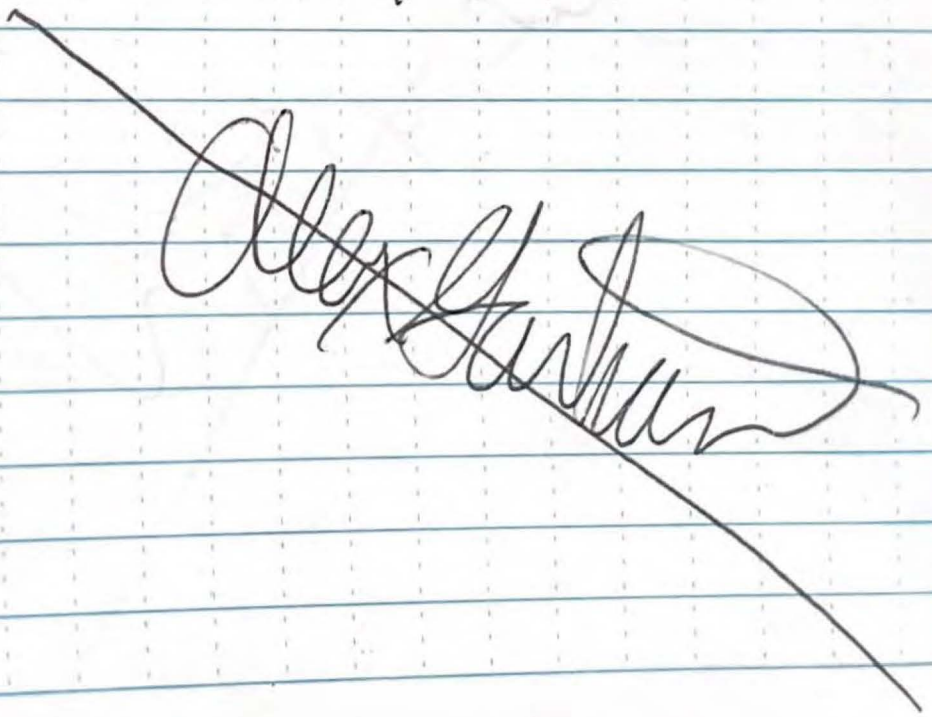
0800 - QC water samples, pack IRA garage, pack complete cooler cacs

1900 pack coolers, EOD

Scale: 1 square = _____

July 19, 2022 Weather: cloudy lt breeze 40-47°

0700 Safety tailgate For demob & survey.
0800 Move equipment to landing strip.
0920 Charter arrives w/ Dylan H. Mike Griggs & Michael Williams depart.
1000 Begin survey setup
1018 Base station operational, begin survey
1700 Survey complete, teardown base station & demobilize to airstrip.
1630 Bering Air charter arrives, demob to NE Cape & Nome



Scale: 1 square = _____

APPENDIX B
PHOTOGRAPH LOG

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Photograph 10: Sample locations marked with stakes in excavation, view north.

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Photograph 20: Aerial view of FSA following site restoration, view northeast.

APPENDIX C
CHEMICAL DATA QUALITY REVIEW

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
%	percent
%R	percent recovery
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
BFB	4-bromofluorobenzene
Brice	Brice Engineering, LLC
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CCV	continuing calibration verification
CDQR	chemical data quality review
CFR	Code of Federal Regulations
CoC	chain-of-custody
CUL	cleanup level
DL	detection limit
DoD	Department of Defense
DQO	data quality objective
DRO	diesel range organics
EB	equipment blank
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FD	field duplicate
FUDS	Formerly Used Defense Site
GC	gas chromatography
GC/MS	gas chromatography/mass spectrometry
HCl	hydrochloric acid
HNO_3	nitric acid
HTRW	hazardous, toxic, and radioactive waste
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LL	low level
LOD	limit of detection
LOQ	limit of quantitation
MB	method blank
MCL	maximum contaminant level
mg/kg	milligrams per kilogram

ACRONYMS AND ABBREVIATIONS (CONTINUED)

mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
PAH	polycyclic aromatic hydrocarbon
PAL	project action level
PID	photoionization detector
POL	petroleum, oil, and lubricants
ppm	parts per million
PQL	practical quantitation limit
PSL	project screening level
QA	quality assurance
QC	quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RRO	residual range organics
RSD	relative standard deviation
SEDD	staged electronic data deliverable
SDG	sample delivery group
SGS AK	SGS North America, Anchorage, Alaska
SIM	selected ion monitoring
SOP	standard operating procedure
SVOC	semi-volatile organic compound
TB	trip blank
TLC	Teflon-lined cap
TLS	Teflon-lined septum
UCL	upper control limit
UFP-QAPP	Unified Federal Policy-Quality Assurance Project Plan
UST	underground storage tank
VOA	volatile organic analysis
VOC	volatile organic compound

1.0 INTRODUCTION

This Chemical Data Quality Report (CDQR) summarizes the quality assurance (QA)/quality control (QC) evaluation of laboratory data collected during sampling activities at the remedial action (RA) activities performed at the Alaska Army National Guard Federal Scout Armory (FSA) in Savoonga, Alaska by Brice Engineering, LLC (Brice) between 12 July and 19 July 2022. This data has been reviewed to evaluate compliance with the acceptance criteria based on data quality objectives (DQOs) specified in the approved Final Work Plan/UFP-QAPP Remedial Action National Guard Federal Scout Armory hereafter referred to as the Work Plan, and UFP-QAPP (U.S. Army Corps of Engineers, 2022); hereafter referred to as the QAPP.

This CDQR includes the report narrative; a sample summary, including all samples collected and submitted to the laboratory for the associated sample delivery group (SDG) in Attachment C-1; complete analytical results presented in crosstab format in Attachment C-2; and the Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklist in Attachment C-3.

2.0 DATA VERIFICATION, DATA QUALITY REVIEW, AND QUALIFICATION

SGS of Anchorage, AK was the primary and only laboratory for this project. SGS Anchorage holds current ADEC laboratory approval and Department of Defense (DoD) Environmental Laboratory Accreditation Program certifications for all requested analyses, and chemical analyses for all parameters were performed in accordance with the DoD Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (DoD 2019a), hereafter referred to as the QSM. Samples were prepared and analyzed in accordance with analytical methods specified in *Test Methods for Evaluating Solid Waste SW-846* (U.S. Environmental Protection Agency [EPA] 2022); *Underground Storage Tanks (USTs) Procedures Manual* (ADEC 2017); and laboratory standard operating procedures (SOPs).

The data quality review and assessment were performed by an experienced QA chemist independent of the analytical laboratory. This evaluation included completion of the ADEC Laboratory Data Review Checklists and review of analytical data including QC sample results, field and laboratory documentation, and all data submittals for the single SDG.

Soil and groundwater analytical results were compared to the project screening levels (PSLs) for the purpose of this review.

For soil samples, PALs are defined by the ADEC-approved ACLs calculated in 2020 (Brice 2021). Analytes not included in the ACLs will be defined by 18 AAC 75 Method Two, Table B1 Soil Cleanup Levels (ADEC 2021). Analytical results for soil samples will be compared to the cleanup levels and laboratory specific limits included in Table 2 of the RA report.

The PALs for supra-permafrost porewater are defined by the ADEC-approved ACLs calculated in 2020 (Brice 2021), which are equivalent to 18 AAC 75 Table C Groundwater Cleanup Levels (ADEC 2021). Analytical results for supra-permafrost porewater samples will be compared to the cleanup levels and laboratory-specific limits included in Table 3 of the RA Report.

The screening levels used for each analyte are presented along with analytical results in the results tables (Attachment C-2).

All project data were reviewed on an analytical-batch basis by assessing QC samples and associated field sample results. Data quality review and usability assessment were performed using the acceptance criteria defined in the QSM (DoD 2019a); DoD General Data Validation Guidelines (DoD 2019b); ADEC technical memorandum *Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data* (ADEC 2019); specific method guidance, such as the ADEC *Underground Storage Tanks Procedures Manual* (ADEC 2017); *Test Methods for Evaluating Solid Waste SW-846* (EPA 2022); and the laboratory SOPs, in that order.

The following information was reviewed as part of the data quality review and assessment:

- Sample handling and chain-of-custody (CoC)
- Sample preservation and holding time compliance
- Field QC samples, including trip blanks (TBs), and field duplicates (FDs)
- Laboratory reporting limits, including limits of detection (LODs) and limits of quantitation (LOQs)
- Method blanks (MBs)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) recoveries
- Surrogate spike recoveries
- Matrix spike (MS) and matrix spike duplicate (MSD) recoveries
- Initial and continuing calibration summary information
- Internal standards performance (gas chromatography/mass spectrometry [GC/MS])
- Precision, including relative percent difference (RPD) values for duplicate analyses
- Case narrative review, laboratory flagging review, and other analytical method-specific criteria

The data quality review and assessment identified results requiring qualification and potential effects on data usability based on the acceptance criteria defined in the Work Plan. The following acceptance criteria were used for this data quality review and assessment:

- *Precision* is a measure of the reproducibility of measurements, which can be used to verify laboratory procedures, determine matrix effect, or sample homogeneity. Precision was measured by the RPD between LCS and LCSDs, MS and MSDs, or primary and FD results.
- *Accuracy* is a measure of the correctness or closeness to the true value. Accuracy was evaluated by reviewing the following elements: calibrations, surrogates, LCS, LCSD, MS, MSD, MBs, relative response factors and relative standard deviations (RSD), tune criteria, second column confirmations, and internal standards.
- *Representativeness* is a measure of the degree to which the samples reflect the site characteristics. Representativeness was measured by reviewing sampling design, sampling procedures, sample documentation, holding times, and preservations.
- *Completeness* is a measure of the amount of valid data obtained compared to the amount that was expected to be obtained under correct, normal conditions. For completeness requirements, valid results were all results not rejected and determined to be usable in the context of the DQOs. Completeness was evaluated for each analytical method for a particular sampling event with respect to each DQO or end data use. The completeness goal is 90 percent (%) for this project.
- *Comparability* is a measure of the confidence with which one data set can be compared to another. The following were reviewed to ensure comparability: use of standard methods for sampling and analysis, reporting in standard units, operating instruments within calibrated ranges, and using standard and comprehensive reporting formats.

- *Sensitivity* is a measure of the ability of a method or instrument to detect the target analyte at the level of interest. The laboratory-specific limits were evaluated against the PSLs to determine whether the analytical methods and/or laboratory procedures were able to meet the project DQOs.

The qualifiers listed in Table 1 were applied to the analytical data set, as appropriate.

Table 1 Data Qualifiers

QUALIFIER	DESCRIPTION
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	Analyte is considered an estimated value because the result is greater than or equal to the DL and less than the LOQ.
B	Analyte result is considered a high estimated value due to contamination present in an associated blank (e.g., MB or TB).
H	Analyte result is considered a low estimate due to a holding time exceedance.
QH/QL/QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a QC failure.
R	Analyte result is rejected – result is not usable. Note that R replaces the chemical result (no result shall be reported with an R flag).

Notes:
For definitions, refer to the Acronyms and Abbreviations section.

Qualification may not be required in the following circumstances:

- Surrogate or MS recoveries were outside QC limits, and dilution of the sample resulted in surrogate or spike dilution to a level beyond quantitation.
- MS recoveries were outside QC limits, and the spiked concentration was less than that of the parent sample.
- An analyte was detected in the associated blank, but there was no detection in the associated sample.
- MS/MSD or LCS/LCSD recoveries exceeded upper control limits (UCLs) and there was no detection in the sample(s).

Data quality exceptions that do not result in qualifications are not discussed in this report and are addressed in the associated ADEC Laboratory Data Review Checklists (Attachment C-3).

3.0 CHEMICAL DATA QUALITY REVIEW

The data verification and CDQR were performed to assess the overall quality and usability of the data collected to support sampling activities for the Remedial Action (RA) activities performed at the Alaska Army National Guard Federal Scout Armory

Complete details for the review and evaluation of field samples and associated QC samples are included in this CDQR and in the ADEC Laboratory Data Review Checklists (Attachment C-3). During the data quality review, analytical results or recoveries that fell outside acceptance criteria were identified and qualifiers were applied to the results, where appropriate, in accordance with the project Work Plan. Qualified results are considered estimated, and whenever possible, direction of potential bias was assigned and effects on usability are discussed.

The following sections describe the results of the review and assessment of data for each analytical method. QC parameters met QSM criteria except where noted. A complete summary of qualified results is presented in Table 3, located at the end of this report.

3.1 Analytical Sample and Field Quality Control Sample Summary

A total of 7 primary soil samples, 1 FD soil samples, 2 primary groundwater samples, 1 FD groundwater samples, 1 waste characterization sample, and 1 TBs were collected and analyzed in support of project activities. The sample summary table in Attachment C-1 includes all field samples submitted to the analytical laboratory.

The overall project-required frequency of one FD for every 10 or fewer primary samples, per analyte, per matrix, was met.

MS/MSDs were collected and submitted to the laboratory at the project-required frequency of one set for every 20 or fewer project samples (5%) and one for every preparatory batch (designated MS/MSD samples were included with each shipment).

TBs were included in the cooler containing samples for volatile analyses SW8260D. Unfortunately, the soil samples did not have a TB included in the cooler. A set of water samples TBs was included in the SDG for evaluation.

3.2 Sample Handling and Chain-of-Custody

CoC forms and laboratory case narratives were reviewed to assess sample handling procedures that may affect the integrity of the samples and quality of the resulting data. Copies of CoCs and cooler receipt forms are included in the final laboratory report. Samples were required to be maintained at 0 to 6 degrees Celsius (°C) following collection, during storage, and upon receipt at the laboratory.

Samples were packed with frozen gel packs in accordance with the Work Plan and the packaging and shipping SOP, BE-SOP-03 Labeling, Packaging, and Shipping Samples. Both soil and water samples were shipped to Anchorage, via Alaska Airlines Goldstreak where they were picked up by Brice Engineering and transported to the laboratory in Anchorage, AK. All sample coolers containing soil and groundwater samples were received with temperature blank and ambient cooler temperatures between 0 and 6°C.

There were no discrepancies documented in the cooler receipt information. However, the following discrepancy was noted during data review.

- **1224072:** The COC listed 3 volatile water Trip Blanks as a soil matrix which were listed as sample ID 22SAV-TB01. There was no soil trip blank included in the sample shipment. The set of water trip blanks was adjusted to read 22SAV-TB02. A note was made on the comments section of page two of the COC which suggests that this change was approved by Tori P on 7/1/22.

3.3 Sample Preservation and Holding Time Compliance

All samples were extracted and/or analyzed within the recommended holding times and were properly preserved for the analytical procedures used for this project.

3.4 Sample Limits of Detection and Limits of Quantitation

Sample LOQs and LODs for non-detects were compared to the PSLs to determine whether the laboratory data met the acceptance criteria for sensitivity. All reported LODs for non-detect results met project acceptance criteria for sensitivity, except as noted below.

Non-detect LOD exceedances are highlighted yellow in the report tables included in Appendix A.

Non-detect results for Benzene in the following sample had an LOD that exceeded the PSL:

- **1224072-06:** Sample, 22SAV-SW01-1.5 (1224072-6) reported an ND result at the LOD in which exceeded the PAL for Benzene. The sample was reported as ND [0.199] m/Kg which is greater than the PSL of 0.13 mg/Kg.

These results cannot be used to verify the absence of these analytes less than the PSLs.

3.5 Blanks

MBs, TBs, and EBs were reviewed to detect potential cross-contamination. MB detections are indicative of laboratory cross-contamination, TBs measure shipment and storage cross-contamination, and EBs are reviewed to assess potential cross-contamination between samples where non-dedicated sampling equipment is used.

3.5.1 Method Blanks

An MB was included with each preparatory batch of 20 or fewer samples, as required.

No target analytes were detected in the soil MBs.

3.5.2 Trip Blanks

A water TB was included with the cooler containing volatile samples, as required. There were no detections for BTEX in this sample.

The COC documented a soil (22SAV-TB01) and water (22SAV-TB02) trip blank for the 8260 BTEX; However, there was no soil container that was received at the lab and the water trip blank was added by the laboratory. VOA soil data quality is affected by the lack of a soil trip blank. It is impossible to determine if any low-level reportable VOA results in the SDG may be due to potential cross contamination during transport. Data is still considered usable for making project decisions as all results will be assumed to be unaffected by cross contamination.

3.5.3 Equipment Blanks

All samples were taken with disposable utensils and tubing. There was no need for decontamination or equipment monitoring blank samples.

3.6 Laboratory Control Samples

An LCS or LCS/LCSD pair was included with each preparatory batch, as required. LCS and LCSD percent recovery (%R) and LCS/LCSD RPD were compared to the project acceptance criteria. All LCS/LCSD recoveries were within control limits and LCS/LCSD precision was within the RPD limit.

3.7 Matrix Spike Samples and Duplicates

Project-specific MS/MSD samples were collected and submitted at the project-required frequency of one for each preparatory batch and one MS/MSD per 20 or fewer samples; however, the laboratory split project samples into multiple batches, some of which did not include an MS/MSD. MS and MSD samples were prepared and analyzed for each laboratory batch with the following exceptions:

- 8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, and Pyrene are low and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are reported as ND at the LOD. Undetected results for the associated sample are considered not affected. High target analytes and large dilutions render the BMS/BMSD % recoveries at a point where the results are no longer accurate and useful for QA evaluation.
- **8270 PAH SIM** – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for Acenaphthene and Acenaphthylene are high and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are reported as ND at the LOD. Results are considered not affected since the bias is high and the results are ND.
- **8270 PAH SIM** – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for 1-Methylnaphthalene, 2-Methylnaphthalene, Fluorene, and Naphthalene are low and do not meet laboratory QC goals. Detected results for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected as the spike level of the analytes were either diluted out due to high target analytes in the sample or the spike levels were less than the parent sample.
- **8270 PAH SIM** – BMSD (22SAV-SW01-1.5) 1224072-08 Result for Phenanthrene is low and does not meet laboratory QC goals. Detected result for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected due to the high dilution required for analysis of other target analytes.
- **AK102 (DRO)** – BMSD (22SAV-SW01-1.5) 1224072-08 Result for DRO is low and does not meet laboratory QC goals. Detected result for the associated sample (22SAV-SW01-1.5) 1224072-06 are considered affected. However, the sample result is greater than 10X the PAL therefore no data qualification is required.

LCSs and LCSDs were prepared and analyzed for each of these batches and LCS/LCSD recoveries met acceptance criteria for accuracy and precision in all case which suggest that the instrument, method, and prep procedure all work with QA/QC protocols when a blank matrix is being used.

MS/MSD recoveries and MS/MSD RPD were compared to project acceptance criteria and met the criteria, except as noted below.

- **8270 PAH SIM** – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Precision results for 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Fluorene, and Naphthalene are high and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected due to the large dilutions that was required for quantitation. These dilutions diminish the accuracy of the results which do not provide useful information to determine the effect of the matrix on the overall data quality and usability. Result a usable for all project making decisions.

3.8 Surrogates

Surrogates were included with all laboratory QC and field samples, as required. Surrogate recoveries were reviewed and compared to project acceptance criteria. All surrogate recoveries were within control limits for laboratory QC and field samples, except as noted below.

- **8270 PAH SIM** – (22SAV-WP95) 1224072-16 Surrogate result for Fluoranthene-d10 is low and does not meet laboratory QC goals. All associated results were reported as ND. Results are not considered affected.
- **8270 PAH SIM** – (22SAV-BO1-3) 1224072-02, (22SAV-B91-3) 1224072-03, (22SAV-SW01-1.5) 1224072-06/07/08, (22SAV-SW02-2.5) 1224072-09 Surrogate results for 2-Methylnaphthalene-d10 are high and do not meet laboratory QC goals. Sample results for these sample are diluted to a point where surrogate % recoveries do not provide useful or accurate information. Associated results are not considered affected due to the large dilutions (10X to 40X).
- **8260 VOA** – (22SAV-SW01-1.5) 1224072-06 Surrogate result for 4-Bromofluorobenzene is high and does not meet laboratory QC goals. Sample results for this sample are diluted to a point where surrogate % recoveries do not provide useful or accurate information. Associated results are not considered affected due to the large dilutions (20X).
- **8260 VOA** – (22SAV-WP05) 1224072-13 Surrogate result for 1,2-Dichloroethane-d4 is high and does not meet laboratory QC goals. Benzene is associated with this surrogate, and it was detected above the LOD in the sample. The reported result in the sample, 0.00244 [0.0002] mg/L was flagged with a QH qualifier to note the potential high bias in the result. The result is still considered usable for all project making decisions as the reported result is more than 100X below the associated PAL of 4.6 mg/L.

3.9 Field Duplicate Precision

FD precision was evaluated by calculating the RPD between the parent sample result and the FD result when both results were greater than the LOQ, and when one or both results fell between the LOD and the LOQ. In the case of a sample that is detected in one sample and ND for the second sample, the LOD is used as the value for the ND result. Acceptance criteria were less than 50% for soil results and 30% for water results.

A total of 1 FD sample was submitted and analyzed for 7 primary soil samples, and 1 FD sample was submitted and analyzed for 2 primary groundwater samples. FD pairs were analyzed for one or more of the following methods: AK102/AK103, SW8260D BTEX, and SW8270D PAH SIM.

The four FD RPDs that did not meet laboratory QC goals of <30% for waters are considered estimated and potentially biased in an unknown direction. Results have been flagged with a QN qualifier do note the data quality deficiency. Results for these samples are still considered usable for project making decisions as none of the are close or exceed an associated PAL

Table 2, located at the end of this report, summarizes the FD detections that were included in precision evaluations.

Table 2 Field Duplicate Precision Evaluation

SDG	METHOD	ANALYTE	PRIMARY SAMPLE	RESULT	UNITS	FIELD DUPLICATE	RESULT	UNITS	RPD	QUALIFIER
1224072	8270 PAH SIM	Benzo(a)anthracene	22SAV-WP05 (1224072013)	0.0000135	mg/L	22SAV-WP95 (1224072016)	0.000024 ND	mg/L	56.00%	QN
1224072	AK103	Residual Range Organics (C25-C36)	22SAV-WP05 (1224072013)	0.743	mg/L	22SAV-WP95 (1224072016)	1.27	mg/L	52.36%	QN
1224072	8270D PAH SIM	2-Methylnaphthalene	22SAV-WP05 (1224072013)	0.000218	mg/L	22SAV-WP95 (1224072016)	0.000332	mg/L	41.45%	QN
1224072	8270D PAH SIM	1-Methylnaphthalene	22SAV-WP05 (1224072013)	0.000193	mg/L	22SAV-WP95 (1224072016)	0.000278	mg/L	36.09%	QN

Notes:
For definitions, refer to the Acronyms and Abbreviations section.

3.10 Additional Quality Control Discrepancies

There are no additional discrepancies not noted in the previous sections of this report that resulted in data qualification.

4.0 COMPLETENESS

Completeness is a measure of the amount of valid data obtained compared with the amount that was expected to be obtained under correct, normal conditions. For completeness requirements, valid results are all results not rejected and determined to be usable in the context of project DQOs.

Completeness was evaluated using the formula below. The goal for completeness was 90% for all methods and matrices.

$$\%\ Completeness\ =\ 100\ x\ (\frac{V}{n})$$

Where: V = number of measurements judged valid
n = total number of measurements

A total of 11 samples were submitted for 8260D BTEX, AK102/103, and 8270D PAH SIM analysis.

No results were rejected, and all results were considered usable. The completeness goal of 90% for all methods and matrices was met.

5.0 OVERALL DATA QUALITY AND USABILITY ASSESSMENT

In general, the overall quality of the project data was acceptable and completeness goals were met. Qualified data are considered acceptable for use, with the limitations discussed within this QA/QC report and the ADEC Laboratory Data Review Checklists regarding the qualifiers applied to the results.

Table 3 includes all qualified results and reasons for qualification.

A small portion of the results had QC issues which required qualification of project data. Most significantly the LOD exceedance noted in Section 3.5. Analytical results for benzene cannot be used to determine whether the analyte is present at a concentration greater than or less than the PSLs.

The following QC issues in SDG 1224072 required qualification and explanation:

- The lack of a soil matrix VOA trip blank
- MS/MSD recovery failures
- Surrogate recovery failures

6.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2017. *Underground Storage Tanks Procedures Manual, Guidance for Treatment of Petroleum-Contaminated Soil and Standard Sampling Procedures.* March.

ADEC. 2019. *Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data.* October.

ADEC. 2021. 18 Alaska Administrative Code (AAC) 75, *Oil and Other Hazardous Substances Pollution Control.* November.

Brice Engineering (Brice). 2022. *Final Work Plan/UFP-QAPP Remedial Action National Guard Federal Scout Armory.* June.

Department of Defense (DoD). 2019a. *Quality Systems Manual for Environmental Laboratories, Version 5.3.* May.

DoD. 2019b. *General Data Validation Guidelines.* November.

DoD. 2020a. *Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS.* May.

DoD.2020b. *Data Validation Guidelines Module 2: Data Validation Procedure for ICP-OES.* May.

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DoD. 2021. *Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC.* March.

U.S. Environmental Protection Agency (EPA). 2009. *National Primary Drinking Water Regulations.* EPA 816-F-09-004. May.

EPA. 2018. *Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4.* March.

EPA. 2022. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846), through Revision 7.* July.

Table 3 Qualified Results Summary

SDG	LOCATION ID	SAMPLE ID	MATRIX	METHOD	ANALYTE	RESULT	PAL	UNITS	QUALIFIER	REASON
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	Anthracene	ND [0.595] U	390	mg/kg	none	Low % Recovery BMS/BMSD; High target analytes required 40X dilutions which render % recovery not useful
					Benzo(a)anthracene	ND [0.595] U	0.7	mg/kg	none	
					Benzo(a)pyrene	ND [0.595] U	1.9	mg/kg	none	
					Benzo(b)fluoranthene	ND [0.595] U	20	mg/kg	none	
					Benzo(g,h,i)perylene	ND [0.595] U	15,000	mg/kg	none	
					Benzo(k)fluoranthene	ND [0.595] U	190	mg/kg	none	
					Chrysene	ND [0.595] U	600	mg/kg	none	
					Dibenzo(a,h)anthracene	ND [0.595] U	6.3	mg/kg	none	
					Fluoranthene	ND [0.595] U	590	mg/kg	none	
					Indeno(1,2,3-cd)pyrene	ND [0.595] U	65	mg/kg	none	
					Pyrene	ND [0.595] U	87	mg/kg	none	
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	1-Methylnaphthalene	38.7 [2.98]	0.41	mg/kg	none	Low % Recovery BMS/BMSD; Analyte 10X > PAL
					2-Methylnaphthalene	51.9 [2.98]	1.3	mg/kg	none	
					Fluorene	0.879 [0.595] J	36	mg/kg	none	Low % Recovery BMS/BMSD; Dilution > 40X
					Naphthalene	30.9 [2.39]	0.43	mg/kg	none	Low % Recovery BMS/BMSD; Analyte 10X > PAL
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	Phenanthrene	0.306 [0.595] J	39	mg/kg	none	Low % Recovery BMSD; Dilution > 40X
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	1-Methylnaphthalene	38.7 [2.98]	0.41	mg/kg	none	High RPD BMS/BMSD; Analyte 10X > PAL
					2-Methylnaphthalene	51.9 [2.98]	1.3	mg/kg	none	
					Acenaphthene	ND [0.595] U	37	mg/kg	none	High RPD BMS/BMSD; Target analyte 10X > PAL; Dilution > 40X
					Acenaphthylene	ND [0.595] U	18	mg/kg	none	
					Fluorene	0.879 [0.595] J	36	mg/kg	none	
					Naphthalene	30.9 [2.39]	0.43	mg/kg	none	High RPD BMS/BMSD; Analyte 10X > PAL
1224072	1224072-06	22SAV-SW01-1.5	XXX46654	AK102	Diesel Range Organics	12,500 [119]	250	mg/kg	none	Low % Recovery BMSD; Analyte 10X > PAL
1224072	1224072-13	22SAV-WP05	VXX38900	8260D BTEX	Benzene	0.00244 [0.0002] QH	4.6	mg/L	QH	High % Surrogate Recovery
1224072	1224072-16	22SAV-WP95	XXX46659	8270D PAH SIM	Fluoranthene-d10 - SURR	various	NA	mg/L	none	High % Surrogate Recovery, associated results ND
1224072	1224072-02	22SAV-BO1-3	XXX46666	8270D PAH SIM	2-Methylnaphthalene-d10 - SURR	various	NA	mg/kg	none	High % Surrogate Recovery, Sample diluted > 10X
	1224072-03	22SAV-B91-3								
	1224072-06/7/8	22SAV-SW01-1.5								
	1224072-09	22SAV-SW02-2.5								
1224072	1224072-06	22SAV-SW01-1.5	VXX38907	8260D BTEX	4-Bromoflurorbenzene - SURR	various	NA	mg/L	none	High % Surrogate Recovery, Sample diluted > 10X
1224072	1224072-13	22SAV-WP05	XXX46659	8270D PAH SIM	Benzo(a)anthracene	0.0000135 [0.0000223] J, QN	0.3	mg/L	QN	Field Duplicate RPD > 30%
					1-Methylnaphthalene	0.000193 [0.0000223] QN	11			
					2-Methylnaphthalene	0.000218 [0.0000223] QN	36			
			XXX46660	AK103	Residual Range Organics (C25-C36)	0.743 [0.232] QN	1,100			
	1224072-16	22SAV-WP95	XXX46659	8270D PAH SIM	Benzo(a)anthracene	ND [0.000024] QN	0.3			
					1-Methylnaphthalene	0.000278 [0.000024] QN	11			
					2-Methylnaphthalene	0.000332 [0.000024] QN	36			
			XXX46660	AK103	Residual Range Organics (C25-C36)	1.27 [0.240] QN	1,100			

Table 3 Qualified Results Summary

SDG	LOCATION ID	SAMPLE ID	MATRIX	METHOD	ANALYTE	RESULT	PAL	UNITS	QUALIFIER	REASON
1224072	1224072-06	22SAV-SW01-1.5	VXX38907	8260D BTEX	Benzene	ND [0.199] U	0.13	mg/kg	Data table Highlight	ND result > PAL, Sample diluted > 10X

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
Bold exceeds the PAL
Yellow highlight – the LOD for a non-detect results exceeds PAL.
FD>RPD – Field duplicate relative percent difference criteria exceeded
MS<LCL – Matrix spike recovery less than the lower control limit
MSD>RPD – Matrix spike relative percent difference criteria exceeded
QN/QL/QH – Result is an estimated value as the result of a QC failure. When possible, direction of bias indicated.
MSD<LCL – Matrix spike duplicate recovery less than the lower control limit
Sur<LCL – Surrogate recovery less than the lower control limit
Sur>UCL – Surrogate recovery greater than the upper control limit

Attachment C-1
Sample Summary

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Sample Summary

SDG	LOC ID	SAMPLE ID	LAB SAMPLE ID	COLLECTION DATE	MATRIX	DEPTH	SAMPLE TYPE	COOLER	CONTAINERS	BOTTLE TYPE	SAMLPER	PRESERVATION	6020B	8260D	8270DSIM	A2540G	AK102	AK103	TAT
1224072	B91	22SAV-B91-3	1224072003	07/15/2022 09:31:00	Soil	3	Duplicate	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	B01	22SAV-B01-3	1224072002	07/15/2022 09:30:00	Soil	3	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	B02	22SAV-B02-3	1224072004	07/15/2022 09:35:00	Soil	3	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	B03	22SAV-B03-3	1224072005	07/15/2022 09:40:00	Soil	3	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	SW01	22SAV-SW01-1.5	1224072006	07/15/2022 10:30:00	Soil	1.5	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	SW01	22SAV-SW01-1.5	1224072007	07/15/2022 10:30:00	Soil	1.5	MS	22SAV-01	1	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	SW01	22SAV-SW01-1.5	1224072008	07/15/2022 10:30:00	Soil	1.5	MSD	22SAV-01	1	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	SW02	22SAV-SW02-2.5	1224072009	07/15/2022 10:35:00	Soil	2.5	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	SW03	22SAV-SW03-2	1224072010	07/15/2022 10:40:00	Soil	2	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	SW04	22SAV-SW04-2	1224072011	07/15/2022 10:45:00	Soil	2	Primary	22SAV-01	2	1x4 oz TLC AG, 1x 4oz TLS AG	AG	MeOH, 4C		X	X	X	X		10 day
1224072	TB	22SAV-TB02	1224072001	07/17/2022 08:00:00	Ground_Water	N/A	TB	22SAV-01	3	3x40 mL VOA TLS	AG	HCL, 4C		X					10 day
1224072	WP-01	22SAV-WP01	1224072017	07/17/2022 18:09:00	Ground_Water	2.8	Primary	22SAV-01	7	4x250 mL TLC AG, 3x40 mL VOA TLS	AG	HCL, 4C		X	X		X	X	10 day
1224072	WP-05	22SAV-WP05	1224072013	07/17/2022 16:05:00	Ground_Water	2.3	Primary	22SAV-01	7	4x250 mL TLC AG, 3x40 mL VOA TLS	AG	HCL, 4C		X	X		X	X	10 day
1224072	WP-05	22SAV-WP05	1224072014	07/17/2022 16:05:00	Ground_Water	2.3	MS	22SAV-01	7	4x250 mL TLC AG, 3x40 mL VOA TLS	AG	HCL, 4C		X	X		X	X	10 day
1224072	WP-05	22SAV-WP05	1224072015	07/17/2022 16:05:00	Ground_Water	2.3	MSD	22SAV-01	7	4x250 mL TLC AG, 3x40 mL VOA TLS	AG	HCL, 4C		X	X		X	X	10 day
1224072	WP-05	22SAV-WP95	1224072016	07/17/2022 16:10:00	Ground_Water	2.3	Duplicate	22SAV-01	7	4x250 mL TLC AG, 3x40 mL VOA TLS	AG	HCL, 4C		X	X		X	X	10 day
1224072	IDW	22SAV-WC01	1224072012	07/14/2022 17:30:00	Leachate	N/A	Primary	22SAV-01	1	1x8 oz	AG	4C	X						5 day - RUSH

Notes:

All samples were shipped to SGS Anchorage
NPDL - 22-067
AG - amber glass
HCL - hydrochloric acid
IDW - investigation derived waste
MeOH - methanol
mL - milliliter
MS - matrix spike
MSD - matrix spike duplicate
oz - ounce
TAT - turnaround time
TB - trip blank
TLC - teflon-lined cap
TLS - teflon-lined septa
VOA - volatile organic analysis

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Attachment C-2
Data Summary Table

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Soil Analytical Results

					SAMPLE ID	22SAV-B91-3	22SAV-BO1-3	22SAV-BO2-3	22SAV-BO3-3	22SAV-SW01-1.5	22SAV-SW02-2.5	22SAV-SW03-2	22SAV-SW04-2
					LOCATION ID	B91	B01	B02	B03	SW01	SW02	SW03	SW04
					LAB SDG	1224072-3	1224072-2	1224072-4	1224072-5	1224072-6	1224072-9	1224072-10	1224072-11
					COLLECTION DATE	7/15/2022 9:31:00 AM	7/15/2022 9:30:00 AM	7/15/2022 9:35:00 AM	7/15/2022 9:40:00 AM	7/15/2022 10:30:00 AM	7/15/2022 10:35:00 AM	7/15/2022 10:40:00 AM	7/15/2022 10:45:00 AM
					MATRIX	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
					QC TYPE	Field Dup B01	Primary	Primary	Primary	Primary (MS/MSD)	Primary	Primary	Primary
METHOD	ANALYTE	ADEC[1]	ACL[2]	PAL[3]	UNITS								
AK102	Diesel Range Organics	250	3000	3000	mg/kg	*15,500 [650]*	*20,900 [675]*	1,860 [13.7]	1,120 [13.6]	*12,500 [119]*	*4,030 [118]*	191 [12.7]	404 [12.1]
SW8260D	Benzene	0.022	0.13	0.13	mg/kg	*1.37 [0.0615]*	*2.08 [0.129]*	*0.138 [0.0132]*	0.0550 [0.0131]	ND [0.199] U	0.0513 [0.00980]	ND [0.0112] U	ND [0.0106] U
SW8260D	Ethylbenzene	0.13	1.2	1.2	mg/kg	*10.8 [0.123]*	*13.7 [0.258]*	*2.22 [0.0265]*	*1.83 [0.0262]*	*1.79 [0.398]*	0.384 [0.0196]	ND [0.0225] U	ND [0.0211] U
SW8260D	m,p-Xylene	NS	NS	NS	mg/kg	33.0 [0.246]	42.5 [0.515]	6.08 [0.0530]	4.83 [0.0525]	4.10 [0.795]	1.04 [0.0392]	ND [0.0449] U	ND [0.0423] U
SW8260D	o-Xylene	NS	NS	NS	mg/kg	16.2 [0.123]	20.8 [0.258]	3.64 [0.0265]	3.66 [0.0262]	7.17 [0.398]	1.20 [0.0196]	ND [0.0225] U	ND [0.0211] U
SW8260D	Toluene	6.7	47	47	mg/kg	12.2 [0.123]	17.6 [0.258]	0.517 [0.0265]	0.0420 [0.0262] J	ND [0.398] U	0.207 [0.0196]	ND [0.0225] U	ND [0.0211] U
SW8260D	Xylenes (total)	1.5	13	13	mg/kg	*49.2 [0.369]*	*63.3 [0.770]*	9.73 [0.0795]	8.49 [0.0785]	11.3 [1.20]	2.24 [0.0590]	ND [0.0675] U	ND [0.0635] U
SW8270DSIM	1-Methylnaphthalene	0.41	4.9	4.9	mg/kg	*51.2 [3.31]*	*38.5 [3.38]*	*5.02 [0.422]*	*8.48 [0.680]*	*38.7 [2.98]*	*9.72 [0.740]*	0.0463 [0.0158]	0.473 [0.0151]
SW8270DSIM	2-Methylnaphthalene	1.3	15	15	mg/kg	*73.9 [3.31]*	*55.2 [3.38]*	7.09 [0.422]	12.3 [0.680]	*51.9 [2.98]*	11.5 [0.740]	0.0570 [0.0158]	0.461 [0.0151]
SW8270DSIM	Acenaphthene	37	NS	37	mg/kg	ND [0.660] U	ND [0.675] U	0.0796 [0.0845] J	0.115 [0.0680] J	ND [0.595] U	0.143 [0.148] J	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Acenaphthylene	18	NS	18	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Anthracene	390	NS	390	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Benzo(a)anthracene	0.7	NS	0.7	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Benzo(a)pyrene	1.9	NS	1.9	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Benzo(b)fluoranthene	20	NS	20	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Benzo(g,h,i)perylene	15000	NS	15000	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Benzo(k)fluoranthene	190	NS	190	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Chrysene	600	1200	1200	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Dibenzo(a,h)anthracene	6.3	NS	6.3	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Fluoranthene	590	NS	590	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Fluorene	36	460	460	mg/kg	0.877 [0.660] J	0.691 [0.675] J	0.0853 [0.0845] J	0.143 [0.0680]	0.879 [0.595] J	0.179 [0.148] J	ND [0.0158] U	0.00893 [0.0151] J
SW8270DSIM	Indeno(1,2,3-cd)pyrene	65	NS	65	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Naphthalene	0.038	0.43	0.43	mg/kg	*47.1 [2.65]*	*35.2 [2.71]*	*4.77 [0.338]*	*9.54 [0.545]*	*30.9 [2.39]*	*5.19 [0.119]*	0.0237 [0.0126] J	0.120 [0.0121]
SW8270DSIM	Phenanthrene	39	NS	39	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	0.0435 [0.0680] J	0.306 [0.595] J	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SW8270DSIM	Pyrene	87	1100	1100	mg/kg	ND [0.660] U	ND [0.675] U	ND [0.0845] U	ND [0.0680] U	ND [0.595] U	ND [0.148] U	ND [0.0158] U	ND [0.0151] U
SM2540G	Solids	NA	NA	NA	%	75.6	73.9	73.1	73.2	83.5	84.3	79	81.6

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Supra-permafrost Porewater Analytical Results

				SAMPLE ID	22SAV-WP01	22SAV-WP05	22SAV-WP95	22SAV-TB02
				LOCATION ID	WP-01	WP-05	WP-05	TB
				COLLECTION DATE	07/17/2022 18:09	07/17/2022 16:05	07/17/2022 16:10	07/17/2022 08:00
				LAB SDG	1224072017	1224072013	1224072016	1224072001
				MATRIX	Surface Water	Surface Water	Surface Water	Water
Method	**Analyte**	**PAL[1]**	**Units**		**Primary Sample**	**Primary Sample**	**Field Dup (22SAV-WP05)**	**Trip Blank**
AK102	Diesel Range Organics (C10-C25)	1.5	mg/L		**5.89 [0.288]**	0.881 [0.278]	1.12 [0.288]	--
AK103	Residual Range Organics (C25-C36)	1.1	mg/L		**1.63 [0.240]**	0.743 [0.232] QN	**1.27 [0.240] QN**	--
8260D	Benzene	0.0046	mg/L		**0.0160 [0.0002]**	0.00244 [0.0002] QH	0.00212 [0.0002]	ND [0.0002]
8260D	Ethylbenzene	0.015	mg/L		0.00101 [0.0005]	0.00113 [0.0005]	0.00109 [0.0005]	ND [0.0005]
8260D	o-Xylene	NS	mg/L		0.00615 [0.0005]	0.00212 [0.0005]	0.00202 [0.0005]	ND [0.0005]
8260D	Toluene	1.1	mg/L		0.00156 [0.0005]	0.00532 [0.0005]	0.00519 [0.0005]	ND [0.0005]
8260D	Xylene, Isomers m & p	NS	mg/L		0.0058 [0.001]	0.00449 [0.001]	0.00431 [0.001]	ND [0.001]
8260D	Xylenes	0.19	mg/L		0.012 [0.0015]	0.00661 [0.0015]	0.00633 [0.0015]	ND [0.0015]
8270DSIM	1-Methylnaphthalene	0.011	mg/L		ND [0.000024]	0.000193 [0.0000223] QN	0.000278 [0.000024] QN	--
8270DSIM	2-Methylnaphthalene	0.036	mg/L		ND [0.000024]	0.000218 [0.0000223] QN	0.000332 [0.000024] QN	--
8270DSIM	Acenaphthene	0.53	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Acenaphthylene	0.26	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Anthracene	0.043	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Benzo(a)anthracene	0.0003	mg/L		ND [0.000024]	0.0000135 [0.0000223] J, QN	ND [0.000024] QN	--
8270DSIM	Benzo(a)pyrene	0.00025	mg/L		ND [0.0000096]	ND [0.00000895]	ND [0.0000096]	--
8270DSIM	Benzo(b)fluoranthene	0.0025	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Benzo(g,h,i)perylene	0.00026	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Benzo(k)fluoranthene	0.0008	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Chrysene	0.002	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Dibenzo(a,h)anthracene	0.00025	mg/L		ND [0.0000096]	ND [0.00000895]	ND [0.0000096]	--
8270DSIM	Fluoranthene	0.26	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Fluorene	0.29	mg/L		ND [0.000024]	0.0000192 [0.0000223] J	0.0000212 [0.000024] J	--
8270DSIM	Indeno(1,2,3-cd)pyrene	0.00019	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--
8270DSIM	Naphthalene	0.0017	mg/L		0.000988 [0.0000481]	0.000206 [0.0000447]	0.000261 [0.0000481]	--
8270DSIM	Phenanthrene	0.17	mg/L		ND [0.0000481]	ND [0.0000447]	ND [0.0000481]	--
8270DSIM	Pyrene	0.12	mg/L		ND [0.000024]	ND [0.0000223]	ND [0.000024]	--

Notes:

[1] PALs are defined by 18 AAC 75 Table C Groundwater cleanup levels (ADEC 2021).

Bold/red indicates that a detected result exceeds the PSL.

LOD shown in brackets [ ]

mg/L – milligrams per liter

ADEC – Alaska Department of Environmental Conservation

J – the result is an estimated value greater than or equal to the DL and below the LOQ

LOD – limit of detection

LOQ – limit of quantitation

MS/MSD – matrix spike/matrix spike duplicate

ND – not detected

ACL – alternative cleanup level

QC – quality control

QH/QL/QN – the result is an estimated value, bias high/low/indeterminate, due to a QC failure

PAL – project action level

SDG – sample delivery group

SIM – selected ion monitoring

NA - not applicable

NS - not specified

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Investigation Derived Waste
Analytical Results

		SAMPLE ID	22SAV-WC01
		LOCATION ID	Waste Characterization
		LAB SDG	07/14/2022 17:30
		COLLECTION DATE	1224072012
		MATRIX	
Method	**Analyte**	**Units**	
6020B	Arsenic	mg/L	ND [0.250]
6020B	Barium	mg/L	0.332 [0.0750]
6020B	Cadmium	mg/L	ND [0.0500]
6020B	Chromium	mg/L	ND [0.250]
6020B	Lead	mg/L	0.0489 [0.0250] J
6020B	Mercury	mg/L	0.0126 [0.0125] J

Notes:

LOD shown in brackets [ ]

mg/L – milligrams per liter

J – the result is an estimated value greater than or equal to the DL and below the LOQ

LOD – limit of detection

LOQ – limit of quantitation

ND – not detected

SDG – sample delivery group

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Attachment C-3
ADEC Laboratory Data Review Checklists

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ADEC Contaminated Sites Program Laboratory Data Review Checklist

Completed By:	Troy Engstrom	**CS Site Name:**	ANG Federal Scout Armory Savoonga, AK	**Lab Name:**	SGS Anchorage
Title:	Senior Chemist	**ADEC File No.:**	670.38.002	**Lab Report No.:**	1224072
Consulting Firm:	Brice Engineering	**Hazard ID No.:**	3099	**Lab Report Date:**	07/29/2022

Note: *Any N/A or No box checked must have an explanation in the comments box.*

1. **Laboratory**

   a. Did an ADEC Contaminated Sites Laboratory Approval Program (CS-LAP) approved laboratory receive and perform all the submitted sample analyses?
   Yes ☒ No ☐ N/A ☐
   Comments: SGS Anchorage is ADEC, and DOD ELAP certified. ADEC CS 17-021 (Expires 01/31/2024), A2LA Cert. No. 2944.01 (Expires 12/31/2023)

   b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses CS-LAP approved?
   Yes ☐ No ☐ N/A ☒
   Comments: No samples were subcontracted to an alternative laboratory. All analytical results were completed in the SGS Anchorage laboratory.

2. **Chain of Custody (CoC)**

   a. Is the CoC information completed, signed, and dated (including released/received by)?
   Yes ☒ No ☐ N/A ☐
   Comments: All pages of SDG 1224072 COC were complete including the dates and times that the samples were sent to the laboratory and when the laboratory received the samples. All signatures were complete and in the appropriate areas of the CoC.

   b. Were the correct analyses requested?
   Yes ☒ No ☐ N/A ☐
   Analyses requested: 8260C BTEX, AK102 (soils), AK102/103 (water), 8270D PAH SIM, TCLP RCRA8 metals 1311/6020 (Waste Characterization samples only).

Comments: All requested analyses were correct, and no revision of the analytical suite was altered from the list initially requested above.

3. Laboratory Sample Receipt Documentation

a. Is the sample/cooler temperature documented and within range at receipt (0° to 6° C)?
Yes ☒ No ☐ N/A ☐
Cooler temperature(s): No cooler temperature was documented by the lab
Sample temperature(s): 2.4° C
Comments: All samples were received in one cooler (cooler ID 22SAV-01) with a documented temperature of 2.4° C for the lab supplied temperature blank.

b. Is the sample preservation acceptable – acidified waters, methanol preserved soil (GRO, BTEX, VOCs, etc.)?
Yes ☒ No ☐ N/A ☐
Comments: All samples were received with the appropriate preservation and required bottle type.

c. Is the sample condition documented – broken, leaking, zero headspace (VOA vials); canister vacuum/pressure checked and no open valves, etc.?
Yes ☒ No ☐ N/A ☐
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, canister not holding a vacuum, etc.?
Yes ☒ No ☐ N/A ☐
Comments: The COC listed 3 volatile water Trip Blanks as a soil matrix which were listed as sample ID 22SAV-TB01. There was no soil trip blank included in the sample shipment. The set of water trip blanks was adjusted to read 22SAV-TB02. A note was made on the comments section of page two of the COC which suggests that this change was approved by Tori P on 7/1/22.

e. Is the data quality or usability affected?
Yes ☒ No ☐ N/A ☐
Comments: There is no soil Trip Blank results for the SDG, only water Trip Blank results. Should low level contamination of soil sample results be suspected there will be no way to evaluate this without a soil volatile trip blank. Additional information discussed below in section 6.e.iv.

4. Case Narrative

a. Is the case narrative present and understandable?
Yes ☒ No ☐ N/A ☐

Comments: Case narrative was clear and documented the QC deficiencies in the SDG.

b. Are there discrepancies, errors, or QC failures identified by the lab?
Yes ☒ No ☐ N/A ☐
Comments: There are 13 QC discrepancies identified in the case narrative. All QC failures were specific to a MB, LCS/LCSD, MS/MSD, and/or surrogate recovery that will be discussed in sections five thru six in this checklist. Despite the QA/AC exceedances, none of the results in the SDG are considered affected to the point where data usability would be affected.

c. Were all the corrective actions documented?
Yes ☐ No ☐ N/A ☒
Comments: There were no corrective actions associated with this SDG.

d. What is the effect on data quality/usability according to the case narrative?
Comments: The QC issues in the SDG which were noted in the Case Narrative are not considered to have an impact on the overall data quality or usability of the results contained in the SDG.

5. Sample Results

a. Are the correct analyses performed/reported as requested on CoC?
Yes ☒ No ☐ N/A ☐
Comments: The lab report included all the requested analysis on the CoC. The analyses included 8260 BTEX, AK102/103 (DRO/RRO), PAHs by 8270D SIM, and TCLP metals for the Waste Characterization (WC) sample.

b. Are all applicable holding times met?
Yes ☒ No ☐ N/A ☐
Comments: All method hold times were achieved.

c. Are all soils reported on a dry weight basis?
Yes ☒ No ☐ N/A ☐
Comments: All reported results were dry weight corrected using SM2540G.

d. Are the reported limits of quantitation (LoQ) or limits of detections (LOD), or reporting limits (RL) less than the Cleanup Level or the action level for the project?
Yes ☐ No ☒ N/A ☐
Comments: One sample, 22SAV-SW01-1.5 (1224072-6) reported an ND result at the LOD in which exceeded the PAL for Benzene. The sample was reported as ND [0.199] m/Kg which is greater than the PAL of 0.13 mg/Kg. All additional ND results in the SDG were reported with LoD results that are below the associated PALs.

e. Is the data quality or usability affected?
Yes ☒ No ☐ N/A ☐
Comments: The data quality deficiency for sample 22SAV-SW01-1.5 (1224072-6) was noted in the data table by highlighting the ND Benzene result in yellow. All additional analytical results meet data quality objectives with respect to holding time, dry weight results, and reporting limits.

Overall data usability is considered unaffected as the single Benzene result that did not meet the PAL was due to high target analytes in the sample. The 8260D result was diluted and reported at a 20X dilution. This result was necessary as the sample contained 12,500 mg/Kg of DRO. The PAL for Benzene was not reasonably achievable without potentially contaminating the analytical instrumentation to a achieve a result that meets the PAL. Since the sample reported PAL exceedances for other target compounds the presence of Benzene at or below the PAL becomes less significant for project making decisions.

6. QC Samples

a. Method Blank

i. Was one method blank reported per matrix, analysis, and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments: Method blanks were run at the method required frequency for all analyses in the SDG.

ii. Are all method blank results less than LOQ (or RL)?
Yes ☒ No ☐
Comments: The MBs were reported as ND at the LOD for all target analytes except one in the SDG. MB 1675613 was a “J” flagged detection in the TCLP 6020B analysis for Barium at 0.0552 mg/L. This result was above the DL (0.0470 mg/L) but below the LOD.

iii. If above LoQ or RL, what samples are affected?
Comments: Sample ID 22SAV-WC01 (Lab ID 4072-12) was the only sample associated with the detection of Barium in MB 1675613.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☒ N/A ☐
Comments: Results are not affected since the detected result for Barium in the MB was less than ½ the LOQ.

v. Data quality or usability affected?
Yes ☐ No ☒ N/A ☐
Comments: All results are considered adequate quality for making all project decisions with respect to the MBs in SDG 1224072.

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

i. Organics – Are one LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)
Yes ☒ No ☐ N/A ☐
Comments: LCSs were run at the method required frequency for all analyses in the SDG. An LCS/LCSD pair was run for both water and soil AK102 (DRO) analyses.

ii. Metals/Inorganics – Are one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments: All LCSs and sample duplicates were run at the method required frequency for all metals analyses in the SDG.

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)
Yes ☒ No ☐ N/A ☐
Comments: All LCS/LCSDs met laboratory method accuracy goals. The Case Narrative mentioned that the LCS % recovery for trichlorofluoromethane in LCS 1840221 does not meet recovery goals. This analyte was not a target analyte in the SDG as BTEX were the only target analytes requested for 8260B analysis. Results were considered unaffected by the trichlorofluoromethane LCS recovery.

iv. Precision – Are all relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? Was the RPD reported from LCS/LCSD, and or sample/sample duplicate? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)
Yes ☒ No ☐ N/A ☐
Comments: All LCS/LCSDs met laboratory method precision goals.

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: All LCS/LCSDs met laboratory method accuracy and precision goals. No samples are affected.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☐ N/A ☒
Comments: All LCS/LCSDs met laboratory method accuracy and precision goals. No samples are affected.

vii. Is the data quality or usability affected?
Yes ☐ No ☐ N/A ☒
Comments: All LCS/LCSDs met laboratory method accuracy and precision goals. Data quality and usability are considered usable for project making decisions with respect to the LCS/LCSDs.

c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

i. Organics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☒ No ☐ N/A ☐
Comments: Prep batch VXX38900 is missing a Benzene result for both BMS/BMSD. The sample was reanalyzed in batch VXX38936 with passing results.

ii. Metals/Inorganics – Are one MS/MSD reported per matrix, analysis and 20 samples?
Yes ☐ No ☐ N/A ☒
Comments: Metals/Inorganics consists of a single waste sample which does not require a MS/MSD.

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?
Yes ☐ No ☒ N/A ☐
Comments:

8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, and Pyrene are low and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are reported as ND at the LOD.

8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for Acenaphthene and Acenaphthylene are high and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are reported as ND at the LOD. Results are considered not affected since the bias is high and the results are ND.

8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for 1-Methylnaphthalene, 2-Methylnaphthalene, Fluorene, and Naphthalene are low and do not meet laboratory QC goals. Detected results for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected as the spike level of the analytes were either diluted out due to high target analytes in the sample or the spike levels were less

than the parent sample.

8270 PAH SIM – BMSD (22SAV-SW01-1.5) 1224072-08 Result for Phenanthrene is low and does not meet laboratory QC goals. Detected result for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected due to the high dilution required for analysis of other target analytes.

AK102 (DRO) – BMSD (22SAV-SW01-1.5) 1224072-08 Result for DRO is low and does not meet laboratory QC goals. Detected result for the associated sample (22SAV-SW01-1.5) 1224072-06 are considered affected. However, the sample result is greater than 10X the PAL therefore no data qualification is required.

iv. Precision – Are all relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.
Yes ☐ No ☒ N/A ☐
Comments:

8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Precision results for 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Fluorene, and Naphthalene are high and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected due to the large dilutions that was required for quantitation. These dilutions diminish the accuracy of the results which do not provide useful information to determine the effect of the matrix on the overall data quality and usability.

v. If %R or RPD is outside of acceptable limits, what samples are affected?
Comments: Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are considered affected in all cases. No other samples in the SDG are affected.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes ☐ No ☒ N/A ☐
Comments: 8270 PAH SIM – (22SAV-SW01-1.5) 1224072-06 results for the following analytes Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, and Pyrene are low and did not meet % recovery goals due to high concentrations of target analytes required large dilutions which

diluted the recovery result to a point where the results no longer are considered useful.

8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Results for 1-Methylnaphthalene, 2-Methylnaphthalene, Fluorene, and Naphthalene are low and do not meet laboratory QC goals. Detected results for the associated sample (22SAV-SW01-1.5) 1224072-06 are considered not affected. High target analytes and large dilutions render the % recoveries at a point where the results are no longer accurate and useful for QA evaluation.

8270 PAH SIM – BMSD (22SAV-SW01-1.5) 1224072-08 Result for Phenanthrene is low and does not meet laboratory QC goals.
The detected result for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected due to high target analytes and large sample dilutions.

8270 PAH SIM – BMS/BMSD (22SAV-SW01-1.5) 1224072-07/08 Precision (RPD) results for 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Fluorene, and Naphthalene are high and do not meet laboratory QC goals. Results for the associated sample (22SAV-SW01-1.5) 1224072-06 are not considered affected. There are no qualifiers added to sample (22SAV-SW01-1.5) 1224072-06 for 1-Methylnaphthalene, 2-Methylnaphthalene, and naphthalene as these results are 10X above the PAL and are considered unaffected. Results for Acenaphthene, Acenaphthylene, and Fluorene were not flagged with a QN qualifier as high target analytes and large dilutions render the % RPDs to a point where the results are no longer accurate and useful for QA evaluation.

AK102 (DRO) – BMSD (22SAV-SW01-1.5) 1224072-08 Result for DRO is low and does not meet laboratory QC goals. Detected result for the associated sample (22SAV-SW01-1.5) 1224072-06 are considered affected. However, the sample result is greater than 10X the PAL therefore no data qualification is required.

vii. Is the data quality or usability affected?

Yes ☐ No ☒ N/A ☐

Comments: Results for sample (22SAV-SW01-1.5) 1224072-06 that was not qualified should be evaluated carefully to determine any potential bias that the matrix highlights in the primary sample. Data usability is not considered affected since several analytes (1-Methylnaphthalene, 2-Methylnaphthalene, Naphthalene, and DRO) are more that 10X the associated PAL for the sample (22SAV-SW01-1.5) 1224072-06 that required the only data qualification.

d. Surrogates – Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC, and laboratory samples?
Yes ☒ No ☐ N/A ☐
Comments: Surrogates were included at the method required frequency for all analyses in the SDG.

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)
Yes ☐ No ☒ N/A ☐
Comments:

8270 PAH SIM – (22SAV-WP95) 1224072-16 Surrogate result for Fluoranthene-d10 is low and does not meet laboratory QC goals. All associated results were reported as ND. Results are not considered affected.

8270 PAH SIM – (22SAV-BO1-3) 1224072-02, (22SAV-B91-3) 1224072-03, (22SAV-SW01-1.5) 1224072-06/07/08, (22SAV-SW02-2.5) 1224072-09 Surrogate results for 2-Methylnaphthalene-d10 are high and do not meet laboratory QC goals. Sample results for these samples are diluted to a point where surrogate % recoveries do not provide useful or accurate information. Associated results are not considered affected due to the large dilutions (10X to 40X).

8260 VOA – (22SAV-SW01-1.5) 1224072-06 Surrogate result for 4-Bromofluorobenzene is high and does not meet laboratory QC goals. Sample results for this sample are diluted to a point where surrogate % recoveries do not provide useful or accurate information. Associated results are not considered affected due to the large dilutions (20X).

8260 VOA – (22SAV-WP05) 1224072-13 Surrogate result for 1,2-Dichloroethane-d4 is high and does not meet laboratory QC goals. Benzene is associated with this surrogate, and it was detected above the LOD in the sample.

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?
Yes ☒ No ☐ N/A ☐
Comments: 8260 VOA – (22SAV-WP05) 1224072-13 Surrogate result for 1,2-Dichloroethane-d4 is high and does not meet laboratory QC goals.

Benzene is associated with this surrogate, and it was detected above the LOD in the sample. The reported result in the sample, 0.00244 [0.0002] mg/L was flagged with a QH qualifier to note the potential high bias in the result.

iv. Is the data quality or usability affected?
Yes ☒ No ☐ N/A ☐
Comments: The QH qualifier notes the data quality issue in the sample (22SAV-WP05) 1224072-13 which flags the result as estimated and potentially biased high. The result is still considered usable for all project making decisions as the reported result is more than 100X below the associated PAL of 4.6 mg/L.

e. Trip Blanks

i. Is one trip blank reported per matrix, analysis, and for each cooler containing volatile samples? Yes ☐ No ☒ N/A ☐
Comments: The COC documented a soil (22SAV-TB01) and water (22SAV-TB02) trip blank for the 8260 BTEX; However, there was no soil container that was received at the lab and the water trip blank was added by the laboratory.

ii. Are all results less than LoQ or RL?
Yes ☒ No ☐ N/A ☐
Comments: The water 8260 BTEX results were all reported as ND at the associated LOD.

iii. If above LoQ or RL, what samples are affected?
Comments: No detections were recorded for the water trip blank, so no samples are affected.

iv. Is the data quality or usability affected?
Yes ☒ No ☐ N/A ☐
Comments: VOA soil data quality is affected by the lack of a soil trip blank. It is impossible to determine if any low-level reportable VOA results in the SDG may be due to potential cross contamination during transport. Data is still considered usable for making project decisions as all results will be assumed to be unaffected by cross contamination.

f. Field Duplicate

i. Are one field duplicate submitted per matrix, analysis, and 10 project samples?
Yes ☒ No ☐ N/A ☐
Comments: Soil sample 22SAV-B01-3 (1224072-02) is the primary sample; 22SAV-B91-3 (1224072-03) is the soil field duplicate.

Water sample 22SAV-WP05 (1224072-13) is the primary sample; 22SAV-B95-3 (1224072-16) is the water field duplicate.

ii. Was the duplicate submitted blind to lab?
Yes ☒ No ☐ N/A ☐
Comments: The lab was unaware of the two field duplicates.

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

$$RPD\ (\%) = \left| \frac{R_1 - R_2}{\left(\frac{R_1 + R_2}{2}\right)} \right| X\ 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

iv. Is the data quality or usability affected? (Explain)
Yes ☒ No ☐ N/A ☐
Comments: The soil field duplicate met all precision goals of < 50%.

The water field duplicate did not meet the RPD goal of < 30% for the following analytes:

Method	Analyte	PRIMARY	DUPLICATE	RPD
8270DSIM	Benzo(a)anthracene	0.0000135	0.000024 ND	56.00%
AK103	Residual Range Organics (C25-C36)	0.743	1.27	52.36%
8270DSIM	2-Methylnaphthalene	0.000218	0.000332	41.45%
8270DSIM	1-Methylnaphthalene	0.000193	0.000278	36.09%

The four FD RPDs that did not meet laboratory QC goals of <30% for waters are considered estimated and potentially biased in an unknown direction. Results have been flagged with a QN qualifier do note the data quality deficiency. Results for these samples are still considered usable for project making decisions as none of the are close or exceed an associated PAL.

g. Decontamination or Equipment Blanks

i. Were decontamination or equipment blanks collected?
Yes ☐ No ☒ N/A ☐
Comments: All samples were taken with disposable utensils and tubing. No need for decontamination or equipment monitoring blanks samples was required.

ii. Are all results less than LoQ or RL?
Yes ☐ No ☐ N/A ☒
Comments: Click or tap here to enter text.

iii. If above LoQ or RL, specify what samples are affected.
Comments: Click or tap here to enter text.

iv. Are data quality or usability affected?
Yes ☐ No ☐ N/A ☒
Comments: All data is considered usable for all project making decisions.

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

a. Are they defined and appropriate?
Yes ☒ No ☐ N/A ☐
Comments: USACE Qualifications used to validate are listed below.

USACE Data Qualifiers

QUALIFIER	DESCRIPTION
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	Analyte is considered an estimated value because the result is greater than or equal to the DL and less than the LOQ.
B	Analyte result is considered a high estimated value due to contamination present in an associated blank (e.g., MB or TB).
H	Analyte result is considered a low estimate due to a holding time exceedance.
QH/QL/QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a QC failure.
R	Analyte result is rejected – result is not usable. Note that R replaces the chemical result (no result shall be reported with an R flag).

CS Site Name: ANG Federal Scout Armory Savoonga, AK
Lab Report No.: 1224072

Data Qualification Summary

Table 3

Savoonga RA Data Qualification Summary

SDG	Lab Sample ID	Sample ID	Lab Batch	Method	Analyte	RESULT	PAL	UNITS	Qualification	Reason
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	Anthracene	ND [0.595] U	390	mg/Kg	none	Low % Recovery BMS/BMSD; High target analytes required 40X dilutions which render % recovery not useful
					Benzo(a)anthracene	ND [0.595] U	0.7	mg/Kg	none	
					Benzo(a)pyrene	ND [0.595] U	1.9	mg/Kg	none	
					Benzo(b)fluoranthene	ND [0.595] U	20	mg/Kg	none	
					Benzo(g,h,i)perylene	ND [0.595] U	15000	mg/Kg	none	
					Benzo(k)fluoranthene	ND [0.595] U	190	mg/Kg	none	
					Chrysene	ND [0.595] U	600	mg/Kg	none	
					Dibenzo(a,h)anthracene	ND [0.595] U	6.3	mg/Kg	none	
					Fluoranthene	ND [0.595] U	590	mg/Kg	none	
					Indeno(1,2,3-cd)pyrene	ND [0.595] U	65	mg/Kg	none	
					Pyrene	ND [0.595] U	87	mg/Kg	none	
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	1-Methylnaphthalene	38.7 [2.98]	0.41	mg/Kg	none	Low % Recovery BMS/BMSD; Analyte 10X > PAL
					2-Methylnaphthalene	51.9 [2.98]	1.3	mg/Kg	none	
					Fluorene	0.879 [0.595] J	36	mg/Kg	none	Low % Recovery BMS/BMSD; Dilution > 40X
					Naphthalene	30.9 [2.39]	0.43	mg/Kg	none	Low % Recovery BMS/BMSD; Analyte 10X > PAL
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	Phenanthrene	0.306 [0.595] J	39	mg/Kg	none	Low % Recovery BMSD; Dilution > 40X
1224072	1224072-06	22SAV-SW01-1.5	XXX46666	8270D PAH SIM	1-Methylnaphthalene	38.7 [2.98]	0.41	mg/Kg	none	High RPD BMS/BMSD; Analyte 10X > PAL
					2-Methylnaphthalene	51.9 [2.98]	1.3	mg/Kg	none	
					Acenaphthene	ND [0.595] U	37	mg/Kg	none	High RPD BMS/BMSD; Target analyte 10X > PAL; Dilution > 40X
					Acenaphthylene	ND [0.595] U	18	mg/Kg	none	
					Fluorene	0.879 [0.595] J	36	mg/Kg	none	
					Naphthalene	30.9 [2.39]	0.43	mg/Kg	none	High RPD BMS/BMSD; Analyte 10X > PAL
1224072	1224072-06	22SAV-SW01-1.5	XXX46654	AK102	Diesel Range Organics	12500 [119]	250	mg/Kg	none	Low % Recovery BMSD; Analyte 10X > PAL
1224072	1224072-13	22SAV-WP05	VXX38900	8260D BTEX	Benzene	0.00244 [0.0002] QH	4.6	mg/L	QH	High % Surrogate Recovery
1224072	1224072-16	22SAV-WP95	XXX46659	8270D PAH SIM	Fluoranthene-d10 - SURR	various	NA	mg/L	none	High % Surrogate Recovery, associated results ND
1224072	1224072-02	22SAV-BO1-3	XXX46666	8270D PAH SIM	2-Methylnaphthalene-d10 - SURR	various	NA	mg/Kg	none	High % Surrogate Recovery, Sample diluted > 10X
	1224072-03	22SAV-B91-3								
	1224072-06/7/8	22SAV-SW01-1.5								
	1224072-09	22SAV-SW02-2.5								
1224072	1224072-06	22SAV-SW01-1.5	VXX38907	8260D BTEX	4-Bromoflurorbenzene - SURR	various	NA	mg/L	none	High % Surrogate Recovery, Sample diluted > 10X
1224072	1224072-13	22SAV-WP05	XXX46659	8270D PAH SIM	Benzo(a)anthracene	0.0000135 [0.0000223] J, QN	0.3	mg/L	QN	Field Duplicate RPD > 30%
					1-Methylnaphthalene	0.000193 [0.0000223] QN	11			
					2-Methylnaphthalene	0.000218 [0.0000223] QN	36			
			XXX46660	AK103	Residual Range Organics (C25-C36)	0.743 [0.232] QN	1100			
	1224072-16	22SAV-WP95	XXX46659	8270D PAH SIM	Benzo(a)anthracene	ND [0.000024] QN	0.3			
					1-Methylnaphthalene	0.000278 [0.000024] QN	11			
					2-Methylnaphthalene	0.000332 [0.000024] QN	36			
			XXX46660	AK103	Residual Range Organics (C25-C36)	1.27 [0.240] QN	1100			
1224072	1224072-06	22SAV-SW01-1.5	VXX38907	8260D BTEX	Benzene	ND [0.199] U	0.13	mg/Kg	Data table Highlight	ND result > PAL, Sample diluted > 10X

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Attachment C-4
Laboratory Reports

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Laboratory Report of Analysis

To: Brice Engineering LLC
3700 Centerpoint Drive Suite 800
Anchorage, AK 99503
(907) 205-9892

Report Number: **1224072**

Client Project: **AKARNG Savoonga RA 2022**

Dear Victoria Pennick,

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

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

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

Sincerely,
SGS North America Inc.

_____

Justin Nelson Date
Project Manager
Justin.Nelson@sgs.com

SGS North America Inc. 200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Case Narrative

SGS Client: **Brice Engineering LLC**
SGS Project: **1224072**
Project Name/Site: **AKARNG Savoonga RA 2022**
Project Contact: **Victoria Pennick**
22-067

Refer to sample receipt form for information on sample condition.

22SAV-BO1-3 (1224072002) PS

8270D SIM - PAH surrogate recovery for 2-methylnaphthalene-d10 does not meet QC criteria due to dilution.

22SAV-B91-3 (1224072003) PS

8270D SIM - PAH surrogate recovery for 2-methylnaphthalene-d10 does not meet QC criteria due to dilution.

22SAV-SW01-1.5 (1224072006) PS

8260D - Surrogate recovery for 4-Bromofluorobenzene does not meet QC criteria due to matrix interference.
8270D SIM - PAH surrogate recovery for 2-methylnaphthalene-d10 does not meet QC criteria due to dilution.

22SAV-SW01-1.5(1224072006BMS) (1224072007) BMS

8270D SIM - PAH surrogate recovery for 2-methylnaphthalene-d10 does not meet QC criteria due to dilution.
8270D SIM - PAH BMS recoveries for several analytes do not meet QC criteria. See LCS for accuracy requirements.

22SAV-SW01-1.5(1224072006BMSD) (1224072008) BMSD

AK102 - BMSD recovery for DRO does not meet QC criteria. Sample concentration is greater than four times the spike concentration. Refer to the LCS/LCSD for precision requirements.
8270D SIM - PAH surrogate recovery for 2-methylnaphthalene-d10 does not meet QC criteria due to dilution.
8270D SIM - PAH BMSD recoveries for several analytes do not meet QC criteria. See LCS for accuracy requirements.
8270D SIM - PAH BMS/BMSD RPDs for several analytes do not meet QC criteria.

22SAV-SW02-2.5 (1224072009) PS

8270D SIM - PAH surrogate recovery for 2-methylnaphthalene-d10 does not meet QC criteria due to dilution.

22SAV-WP05 (1224072013) PS

8260D - Surrogate recovery for 1,2-dichloroethane-D4 does not meet QC criteria. Analytes associated with this surrogate are not reported above the LOQ.

22SAV-WP95 (1224072016) PS

8270D SIM - PAH surrogate recovery for fluoranthene-d10 does not meet QC criteria.

LCS for HBN 1840153 [XXX/46654 (1674535) LCS

AK102/103 - Surrogate recovery for 5a-androstane does not meet QC criteria associated samples are within QC criteria for 5a-androstane.

MB for HBN 1840219 [VXX/38906] (1674801) MB

8260D - Surrogate recovery for 1,2-dichloroethane-D4 does not meet QC criteria.

LCS for HBN 1840221 [VXX/38907 (1674810) LCS

8260D - LCS recovery for Trichlorofluoromethane does not met QC criteria. This analyte is not being reported above the LOQ in the associated samples.

1224060007(1674811MS) (1674812) MS

8260D - MS recoveries for Trichlorofluoromethane and 1,2,3-Trichlorobenzene do not meet QC criteria. These analytes were not detected above the LOQ in the associated PS.
8260D - MS surrogate recovery for 4-Bromofluorobenzene does not meet QC criteria. This sample was analyzed three times as PS/MS/MSD, results confirm.

1224060007(1674811MSD) (1674813) MSD

SGS North America Inc.
200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Case Narrative

SGS Client: **Brice Engineering LLC**
SGS Project: **1224072**
Project Name/Site: **AKARNG Savoonga RA 2022**
Project Contact: **Victoria Pennick**
22-067

8260D - MSD recoveries for Trichlorofluoromethane and 1,2,3-Trichlorobenzene do not meet QC criteria. These analytes were not detected above the LOQ in the associated PS.
8260D - MSD surrogate recovery for 4-Bromofluorobenzene does not meet QC criteria. This sample was analyzed three times as PS/MS/MSD, results confirm.

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

SGS North America Inc.
200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Laboratory Qualifiers

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

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

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

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

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

Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
22SAV-TB02	1224072001	07/17/2022	07/19/2022	Water (Surface, Eff., Ground)
22SAV-BO1-3	1224072002	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-B91-3	1224072003	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-BO2-3	1224072004	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-BO3-3	1224072005	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-SW01-1.5	1224072006	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-SW01-1.5(1224072006BM	1224072007	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-SW01-1.5(1224072006BM	1224072008	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-SW02-2.5	1224072009	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-SW03-2	1224072010	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-SW04-2	1224072011	07/15/2022	07/19/2022	Soil/Solid (dry weight)
22SAV-WC01	1224072012	07/14/2022	07/19/2022	Solid/Soil (Wet Weight)
22SAV-WP05	1224072013	07/17/2022	07/19/2022	Water (Surface, Eff., Ground)
22SAV-WP05(1224072013BMS)	1224072014	07/17/2022	07/19/2022	Water (Surface, Eff., Ground)
22SAV-WP05(1224072013BMSD	1224072015	07/17/2022	07/19/2022	Water (Surface, Eff., Ground)
22SAV-WP95	1224072016	07/17/2022	07/19/2022	Water (Surface, Eff., Ground)
22SAV-WP01	1224072017	07/17/2022	07/19/2022	Water (Surface, Eff., Ground)

Method	Method Description
8270D SIM LV (PAH)	8270 PAH SIM GC/MS LV
8270D SIM (PAH)	8270 PAH SIM Semi-Volatiles GC/MS
AK102	Diesel Range Organics (S)
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water
SW6020B TCLP	Metals by ICP-MS
SM21 2540G	Percent Solids SM2540G
SW8260D	Volatile Organic Compounds (S) FIELD EXT
SW8260D	Volatile Organic Compounds (W)

Detectable Results Summary

Client Sample ID: **22SAV-BO1-3**
Lab Sample ID: 1224072002

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	38.5	mg/kg
	2-Methylnaphthalene	55.2	mg/kg
	Fluorene	0.691J	mg/kg
	Naphthalene	35.2	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	20900	mg/kg
Volatile GC/MS	Benzene	2.08	mg/kg
	Ethylbenzene	13.7	mg/kg
	o-Xylene	20.8	mg/kg
	P & M -Xylene	42.5	mg/kg
	Toluene	17.6	mg/kg
	Xylenes (total)	63.3	mg/kg

Client Sample ID: **22SAV-B91-3**
Lab Sample ID: 1224072003

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	51.2	mg/kg
	2-Methylnaphthalene	73.9	mg/kg
	Fluorene	0.877J	mg/kg
	Naphthalene	47.1	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	15500	mg/kg
Volatile GC/MS	Benzene	1.37	mg/kg
	Ethylbenzene	10.8	mg/kg
	o-Xylene	16.2	mg/kg
	P & M -Xylene	33.0	mg/kg
	Toluene	12.2	mg/kg
	Xylenes (total)	49.2	mg/kg

Client Sample ID: **22SAV-BO2-3**
Lab Sample ID: 1224072004

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	5.02	mg/kg
	2-Methylnaphthalene	7.09	mg/kg
	Acenaphthene	0.0796J	mg/kg
	Fluorene	0.0853J	mg/kg
	Naphthalene	4.77	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	1860	mg/kg
Volatile GC/MS	Benzene	0.138	mg/kg
	Ethylbenzene	2.22	mg/kg
	o-Xylene	3.64	mg/kg
	P & M -Xylene	6.08	mg/kg
	Toluene	0.517	mg/kg
	Xylenes (total)	9.73	mg/kg

Detectable Results Summary

Client Sample ID: **22SAV-BO3-3**
Lab Sample ID: 1224072005

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	8.48	mg/kg
	2-Methylnaphthalene	12.3	mg/kg
	Acenaphthene	0.115J	mg/kg
	Fluorene	0.143	mg/kg
	Naphthalene	9.54	mg/kg
	Phenanthrene	0.0435J	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	1120	mg/kg
Volatile GC/MS	Benzene	0.0550	mg/kg
	Ethylbenzene	1.83	mg/kg
	o-Xylene	3.66	mg/kg
	P & M -Xylene	4.83	mg/kg
	Toluene	0.0420J	mg/kg
	Xylenes (total)	8.49	mg/kg

Client Sample ID: **22SAV-SW01-1.5**
Lab Sample ID: 1224072006

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	38.7	mg/kg
	2-Methylnaphthalene	51.9	mg/kg
	Fluorene	0.879J	mg/kg
	Naphthalene	30.9	mg/kg
	Phenanthrene	0.306J	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	12500	mg/kg
Volatile GC/MS	Ethylbenzene	1.79	mg/kg
	o-Xylene	7.17	mg/kg
	P & M -Xylene	4.10	mg/kg
	Xylenes (total)	11.3	mg/kg

Client Sample ID: **22SAV-SW02-2.5**
Lab Sample ID: 1224072009

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	9.72	mg/kg
	2-Methylnaphthalene	11.5	mg/kg
	Acenaphthene	0.143J	mg/kg
	Fluorene	0.179J	mg/kg
	Naphthalene	5.19	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	4030	mg/kg
Volatile GC/MS	Benzene	0.0513	mg/kg
	Ethylbenzene	0.384	mg/kg
	o-Xylene	1.20	mg/kg
	P & M -Xylene	1.04	mg/kg
	Toluene	0.207	mg/kg
	Xylenes (total)	2.24	mg/kg

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Detectable Results Summary

Client Sample ID: **22SAV-SW03-2**
Lab Sample ID: 1224072010

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.0463	mg/kg
	2-Methylnaphthalene	0.0570	mg/kg
	Naphthalene	0.0237J	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	191	mg/kg

Client Sample ID: **22SAV-SW04-2**
Lab Sample ID: 1224072011

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.473	mg/kg
	2-Methylnaphthalene	0.461	mg/kg
	Fluorene	0.00893J	mg/kg
	Naphthalene	0.120	mg/kg
Semivolatile Organic Fuels	Diesel Range Organics	404	mg/kg

Client Sample ID: **22SAV-WC01**
Lab Sample ID: 1224072012

	Parameter	Result	Units
TCLP Constituents Metals	Barium	0.332	mg/L
	Lead	0.0489J	mg/L
	Mercury	0.0126J	mg/L

Client Sample ID: **22SAV-WP05**
Lab Sample ID: 1224072013

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.193	ug/L
	2-Methylnaphthalene	0.218	ug/L
	Benzo(a)Anthracene	0.0135J	ug/L
	Fluorene	0.0192J	ug/L
	Naphthalene	0.206	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	0.881	mg/L
	Residual Range Organics	0.743	mg/L
Volatile GC/MS	Benzene	2.44	ug/L
	Ethylbenzene	1.13	ug/L
	o-Xylene	2.12	ug/L
	P & M -Xylene	4.49	ug/L
	Toluene	5.32	ug/L
	Xylenes (total)	6.61	ug/L

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Detectable Results Summary

Client Sample ID: **22SAV-WP95**
Lab Sample ID: 1224072016

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.278	ug/L
	2-Methylnaphthalene	0.332	ug/L
	Fluorene	0.0212J	ug/L
	Naphthalene	0.261	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	1.12	mg/L
	Residual Range Organics	1.27	mg/L
Volatile GC/MS	Benzene	2.12	ug/L
	Ethylbenzene	1.09	ug/L
	o-Xylene	2.02	ug/L
	P & M -Xylene	4.31	ug/L
	Toluene	5.19	ug/L
	Xylenes (total)	6.33	ug/L

Client Sample ID: **22SAV-WP01**
Lab Sample ID: 1224072017

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	Naphthalene	0.988	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	5.89	mg/L
	Residual Range Organics	1.63	mg/L
Volatile GC/MS	Benzene	16.0	ug/L
	Ethylbenzene	1.01	ug/L
	o-Xylene	6.15	ug/L
	P & M -Xylene	5.80	ug/L
	Toluene	1.56	ug/L
	Xylenes (total)	12.0	ug/L

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Results of **22SAV-TB02**

Client Sample ID: **22SAV-TB02**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072001
Lab Project ID: 1224072

Collection Date: 07/17/22 08:00
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200 U		0.400	0.120	ug/L	1		07/20/22 18:35
Ethylbenzene	0.500 U		1.00	0.310	ug/L	1		07/20/22 18:35
o-Xylene	0.500 U		1.00	0.310	ug/L	1		07/20/22 18:35
P & M -Xylene	1.00 U		2.00	0.620	ug/L	1		07/20/22 18:35
Toluene	0.500 U		1.00	0.310	ug/L	1		07/20/22 18:35
Xylenes (total)	1.50 U		3.00	1.00	ug/L	1		07/20/22 18:35
Surrogates								
1,2-Dichloroethane-D4 (surr)	118		81-118		%	1		07/20/22 18:35
4-Bromofluorobenzene (surr)	106		85-114		%	1		07/20/22 18:35
Toluene-d8 (surr)	97.3		89-112		%	1		07/20/22 18:35

Batch Information

Analytical Batch: VMS21808
Analytical Method: SW8260D
Analyst: AZL
Analytical Date/Time: 07/20/22 18:35
Container ID: 1224072001-A

Prep Batch: VXX38900
Prep Method: SW5030B
Prep Date/Time: 07/20/22 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **22SAV-BO1-3**

Client Sample ID: **22SAV-BO1-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072002
Lab Project ID: 1224072

Collection Date: 07/15/22 09:30
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.9
Location: B01

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	38.5		6.76	1.69	mg/kg	200		07/28/22 08:48
2-Methylnaphthalene	55.2		6.76	1.69	mg/kg	200		07/28/22 08:48
Acenaphthene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Acenaphthylene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Anthracene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Benzo(a)Anthracene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Benzo[a]pyrene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Benzo[b]Fluoranthene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Benzo[g,h,i]perylene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Benzo[k]fluoranthene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Chrysene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Dibenzo[a,h]anthracene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Fluoranthene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Fluorene	0.691 J		1.35	0.338	mg/kg	40		07/28/22 00:14
Indeno[1,2,3-c,d] pyrene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Naphthalene	35.2		5.41	1.35	mg/kg	200		07/28/22 08:48
Phenanthrene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Pyrene	0.675 U		1.35	0.338	mg/kg	40		07/28/22 00:14
Surrogates								
2-Methylnaphthalene-d10 (surr)	243	*	58-103		%	40		07/28/22 00:14
Fluoranthene-d10 (surr)	63.7		54-113		%	40		07/28/22 00:14

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 00:14
Container ID: 1224072002-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.523 g
Prep Extract Vol: 5 mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 08:48
Container ID: 1224072002-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.523 g
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-BO1-3**

Client Sample ID: **22SAV-BO1-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072002
Lab Project ID: 1224072

Collection Date: 07/15/22 09:30
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.9
Location: B01

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	20900		1350	606	mg/kg	50		07/23/22 02:21
Surrogates								
5a Androstane (surr)	90.5		50-150		%	50		07/23/22 02:21

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/23/22 02:21
Container ID: 1224072002-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.158 g
Prep Extract Vol: 5 mL

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Results of **22SAV-BO1-3**

Client Sample ID: **22SAV-BO1-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072002
Lab Project ID: 1224072

Collection Date: 07/15/22 09:30
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.9
Location: B01

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	2.08		0.257	0.0803	mg/kg	10		07/21/22 15:31
Ethylbenzene	13.7		0.515	0.161	mg/kg	10		07/21/22 15:31
o-Xylene	20.8		0.515	0.161	mg/kg	10		07/21/22 15:31
P & M -Xylene	42.5		1.03	0.309	mg/kg	10		07/21/22 15:31
Toluene	17.6		0.515	0.161	mg/kg	10		07/21/22 15:31
Xylenes (total)	63.3		1.54	0.470	mg/kg	10		07/21/22 15:31
Surrogates								
1,2-Dichloroethane-D4 (surr)	96.9		71-136		%	10		07/21/22 15:31
4-Bromofluorobenzene (surr)	73.8		55-151		%	10		07/21/22 15:31
Toluene-d8 (surr)	105		85-116		%	10		07/21/22 15:31

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 15:31
Container ID: 1224072002-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 09:30
Prep Initial Wt./Vol.: 49.98 g
Prep Extract Vol: 38.0437 mL

Results of **22SAV-B91-3**

Client Sample ID: **22SAV-B91-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072003
Lab Project ID: 1224072

Collection Date: 07/15/22 09:31
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):75.6
Location: B91

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	51.2		6.61	1.65	mg/kg	200		07/28/22 09:04
2-Methylnaphthalene	73.9		6.61	1.65	mg/kg	200		07/28/22 09:04
Acenaphthene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Acenaphthylene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Anthracene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Benzo(a)Anthracene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Benzo[a]pyrene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Benzo[b]Fluoranthene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Benzo[g,h,i]perylene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Benzo[k]fluoranthene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Chrysene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Dibenzo[a,h]anthracene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Fluoranthene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Fluorene	0.877 J		1.32	0.331	mg/kg	40		07/28/22 00:30
Indeno[1,2,3-c,d] pyrene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Naphthalene	47.1		5.29	1.32	mg/kg	200		07/28/22 09:04
Phenanthrene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Pyrene	0.660 U		1.32	0.331	mg/kg	40		07/28/22 00:30
Surrogates								
2-Methylnaphthalene-d10 (surr)	300	*	58-103		%	40		07/28/22 00:30
Fluoranthene-d10 (surr)	59		54-113		%	40		07/28/22 00:30

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 00:30
Container ID: 1224072003-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.511 g
Prep Extract Vol: 5 mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 09:04
Container ID: 1224072003-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.511 g
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

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Results of **22SAV-B91-3**

Client Sample ID: **22SAV-B91-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072003
Lab Project ID: 1224072

Collection Date: 07/15/22 09:31
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):75.6
Location: B91

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	15500		1300	587	mg/kg	50		07/23/22 02:31
Surrogates								
5a Androstane (surr)	84		50-150		%	50		07/23/22 02:31

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/23/22 02:31
Container ID: 1224072003-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.411 g
Prep Extract Vol: 5 mL

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Results of **22SAV-B91-3**

Client Sample ID: **22SAV-B91-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072003
Lab Project ID: 1224072

Collection Date: 07/15/22 09:31
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):75.6
Location: B91

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	1.37		0.123	0.0384	mg/kg	5		07/21/22 15:46
Ethylbenzene	10.8		0.246	0.0767	mg/kg	5		07/21/22 15:46
o-Xylene	16.2		0.246	0.0767	mg/kg	5		07/21/22 15:46
P & M -Xylene	33.0		0.492	0.148	mg/kg	5		07/21/22 15:46
Toluene	12.2		0.246	0.0767	mg/kg	5		07/21/22 15:46
Xylenes (total)	49.2		0.738	0.224	mg/kg	5		07/21/22 15:46
Surrogates								
1,2-Dichloroethane-D4 (surr)	99.9		71-136		%	5		07/21/22 15:46
4-Bromofluorobenzene (surr)	92.7		55-151		%	5		07/21/22 15:46
Toluene-d8 (surr)	103		85-116		%	5		07/21/22 15:46

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 15:46
Container ID: 1224072003-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 09:31
Prep Initial Wt./Vol.: 50.038 g
Prep Extract Vol: 37.2063 mL

Results of **22SAV-BO2-3**

Client Sample ID: **22SAV-BO2-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072004
Lab Project ID: 1224072

Collection Date: 07/15/22 09:35
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.1
Location: B02

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	5.02		0.845	0.211	mg/kg	25		07/28/22 10:08
2-Methylnaphthalene	7.09		0.845	0.211	mg/kg	25		07/28/22 10:08
Acenaphthene	0.0796	J	0.169	0.0423	mg/kg	5		07/28/22 01:50
Acenaphthylene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Anthracene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Benzo(a)Anthracene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Benzo[a]pyrene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Benzo[b]Fluoranthene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Benzo[g,h,i]perylene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Benzo[k]fluoranthene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Chrysene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Dibenzo[a,h]anthracene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Fluoranthene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Fluorene	0.0853	J	0.169	0.0423	mg/kg	5		07/28/22 01:50
Indeno[1,2,3-c,d] pyrene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Naphthalene	4.77		0.676	0.169	mg/kg	25		07/28/22 10:08
Phenanthrene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Pyrene	0.0845	U	0.169	0.0423	mg/kg	5		07/28/22 01:50
Surrogates								
2-Methylnaphthalene-d10 (surr)	83.1		58-103		%	5		07/28/22 01:50
Fluoranthene-d10 (surr)	54.4		54-113		%	5		07/28/22 01:50

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 01:50
Container ID: 1224072004-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.772 g
Prep Extract Vol: 5 mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 10:08
Container ID: 1224072004-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.772 g
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-BO2-3**

Client Sample ID: **22SAV-BO2-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072004
Lab Project ID: 1224072

Collection Date: 07/15/22 09:35
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.1
Location: B02

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	1860		27.3	12.3	mg/kg	1		07/22/22 23:15
Surrogates								
5a Androstane (surr)	94.1		50-150		%	1		07/22/22 23:15

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/22/22 23:15
Container ID: 1224072004-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.027 g
Prep Extract Vol: 5 mL

Results of **22SAV-BO2-3**

Client Sample ID: **22SAV-BO2-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072004
Lab Project ID: 1224072

Collection Date: 07/15/22 09:35
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.1
Location: B02

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.138		0.0264	0.00825	mg/kg	1		07/21/22 19:10
Ethylbenzene	2.22		0.0529	0.0165	mg/kg	1		07/21/22 19:10
o-Xylene	3.64		0.0529	0.0165	mg/kg	1		07/21/22 19:10
P & M -Xylene	6.08		0.106	0.0317	mg/kg	1		07/21/22 19:10
Toluene	0.517		0.0529	0.0165	mg/kg	1		07/21/22 19:10
Xylenes (total)	9.73		0.159	0.0482	mg/kg	1		07/21/22 19:10
Surrogates								
1,2-Dichloroethane-D4 (surr)	98.6		71-136		%	1		07/21/22 19:10
4-Bromofluorobenzene (surr)	78.4		55-151		%	1		07/21/22 19:10
Toluene-d8 (surr)	102		85-116		%	1		07/21/22 19:10

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 19:10
Container ID: 1224072004-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 09:35
Prep Initial Wt./Vol.: 49.668 g
Prep Extract Vol: 38.374 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-BO3-3**

Client Sample ID: **22SAV-BO3-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072005
Lab Project ID: 1224072

Collection Date: 07/15/22 09:40
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.2
Location: B03

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	8.48		1.36	0.340	mg/kg	40		07/28/22 10:41
2-Methylnaphthalene	12.3		1.36	0.340	mg/kg	40		07/28/22 10:41
Acenaphthene	0.115	J	0.136	0.0340	mg/kg	4		07/28/22 01:34
Acenaphthylene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Anthracene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Benzo(a)Anthracene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Benzo[a]pyrene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Benzo[b]Fluoranthene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Benzo[g,h,i]perylene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Benzo[k]fluoranthene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Chrysene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Dibenzo[a,h]anthracene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Fluoranthene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Fluorene	0.143		0.136	0.0340	mg/kg	4		07/28/22 01:34
Indeno[1,2,3-c,d] pyrene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Naphthalene	9.54		1.09	0.272	mg/kg	40		07/28/22 10:41
Phenanthrene	0.0435	J	0.136	0.0340	mg/kg	4		07/28/22 01:34
Pyrene	0.0680	U	0.136	0.0340	mg/kg	4		07/28/22 01:34
Surrogates								
2-Methylnaphthalene-d10 (surr)	93.2		58-103		%	4		07/28/22 01:34
Fluoranthene-d10 (surr)	65.4		54-113		%	4		07/28/22 01:34

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 01:34
Container ID: 1224072005-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.617 g
Prep Extract Vol: 5 mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 10:41
Container ID: 1224072005-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.617 g
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-BO3-3**

Client Sample ID: **22SAV-BO3-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072005
Lab Project ID: 1224072

Collection Date: 07/15/22 09:40
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.2
Location: B03

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	1120		27.1	12.2	mg/kg	1		07/22/22 23:25
Surrogates								
5a Androstane (surr)	92		50-150		%	1		07/22/22 23:25

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/22/22 23:25
Container ID: 1224072005-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.234 g
Prep Extract Vol: 5 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Results of **22SAV-BO3-3**

Client Sample ID: **22SAV-BO3-3**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072005
Lab Project ID: 1224072

Collection Date: 07/15/22 09:40
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):73.2
Location: B03

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.0550		0.0262	0.00818	mg/kg	1		07/21/22 19:26
Ethylbenzene	1.83		0.0524	0.0164	mg/kg	1		07/21/22 19:26
o-Xylene	3.66		0.0524	0.0164	mg/kg	1		07/21/22 19:26
P & M -Xylene	4.83		0.105	0.0315	mg/kg	1		07/21/22 19:26
Toluene	0.0420	J	0.0524	0.0164	mg/kg	1		07/21/22 19:26
Xylenes (total)	8.49		0.157	0.0478	mg/kg	1		07/21/22 19:26
Surrogates								
1,2-Dichloroethane-D4 (surr)	96.8		71-136		%	1		07/21/22 19:26
4-Bromofluorobenzene (surr)	88.3		55-151		%	1		07/21/22 19:26
Toluene-d8 (surr)	102		85-116		%	1		07/21/22 19:26

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 19:26
Container ID: 1224072005-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 09:40
Prep Initial Wt./Vol.: 50.04 g
Prep Extract Vol: 38.4156 mL

Results of **22SAV-SW01-1.5**

Client Sample ID: **22SAV-SW01-1.5**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072006
Lab Project ID: 1224072

Collection Date: 07/15/22 10:30
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):83.5
Location: SW01

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	38.7		5.96	1.49	mg/kg	200		07/28/22 09:20
2-Methylnaphthalene	51.9		5.96	1.49	mg/kg	200		07/28/22 09:20
Acenaphthene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Acenaphthylene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Anthracene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Benzo(a)Anthracene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Benzo[a]pyrene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Benzo[b]Fluoranthene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Benzo[g,h,i]perylene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Benzo[k]fluoranthene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Chrysene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Dibenzo[a,h]anthracene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Fluoranthene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Fluorene	0.879	J	1.19	0.298	mg/kg	40		07/28/22 00:46
Indeno[1,2,3-c,d] pyrene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Naphthalene	30.9		4.77	1.19	mg/kg	200		07/28/22 09:20
Phenanthrene	0.306	J	1.19	0.298	mg/kg	40		07/28/22 00:46
Pyrene	0.595	U	1.19	0.298	mg/kg	40		07/28/22 00:46
Surrogates								
2-Methylnaphthalene-d10 (surr)	288	*	58-103		%	40		07/28/22 00:46
Fluoranthene-d10 (surr)	73.1		54-113		%	40		07/28/22 00:46

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 00:46
Container ID: 1224072006-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.602 g
Prep Extract Vol: 5 mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 09:20
Container ID: 1224072006-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.602 g
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-SW01-1.5**

Client Sample ID: **22SAV-SW01-1.5**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072006
Lab Project ID: 1224072

Collection Date: 07/15/22 10:30
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):83.5
Location: SW01

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	12500		237	107	mg/kg	10		07/23/22 02:42
Surrogates								
5a Androstane (surr)	90.1		50-150		%	10		07/23/22 02:42

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/23/22 02:42
Container ID: 1224072006-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.33 g
Prep Extract Vol: 5 mL

Results of **22SAV-SW01-1.5**

Client Sample ID: **22SAV-SW01-1.5**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072006
Lab Project ID: 1224072

Collection Date: 07/15/22 10:30
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):83.5
Location: SW01

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.199 U		0.398	0.124	mg/kg	20		07/21/22 20:45
Ethylbenzene	1.79		0.795	0.248	mg/kg	20		07/21/22 20:45
o-Xylene	7.17		0.795	0.248	mg/kg	20		07/21/22 20:45
P & M -Xylene	4.10		1.59	0.477	mg/kg	20		07/21/22 20:45
Toluene	0.398 U		0.795	0.248	mg/kg	20		07/21/22 20:45
Xylenes (total)	11.3		2.39	0.725	mg/kg	20		07/21/22 20:45
Surrogates								
1,2-Dichloroethane-D4 (surr)	100		71-136		%	20		07/21/22 20:45
4-Bromofluorobenzene (surr)	162	*	55-151		%	20		07/21/22 20:45
Toluene-d8 (surr)	102		85-116		%	20		07/21/22 20:45

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 20:45
Container ID: 1224072006-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 10:30
Prep Initial Wt./Vol.: 49.994 g
Prep Extract Vol: 33.2253 mL

Results of **22SAV-SW02-2.5**

Client Sample ID: **22SAV-SW02-2.5**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072009
Lab Project ID: 1224072

Collection Date: 07/15/22 10:35
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):84.3
Location: SW02

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	9.72		1.48	0.370	mg/kg	50		07/28/22 10:24
2-Methylnaphthalene	11.5		1.48	0.370	mg/kg	50		07/28/22 10:24
Acenaphthene	0.143 J		0.296	0.0740	mg/kg	10		07/28/22 02:07
Acenaphthylene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Anthracene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Benzo(a)Anthracene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Benzo[a]pyrene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Benzo[b]Fluoranthene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Benzo[g,h,i]perylene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Benzo[k]fluoranthene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Chrysene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Dibenzo[a,h]anthracene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Fluoranthene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Fluorene	0.179 J		0.296	0.0740	mg/kg	10		07/28/22 02:07
Indeno[1,2,3-c,d] pyrene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Naphthalene	5.19		0.237	0.0592	mg/kg	10		07/28/22 02:07
Phenanthrene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Pyrene	0.148 U		0.296	0.0740	mg/kg	10		07/28/22 02:07
Surrogates								
2-Methylnaphthalene-d10 (surr)	126	*	58-103		%	10		07/28/22 02:07
Fluoranthene-d10 (surr)	70.2		54-113		%	10		07/28/22 02:07

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 02:07
Container ID: 1224072009-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.54 g
Prep Extract Vol: 5 mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/28/22 10:24
Container ID: 1224072009-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.54 g
Prep Extract Vol: 5 mL

Results of **22SAV-SW02-2.5**

Client Sample ID: **22SAV-SW02-2.5**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072009
Lab Project ID: 1224072

Collection Date: 07/15/22 10:35
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):84.3
Location: SW02

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	4030		236	106	mg/kg	10		07/23/22 03:14
Surrogates								
5a Androstane (surr)	102		50-150		%	10		07/23/22 03:14

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/23/22 03:14
Container ID: 1224072009-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.148 g
Prep Extract Vol: 5 mL

Results of **22SAV-SW02-2.5**

Client Sample ID: **22SAV-SW02-2.5**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072009
Lab Project ID: 1224072

Collection Date: 07/15/22 10:35
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):84.3
Location: SW02

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.0513		0.0196	0.00612	mg/kg	1		07/21/22 19:41
Ethylbenzene	0.384		0.0392	0.0122	mg/kg	1		07/21/22 19:41
o-Xylene	1.20		0.0392	0.0122	mg/kg	1		07/21/22 19:41
P & M -Xylene	1.04		0.0784	0.0235	mg/kg	1		07/21/22 19:41
Toluene	0.207		0.0392	0.0122	mg/kg	1		07/21/22 19:41
Xylenes (total)	2.24		0.118	0.0358	mg/kg	1		07/21/22 19:41
Surrogates								
1,2-Dichloroethane-D4 (surr)	102		71-136		%	1		07/21/22 19:41
4-Bromofluorobenzene (surr)	93.7		55-151		%	1		07/21/22 19:41
Toluene-d8 (surr)	106		85-116		%	1		07/21/22 19:41

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 19:41
Container ID: 1224072009-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 10:35
Prep Initial Wt./Vol.: 49.651 g
Prep Extract Vol: 32.8104 mL

Results of **22SAV-SW03-2**

Client Sample ID: **22SAV-SW03-2**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072010
Lab Project ID: 1224072

Collection Date: 07/15/22 10:40
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):79.0
Location: SW03

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0463		0.0315	0.00787	mg/kg	1		07/27/22 23:42
2-Methylnaphthalene	0.0570		0.0315	0.00787	mg/kg	1		07/27/22 23:42
Acenaphthene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Acenaphthylene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Anthracene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Benzo(a)Anthracene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Benzo[a]pyrene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Benzo[b]Fluoranthene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Benzo[g,h,i]perylene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Benzo[k]fluoranthene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Chrysene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Dibenzo[a,h]anthracene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Fluoranthene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Fluorene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Indeno[1,2,3-c,d] pyrene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Naphthalene	0.0237	J	0.0252	0.00630	mg/kg	1		07/27/22 23:42
Phenanthrene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Pyrene	0.0158	U	0.0315	0.00787	mg/kg	1		07/27/22 23:42
Surrogates								
2-Methylnaphthalene-d10 (surr)	83.8		58-103		%	1		07/27/22 23:42
Fluoranthene-d10 (surr)	71.3		54-113		%	1		07/27/22 23:42

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/27/22 23:42
Container ID: 1224072010-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.605 g
Prep Extract Vol: 5 mL

Results of **22SAV-SW03-2**

Client Sample ID: **22SAV-SW03-2**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072010
Lab Project ID: 1224072

Collection Date: 07/15/22 10:40
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):79.0
Location: SW03

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	191		25.3	11.4	mg/kg	1		07/22/22 23:35
Surrogates								
5a Androstane (surr)	90.2		50-150		%	1		07/22/22 23:35

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/22/22 23:35
Container ID: 1224072010-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.005 g
Prep Extract Vol: 5 mL

Results of **22SAV-SW03-2**

Client Sample ID: **22SAV-SW03-2**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072010
Lab Project ID: 1224072

Collection Date: 07/15/22 10:40
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):79.0
Location: SW03

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.0112	U	0.0224	0.00700	mg/kg	1		07/21/22 19:57
Ethylbenzene	0.0225	U	0.0449	0.0140	mg/kg	1		07/21/22 19:57
o-Xylene	0.0225	U	0.0449	0.0140	mg/kg	1		07/21/22 19:57
P & M -Xylene	0.0449	U	0.0897	0.0269	mg/kg	1		07/21/22 19:57
Toluene	0.0225	U	0.0449	0.0140	mg/kg	1		07/21/22 19:57
Xylenes (total)	0.0675	U	0.135	0.0409	mg/kg	1		07/21/22 19:57
Surrogates								
1,2-Dichloroethane-D4 (surr)	100		71-136		%	1		07/21/22 19:57
4-Bromofluorobenzene (surr)	103		55-151		%	1		07/21/22 19:57
Toluene-d8 (surr)	102		85-116		%	1		07/21/22 19:57

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 19:57
Container ID: 1224072010-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 10:40
Prep Initial Wt./Vol.: 50.075 g
Prep Extract Vol: 35.5003 mL

Results of **22SAV-SW04-2**

Client Sample ID: **22SAV-SW04-2**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072011
Lab Project ID: 1224072

Collection Date: 07/15/22 10:45
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):81.6
Location: SW04

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.473		0.0301	0.00753	mg/kg	1		07/27/22 23:58
2-Methylnaphthalene	0.461		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Acenaphthene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Acenaphthylene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Anthracene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Benzo(a)Anthracene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Benzo[a]pyrene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Benzo[b]Fluoranthene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Benzo[g,h,i]perylene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Benzo[k]fluoranthene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Chrysene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Dibenzo[a,h]anthracene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Fluoranthene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Fluorene	0.00893 J		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Indeno[1,2,3-c,d] pyrene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Naphthalene	0.120		0.0241	0.00602	mg/kg	1		07/27/22 23:58
Phenanthrene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Pyrene	0.0151 U		0.0301	0.00753	mg/kg	1		07/27/22 23:58
Surrogates								
2-Methylnaphthalene-d10 (surr)	92.6		58-103		%	1		07/27/22 23:58
Fluoranthene-d10 (surr)	76.3		54-113		%	1		07/27/22 23:58

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Analyst: NRB
Analytical Date/Time: 07/27/22 23:58
Container ID: 1224072011-A

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 07/26/22 08:12
Prep Initial Wt./Vol.: 22.892 g
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-SW04-2**

Client Sample ID: **22SAV-SW04-2**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072011
Lab Project ID: 1224072

Collection Date: 07/15/22 10:45
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):81.6
Location: SW04

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	404		24.2	10.9	mg/kg	1		07/22/22 23:46
Surrogates								
5a Androstane (surr)	95.6		50-150		%	1		07/22/22 23:46

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Analyst: HMW
Analytical Date/Time: 07/22/22 23:46
Container ID: 1224072011-A

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 07/20/22 16:59
Prep Initial Wt./Vol.: 30.337 g
Prep Extract Vol: 5 mL

Results of **22SAV-SW04-2**

Client Sample ID: **22SAV-SW04-2**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072011
Lab Project ID: 1224072

Collection Date: 07/15/22 10:45
Received Date: 07/19/22 13:58
Matrix: Soil/Solid (dry weight)
Solids (%):81.6
Location: SW04

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.0106	U	0.0211	0.00659	mg/kg	1		07/21/22 20:13
Ethylbenzene	0.0211	U	0.0422	0.0132	mg/kg	1		07/21/22 20:13
o-Xylene	0.0211	U	0.0422	0.0132	mg/kg	1		07/21/22 20:13
P & M -Xylene	0.0423	U	0.0845	0.0253	mg/kg	1		07/21/22 20:13
Toluene	0.0211	U	0.0422	0.0132	mg/kg	1		07/21/22 20:13
Xylenes (total)	0.0635	U	0.127	0.0385	mg/kg	1		07/21/22 20:13
Surrogates								
1,2-Dichloroethane-D4 (surr)	101		71-136		%	1		07/21/22 20:13
4-Bromofluorobenzene (surr)	110		55-151		%	1		07/21/22 20:13
Toluene-d8 (surr)	104		85-116		%	1		07/21/22 20:13

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/21/22 20:13
Container ID: 1224072011-B

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 07/15/22 10:45
Prep Initial Wt./Vol.: 49.414 g
Prep Extract Vol: 34.0755 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-WC01**

Client Sample ID: **22SAV-WC01**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072012
Lab Project ID: 1224072

Collection Date: 07/14/22 17:30
Received Date: 07/19/22 13:58
Matrix: Solid/Soil (Wet Weight)
Solids (%):
Location: Waste Characterizati

Results by **TCLP Constituents Metals**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	0.250	U	0.500	0.155	mg/L	25	(<5)	07/28/22 17:38
Barium	0.332		0.150	0.0470	mg/L	25	(<100)	07/28/22 17:38
Cadmium	0.0500	U	0.100	0.0300	mg/L	25	(<1)	07/28/22 17:38
Chromium	0.250	U	0.500	0.155	mg/L	25	(<5)	07/28/22 17:38
Lead	0.0489	J	0.0500	0.0155	mg/L	25	(<5)	07/28/22 17:38
Mercury	0.0126	J	0.0250	0.00900	mg/L	25	(<0.2)	07/28/22 17:38
Selenium	0.500	U	1.00	0.310	mg/L	25	(<1)	07/28/22 17:38
Silver	0.0500	U	0.100	0.0310	mg/L	25	(<5)	07/28/22 17:38

Batch Information

Analytical Batch: MMS11618
Analytical Method: SW6020B TCLP
Analyst: DMM
Analytical Date/Time: 07/28/22 17:38
Container ID: 1224072012-A

Prep Batch: MXT6258
Prep Method: SW3010A
Prep Date/Time: 07/28/22 10:05
Prep Initial Wt./Vol.: 2.5 mL
Prep Extract Vol: 25 mL

Results of **22SAV-WP05**

Client Sample ID: **22SAV-WP05**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072013
Lab Project ID: 1224072

Collection Date: 07/17/22 16:05
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-05

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.193		0.0446	0.0134	ug/L	1		07/25/22 14:52
2-Methylnaphthalene	0.218		0.0446	0.0134	ug/L	1		07/25/22 14:52
Acenaphthene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Acenaphthylene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Anthracene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Benzo(a)Anthracene	0.0135	J	0.0446	0.0134	ug/L	1		07/25/22 14:52
Benzo[a]pyrene	0.00895	U	0.0179	0.00554	ug/L	1		07/25/22 14:52
Benzo[b]Fluoranthene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Benzo[g,h,i]perylene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Benzo[k]fluoranthene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Chrysene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Dibenzo[a,h]anthracene	0.00895	U	0.0179	0.00554	ug/L	1		07/25/22 14:52
Fluoranthene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Fluorene	0.0192	J	0.0446	0.0134	ug/L	1		07/25/22 14:52
Indeno[1,2,3-c,d] pyrene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Naphthalene	0.206		0.0893	0.0277	ug/L	1		07/25/22 14:52
Phenanthrene	0.0447	U	0.0893	0.0277	ug/L	1		07/25/22 14:52
Pyrene	0.0223	U	0.0446	0.0134	ug/L	1		07/25/22 14:52
Surrogates								
2-Methylnaphthalene-d10 (surr)	64.1		42-86		%	1		07/25/22 14:52
Fluoranthene-d10 (surr)	66.3		50-97		%	1		07/25/22 14:52

Batch Information

Analytical Batch: XMS13245
Analytical Method: 8270D SIM LV (PAH)
Analyst: NRB
Analytical Date/Time: 07/25/22 14:52
Container ID: 1224072013-F

Prep Batch: XXX46659
Prep Method: SW3535A
Prep Date/Time: 07/21/22 15:05
Prep Initial Wt./Vol.: 280 mL
Prep Extract Vol: 1 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-WP05**

Client Sample ID: **22SAV-WP05**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072013
Lab Project ID: 1224072

Collection Date: 07/17/22 16:05
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-05

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.881		0.556	0.185	mg/L	1		07/26/22 15:50
Surrogates								
5a Androstane (surr)	87.1		50-150		%	1		07/26/22 15:50

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK102
Analyst: DSD
Analytical Date/Time: 07/26/22 15:50
Container ID: 1224072013-D

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 07/21/22 16:20
Prep Initial Wt./Vol.: 270 mL
Prep Extract Vol: 1 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	0.743		0.463	0.185	mg/L	1		07/26/22 15:50
Surrogates								
n-Triacontane-d62 (surr)	94.5		50-150		%	1		07/26/22 15:50

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK103
Analyst: DSD
Analytical Date/Time: 07/26/22 15:50
Container ID: 1224072013-D

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 07/21/22 16:20
Prep Initial Wt./Vol.: 270 mL
Prep Extract Vol: 1 mL

Results of **22SAV-WP05**

Client Sample ID: **22SAV-WP05**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072013
Lab Project ID: 1224072

Collection Date: 07/17/22 16:05
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-05

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	2.44		0.400	0.120	ug/L	1		07/26/22 19:25
Ethylbenzene	1.13		1.00	0.310	ug/L	1		07/20/22 20:49
o-Xylene	2.12		1.00	0.310	ug/L	1		07/20/22 20:49
P & M -Xylene	4.49		2.00	0.620	ug/L	1		07/20/22 20:49
Toluene	5.32		1.00	0.310	ug/L	1		07/20/22 20:49
Xylenes (total)	6.61		3.00	1.00	ug/L	1		07/20/22 20:49
Surrogates								
1,2-Dichloroethane-D4 (surr)	120	*	81-118		%	1		07/20/22 20:49
4-Bromofluorobenzene (surr)	104		85-114		%	1		07/20/22 20:49
Toluene-d8 (surr)	98.3		89-112		%	1		07/20/22 20:49

Batch Information

Analytical Batch: VMS21828
Analytical Method: SW8260D
Analyst: S.S
Analytical Date/Time: 07/26/22 19:25
Container ID: 1224072013-C

Prep Batch: VXX38936
Prep Method: SW5030B
Prep Date/Time: 07/26/22 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VMS21808
Analytical Method: SW8260D
Analyst: AZL
Analytical Date/Time: 07/20/22 20:49
Container ID: 1224072013-A

Prep Batch: VXX38900
Prep Method: SW5030B
Prep Date/Time: 07/20/22 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-WP95**

Client Sample ID: **22SAV-WP95**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072016
Lab Project ID: 1224072

Collection Date: 07/17/22 16:10
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-05

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.278		0.0481	0.0144	ug/L	1		07/25/22 15:54
2-Methylnaphthalene	0.332		0.0481	0.0144	ug/L	1		07/25/22 15:54
Acenaphthene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Acenaphthylene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Anthracene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Benzo(a)Anthracene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Benzo[a]pyrene	0.00960 U		0.0192	0.00596	ug/L	1		07/25/22 15:54
Benzo[b]Fluoranthene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Benzo[g,h,i]perylene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Benzo[k]fluoranthene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Chrysene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Dibenzo[a,h]anthracene	0.00960 U		0.0192	0.00596	ug/L	1		07/25/22 15:54
Fluoranthene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Fluorene	0.0212 J		0.0481	0.0144	ug/L	1		07/25/22 15:54
Indeno[1,2,3-c,d] pyrene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Naphthalene	0.261		0.0962	0.0298	ug/L	1		07/25/22 15:54
Phenanthrene	0.0481 U		0.0962	0.0298	ug/L	1		07/25/22 15:54
Pyrene	0.0240 U		0.0481	0.0144	ug/L	1		07/25/22 15:54
Surrogates								
2-Methylnaphthalene-d10 (surr)	63.7		42-86		%	1		07/25/22 15:54
Fluoranthene-d10 (surr)	47.5	*	50-97		%	1		07/25/22 15:54

Batch Information

Analytical Batch: XMS13245
Analytical Method: 8270D SIM LV (PAH)
Analyst: NRB
Analytical Date/Time: 07/25/22 15:54
Container ID: 1224072016-F

Prep Batch: XXX46659
Prep Method: SW3535A
Prep Date/Time: 07/21/22 15:05
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-WP95**

Client Sample ID: **22SAV-WP95**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072016
Lab Project ID: 1224072

Collection Date: 07/17/22 16:10
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-05

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	1.12		0.577	0.192	mg/L	1		07/26/22 16:20
Surrogates								
5a Androstane (surr)	90.5		50-150		%	1		07/26/22 16:20

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK102
Analyst: DSD
Analytical Date/Time: 07/26/22 16:20
Container ID: 1224072016-D

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 07/21/22 16:20
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	1.27		0.481	0.192	mg/L	1		07/26/22 16:20
Surrogates								
n-Triacontane-d62 (surr)	95.2		50-150		%	1		07/26/22 16:20

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK103
Analyst: DSD
Analytical Date/Time: 07/26/22 16:20
Container ID: 1224072016-D

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 07/21/22 16:20
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Results of **22SAV-WP95**

Client Sample ID: **22SAV-WP95**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072016
Lab Project ID: 1224072

Collection Date: 07/17/22 16:10
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-05

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	2.12		0.400	0.120	ug/L	1		07/20/22 21:04
Ethylbenzene	1.09		1.00	0.310	ug/L	1		07/20/22 21:04
o-Xylene	2.02		1.00	0.310	ug/L	1		07/20/22 21:04
P & M -Xylene	4.31		2.00	0.620	ug/L	1		07/20/22 21:04
Toluene	5.19		1.00	0.310	ug/L	1		07/20/22 21:04
Xylenes (total)	6.33		3.00	1.00	ug/L	1		07/20/22 21:04
Surrogates								
1,2-Dichloroethane-D4 (surr)	114		81-118		%	1		07/20/22 21:04
4-Bromofluorobenzene (surr)	104		85-114		%	1		07/20/22 21:04
Toluene-d8 (surr)	97		89-112		%	1		07/20/22 21:04

Batch Information

Analytical Batch: VMS21808
Analytical Method: SW8260D
Analyst: AZL
Analytical Date/Time: 07/20/22 21:04
Container ID: 1224072016-A

Prep Batch: VXX38900
Prep Method: SW5030B
Prep Date/Time: 07/20/22 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **22SAV-WP01**

Client Sample ID: **22SAV-WP01**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072017
Lab Project ID: 1224072

Collection Date: 07/17/22 18:09
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-01

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
2-Methylnaphthalene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Acenaphthene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Acenaphthylene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Anthracene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Benzo(a)Anthracene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Benzo[a]pyrene	0.00960	U	0.0192	0.00596	ug/L	1		07/25/22 16:14
Benzo[b]Fluoranthene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Benzo[g,h,i]perylene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Benzo[k]fluoranthene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Chrysene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Dibenzo[a,h]anthracene	0.00960	U	0.0192	0.00596	ug/L	1		07/25/22 16:14
Fluoranthene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Fluorene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Indeno[1,2,3-c,d] pyrene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Naphthalene	0.988		0.0962	0.0298	ug/L	1		07/25/22 16:14
Phenanthrene	0.0481	U	0.0962	0.0298	ug/L	1		07/25/22 16:14
Pyrene	0.0240	U	0.0481	0.0144	ug/L	1		07/25/22 16:14
Surrogates								
2-Methylnaphthalene-d10 (surr)	66.9		42-86		%	1		07/25/22 16:14
Fluoranthene-d10 (surr)	76.2		50-97		%	1		07/25/22 16:14

Batch Information

Analytical Batch: XMS13245
Analytical Method: 8270D SIM LV (PAH)
Analyst: NRB
Analytical Date/Time: 07/25/22 16:14
Container ID: 1224072017-F

Prep Batch: XXX46659
Prep Method: SW3535A
Prep Date/Time: 07/21/22 15:05
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 07/29/2022 4:07:59PM

J flagging is activated

Results of **22SAV-WP01**

Client Sample ID: **22SAV-WP01**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072017
Lab Project ID: 1224072

Collection Date: 07/17/22 18:09
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-01

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	5.89		0.577	0.192	mg/L	1		07/26/22 16:30
Surrogates								
5a Androstane (surr)	85.2		50-150		%	1		07/26/22 16:30

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK102
Analyst: DSD
Analytical Date/Time: 07/26/22 16:30
Container ID: 1224072017-D

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 07/21/22 16:20
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	1.63		0.481	0.192	mg/L	1		07/26/22 16:30
Surrogates								
n-Triacontane-d62 (surr)	88.1		50-150		%	1		07/26/22 16:30

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK103
Analyst: DSD
Analytical Date/Time: 07/26/22 16:30
Container ID: 1224072017-D

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 07/21/22 16:20
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Results of **22SAV-WP01**

Client Sample ID: **22SAV-WP01**
Client Project ID: **AKARNG Savoonga RA 2022**
Lab Sample ID: 1224072017
Lab Project ID: 1224072

Collection Date: 07/17/22 18:09
Received Date: 07/19/22 13:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: WP-01

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	16.0		0.400	0.120	ug/L	1		07/20/22 21:19
Ethylbenzene	1.01		1.00	0.310	ug/L	1		07/20/22 21:19
o-Xylene	6.15		1.00	0.310	ug/L	1		07/20/22 21:19
P & M -Xylene	5.80		2.00	0.620	ug/L	1		07/20/22 21:19
Toluene	1.56		1.00	0.310	ug/L	1		07/20/22 21:19
Xylenes (total)	12.0		3.00	1.00	ug/L	1		07/20/22 21:19
Surrogates								
1,2-Dichloroethane-D4 (surr)	114		81-118		%	1		07/20/22 21:19
4-Bromofluorobenzene (surr)	103		85-114		%	1		07/20/22 21:19
Toluene-d8 (surr)	96.8		89-112		%	1		07/20/22 21:19

Batch Information

Analytical Batch: VMS21808
Analytical Method: SW8260D
Analyst: AZL
Analytical Date/Time: 07/20/22 21:19
Container ID: 1224072017-A

Prep Batch: VXX38900
Prep Method: SW5030B
Prep Date/Time: 07/20/22 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Method Blank

Blank ID: LB1 for HBN 1840389 [TCLP/1187
Blank Lab ID: 1675613

Matrix: Solid/Soil (Wet Weight)

QC for Samples:
1224072012

Results by **SW6020B TCLP**

Parameter	Results	LOQ/CL	DL	Units
Arsenic	0.250U	0.500	0.155	mg/L
Barium	0.0552J	0.150	0.0470	mg/L
Cadmium	0.0500U	0.100	0.0300	mg/L
Chromium	0.250U	0.500	0.155	mg/L
Lead	0.0250U	0.0500	0.0155	mg/L
Mercury	0.0125U	0.0250	0.00900	mg/L
Selenium	0.500U	1.00	0.310	mg/L
Silver	0.0500U	0.100	0.0310	mg/L

Batch Information

Analytical Batch: MMS11618
Analytical Method: SW6020B TCLP
Instrument: P7 Agilent 7800
Analyst: DMM
Analytical Date/Time: 7/28/2022 5:21:37PM

Prep Batch: MXT6258
Prep Method: SW3010A
Prep Date/Time: 7/28/2022 10:05:03AM
Prep Initial Wt./Vol.: 2.5 mL
Prep Extract Vol: 25 mL

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Method Blank

Blank ID: LB2 for HBN 1840389 [TCLP/1187
Blank Lab ID: 1675614

Matrix: Solid/Soil (Wet Weight)

QC for Samples:
1224072012

Results by **SW6020B TCLP**

Parameter	Results	LOQ/CL	DL	Units
Arsenic	0.250U	0.500	0.155	mg/L
Barium	0.0750U	0.150	0.0470	mg/L
Cadmium	0.0500U	0.100	0.0300	mg/L
Chromium	0.250U	0.500	0.155	mg/L
Lead	0.0250U	0.0500	0.0155	mg/L
Mercury	0.0125U	0.0250	0.00900	mg/L
Selenium	0.500U	1.00	0.310	mg/L
Silver	0.0500U	0.100	0.0310	mg/L

Batch Information

Analytical Batch: MMS11618
Analytical Method: SW6020B TCLP
Instrument: P7 Agilent 7800
Analyst: DMM
Analytical Date/Time: 7/28/2022 5:24:27PM

Prep Batch: MXT6258
Prep Method: SW3010A
Prep Date/Time: 7/28/2022 10:05:03AM
Prep Initial Wt./Vol.: 2.5 mL
Prep Extract Vol: 25 mL

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Method Blank

Blank ID: MB for HBN 1840468 [MXT/6258]
Blank Lab ID: 1675891

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072012

Results by **SW6020B TCLP**

Parameter	Results	LOQ/CL	DL	Units
Arsenic	0.250U	0.500	0.155	mg/L
Barium	0.0750U	0.150	0.0470	mg/L
Cadmium	0.0500U	0.100	0.0300	mg/L
Chromium	0.250U	0.500	0.155	mg/L
Lead	0.0250U	0.0500	0.0155	mg/L
Mercury	0.0125U	0.0250	0.00900	mg/L
Selenium	0.500U	1.00	0.310	mg/L
Silver	0.0500U	0.100	0.0310	mg/L

Batch Information

Analytical Batch: MMS11618
Analytical Method: SW6020B TCLP
Instrument: P7 Agilent 7800
Analyst: DMM
Analytical Date/Time: 7/28/2022 5:15:56PM

Prep Batch: MXT6258
Prep Method: SW3010A
Prep Date/Time: 7/28/2022 10:05:03AM
Prep Initial Wt./Vol.: 2.5 mL
Prep Extract Vol: 25 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [MXT6258]
Blank Spike Lab ID: 1675892
Date Analyzed: 07/28/2022 17:18

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1224072012

Results by **SW6020B TCLP**

Blank Spike (mg/L)

Parameter	Spike	Result	Rec (%)	CL
Arsenic	10	8.78	88	(84-116)
Barium	10	9.03	90	(86-114)
Cadmium	1	0.917	92	(87-115)
Chromium	4	3.79	95	(85-116)
Lead	10	9.30	93	(88-115)
Mercury	0.1	0.0938	94	(70-124)
Selenium	10	8.11	81	(80-120)
Silver	1	0.955	96	(85-116)

Batch Information

Analytical Batch: **MMS11618**
Analytical Method: **SW6020B TCLP**
Instrument: **P7 Agilent 7800**
Analyst: **DMM**

Prep Batch: **MXT6258**
Prep Method: **SW3010A**
Prep Date/Time: **07/28/2022 10:05**
Spike Init Wt./Vol.: 10 mg/L Extract Vol: 25 mL
Dupe Init Wt./Vol.: Extract Vol:

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Matrix Spike Summary

Original Sample ID: 1675890
MS Sample ID: 1675894 MS
MSD Sample ID: 1675895 MSD

QC for Samples: 1224072012

Analysis Date: 07/28/2022 17:27
Analysis Date: 07/28/2022 17:30
Analysis Date: 07/28/2022 17:32
Matrix: Water (Surface, Eff., Ground)

Results by **SW6020B TCLP**

		Matrix Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Arsenic	0.250U	10.0	10	100	10.0	9.38	94	84-116	6.67	(< 20)
Barium	0.785	10.0	11	102	10.0	10.2	94	86-114	8.26	(< 20)
Cadmium	0.0500U	1.00	1.02	102	1.00	0.949	95	87-115	7.27	(< 20)
Chromium	0.250U	4.00	4.25	106	4.00	3.92	98	85-116	7.97	(< 20)
Lead	0.0220J	10.0	10.4	104	10.0	9.64	96	88-115	7.99	(< 20)
Mercury	0.0125U	0.100	.104	104	0.100	0.0957	96	70-124	8.36	(< 20)
Selenium	0.500U	10.0	9.78	98	10.0	8.89	89	80-120	9.53	(< 20)
Silver	0.0500U	1.00	1.05	105	1.00	0.969	97	85-116	8.07	(< 20)

Batch Information

Analytical Batch: MMS11618
Analytical Method: SW6020B TCLP
Instrument: P7 Agilent 7800
Analyst: DMM
Analytical Date/Time: 7/28/2022 5:30:07PM

Prep Batch: MXT6258
Prep Method: Waters Digest for Metals by ICP-MS(TCLP)
Prep Date/Time: 7/28/2022 10:05:03AM
Prep Initial Wt./Vol.: 2.50mL
Prep Extract Vol: 25.00mL

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Method Blank

Blank ID: MB for HBN 1840174 [SPT/11579]
Blank Lab ID: 1674602

Matrix: Soil/Solid (dry weight)

QC for Samples:
1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **SM21 2540G**

Parameter	Results	LOQ/CL	DL	Units
Total Solids	100			%

Batch Information

Analytical Batch: SPT11579
Analytical Method: SM21 2540G
Instrument:
Analyst: IGK
Analytical Date/Time: 7/20/2022 7:27:00PM

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Duplicate Sample Summary

Original Sample ID: 1224035012
Duplicate Sample ID: 1674603
QC for Samples:

Analysis Date: 07/20/2022 19:27
Matrix: Soil/Solid (dry weight)

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	91.1	91.7	%	0.72	(< 15)

Batch Information

Analytical Batch: SPT11579
Analytical Method: SM21 2540G
Instrument:
Analyst: IGK

Print Date: 07/29/2022 4:08:09PM

Duplicate Sample Summary

Original Sample ID: 1224055008
Duplicate Sample ID: 1674604
Analysis Date: 07/20/2022 19:27
Matrix: Soil/Solid (dry weight)

QC for Samples:

1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	89.3	89.0	%	0.36	(< 15)

Batch Information

Analytical Batch: SPT11579
Analytical Method: SM21 2540G
Instrument:
Analyst: IGK

Print Date: 07/29/2022 4:08:09PM

Duplicate Sample Summary

Original Sample ID: 1224075026
Duplicate Sample ID: 1674605

Analysis Date: 07/20/2022 19:27
Matrix: Soil/Solid (dry weight)

QC for Samples:

1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	58.3	54.6	%	6.50	(< 15)

Batch Information

Analytical Batch: SPT11579
Analytical Method: SM21 2540G
Instrument:
Analyst: IGK

Print Date: 07/29/2022 4:08:09PM

Method Blank

Blank ID: MB for HBN 1840180 [VXX/38900]
Blank Lab ID: 1674623

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072001, 1224072013, 1224072016, 1224072017

Results by **SW8260D**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	114	81-118		%
4-Bromofluorobenzene (surr)	105	85-114		%
Toluene-d8 (surr)	98	89-112		%

Batch Information

Analytical Batch: VMS21808
Analytical Method: SW8260D
Instrument: Agilent 7890-75MS
Analyst: AZL
Analytical Date/Time: 7/20/2022 3:22:00PM

Prep Batch: VXX38900
Prep Method: SW5030B
Prep Date/Time: 7/20/2022 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Leaching Blank

Blank ID: LB for HBN 1839953 [TCLP/11855
Blank Lab ID: 1673589

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072001, 1224072013, 1224072016, 1224072017

Results by **SW8260D**

Parameter	Results	LOQ/CL	DL	Units
Benzene	10.0U	20.0	6.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	114	81-118		%
4-Bromofluorobenzene (surr)	105	85-114		%
Toluene-d8 (surr)	97.2	89-112		%

Batch Information

Analytical Batch: VMS21808
Analytical Method: SW8260D
Instrument: Agilent 7890-75MS
Analyst: AZL
Analytical Date/Time: 7/20/2022 7:05:00PM

Prep Batch: VXX38900
Prep Method: SW5030B
Prep Date/Time: 7/20/2022 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [VXX38900]
Blank Spike Lab ID: 1674624
Date Analyzed: 07/20/2022 15:37

Spike Duplicate ID: LCSD for HBN 1224072 [VXX38900]
Spike Duplicate Lab ID: 1674625
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1224072001, 1224072013, 1224072016, 1224072017

Results by **SW8260D**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	30	29.0	97	30	27.9	93	(79-120)	3.90	(< 20)
Ethylbenzene	30	29.5	98	30	29.2	97	(79-121)	0.99	(< 20)
o-Xylene	30	29.3	98	30	29.2	97	(78-122)	0.48	(< 20)
P & M -Xylene	60	59.5	99	60	59.1	99	(80-121)	0.74	(< 20)
Toluene	30	27.9	93	30	27.7	92	(80-121)	0.47	(< 20)
Xylenes (total)	90	88.8	99	90	88.3	98	(79-121)	0.66	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30		107	30		105	(81-118)	1.50	
4-Bromofluorobenzene (surr)	30		104	30		104	(85-114)	0.61	
Toluene-d8 (surr)	30		96	30		97	(89-112)	1.60	

Batch Information

Analytical Batch: **VMS21808**
Analytical Method: **SW8260D**
Instrument: **Agilent 7890-75MS**
Analyst: **AZL**

Prep Batch: **VXX38900**
Prep Method: **SW5030B**
Prep Date/Time: **07/20/2022 06:00**
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 07/29/2022 4:08:14PM

Billable Matrix Spike Summary

Original Sample ID: 1224072013
MS Sample ID: 1224072014 BMS
MSD Sample ID: 1224072015 BMSD

Analysis Date: 07/20/2022 20:49
Analysis Date: 07/20/2022 16:51
Analysis Date: 07/20/2022 17:06
Matrix: Water (Surface, Eff., Ground)

QC for Samples:

Results by **SW8260D**

		Matrix Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Ethylbenzene	1.13	30.0	31.7	102	30.0	31.9	103	79-121	0.53	(< 20)
o-Xylene	2.12	30.0	32.4	101	30.0	32.6	102	78-122	0.55	(< 20)
P & M -Xylene	4.49	60.0	66.2	103	60.0	66.4	103	80-121	0.29	(< 20)
Toluene	5.32	30.0	33.9	95	30.0	33.7	95	80-121	0.50	(< 20)
Xylenes (total)	6.61	90.0	98.7	102	90.0	99.0	103	79-121	0.37	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		30.0	31.5	105	30.0	32.0	107	81-118	1.50	
4-Bromofluorobenzene (surr)		30.0	31.2	104	30.0	31.2	104	85-114	0.10	
Toluene-d8 (surr)		30.0	29.3	98	30.0	29.1	97	89-112	0.62	

Batch Information

Analytical Batch: VMS21808
Analytical Method: SW8260D
Instrument: Agilent 7890-75MS
Analyst: AZL
Analytical Date/Time: 7/20/2022 4:51:00PM

Prep Batch: VXX38900
Prep Method: Volatiles Extraction 8240/8260
Prep Date/Time: 7/20/2022 6:00:00AM
Prep Initial Wt./Vol.: 5.00mL
Prep Extract Vol: 5.00mL

Print Date: 07/29/2022 4:08:16PM

Method Blank

Blank ID: MB for HBN 1840221 [VXX/38907]
Blank Lab ID: 1674809

Matrix: Soil/Solid (dry weight)

QC for Samples:
1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **SW8260D**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.00625U	0.0125	0.00390	mg/kg
Ethylbenzene	0.0125U	0.0250	0.00780	mg/kg
o-Xylene	0.0125U	0.0250	0.00780	mg/kg
P & M -Xylene	0.0250U	0.0500	0.0150	mg/kg
Toluene	0.0125U	0.0250	0.00780	mg/kg
Xylenes (total)	0.0375U	0.0750	0.0228	mg/kg
Surrogates				
1,2-Dichloroethane-D4 (surr)	101	71-136		%
4-Bromofluorobenzene (surr)	112	55-151		%
Toluene-d8 (surr)	104	85-116		%

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Instrument: VRA Agilent GC/MS 7890B/5977A
Analyst: S.S
Analytical Date/Time: 7/21/2022 11:42:00AM

Prep Batch: VXX38907
Prep Method: SW5035A
Prep Date/Time: 7/21/2022 6:00:00AM
Prep Initial Wt./Vol.: 50 g
Prep Extract Vol: 25 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [VXX38907]
Blank Spike Lab ID: 1674810
Date Analyzed: 07/21/2022 11:58

Matrix: Soil/Solid (dry weight)

QC for Samples: 1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **SW8260D**

Blank Spike (mg/kg)

Parameter	Spike	Result	Rec (%)	CL
Benzene	0.750	0.721	96	(77-121)
Ethylbenzene	0.750	0.770	103	(76-122)
o-Xylene	0.750	0.780	104	(77-123)
P & M -Xylene	1.50	1.54	102	(77-124)
Toluene	0.750	0.724	97	(77-121)
Xylenes (total)	2.25	2.32	103	(78-124)
Surrogates				
1,2-Dichloroethane-D4 (surr)	0.750		97	(71-136)
4-Bromofluorobenzene (surr)	0.750		107	(55-151)
Toluene-d8 (surr)	0.750		105	(85-116)

Batch Information

Analytical Batch: **VMS21814**
Analytical Method: **SW8260D**
Instrument: **VRA Agilent GC/MS 7890B/5977A**
Analyst: **S.S**

Prep Batch: **VXX38907**
Prep Method: **SW5035A**
Prep Date/Time: **07/21/2022 06:00**
Spike Init Wt./Vol.: 0.750 mg/kg Extract Vol: 25 mL
Dupe Init Wt./Vol.: Extract Vol:

Print Date: 07/29/2022 4:08:19PM

Matrix Spike Summary

Original Sample ID: 1674811
MS Sample ID: 1674812 MS
MSD Sample ID: 1674813 MSD

Analysis Date: 07/21/2022 14:59
Analysis Date: 07/21/2022 13:26
Analysis Date: 07/21/2022 13:41
Matrix: Solid/Soil (Wet Weight)

QC for Samples: 1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **SW8260D**

		Matrix Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	0.0115U	1.38	1.36	99	1.38	1.37	100	77-121	1.10	(< 20)
Ethylbenzene	0.0229U	1.38	1.42	103	1.38	1.43	104	76-122	0.41	(< 20)
o-Xylene	0.0229U	1.38	1.45	105	1.38	1.44	105	77-123	0.55	(< 20)
P & M -Xylene	0.0457U	2.75	2.86	104	2.75	2.85	103	77-124	0.32	(< 20)
Toluene	0.0229U	1.38	1.36	99	1.38	1.35	98	77-121	0.80	(< 20)
Xylenes (total)	0.0685U	4.13	4.31	104	4.13	4.29	104	78-124	0.40	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		1.38	1.31	96	1.38	1.33	97	71-136	1.50	
4-Bromofluorobenzene (surr)		1.22	0.664	55 *	1.22	0.655	54 *	55-151	1.40	
Toluene-d8 (surr)		1.38	1.44	105	1.38	1.44	104	85-116	0.20	

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Instrument: VRA Agilent GC/MS 7890B/5977A
Analyst: S.S
Analytical Date/Time: 7/21/2022 1:26:00PM

Prep Batch: VXX38907
Prep Method: Vol. Extraction SW8260 Field Extracted L
Prep Date/Time: 7/21/2022 6:00:00AM
Prep Initial Wt./Vol.: 51.24g
Prep Extract Vol: 46.89mL

Print Date: 07/29/2022 4:08:21PM

Billable Matrix Spike Summary

Original Sample ID: 1224072006
MS Sample ID: 1224072007 BMS
MSD Sample ID: 1224072008 BMSD

Analysis Date: 07/21/2022 20:45
Analysis Date: 07/21/2022 21:00
Analysis Date: 07/21/2022 21:16
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **SW8260D**

		Matrix Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	0.199U	24.0	23.1	97	24.0	23.2	97	77-121	0.62	(< 20)
Ethylbenzene	1.79	24.0	26.0	101	24.0	25.9	100	76-122	0.55	(< 20)
o-Xylene	7.17	24.0	31.5	101	24.0	31.5	102	77-123	0.18	(< 20)
P & M -Xylene	4.10	47.9	52.0	100	47.9	52.2	100	77-124	0.47	(< 20)
Toluene	0.398U	24.0	23.0	96	24.0	23.1	97	77-121	0.49	(< 20)
Xylenes (total)	11.3	71.9	83.5	100	71.9	83.7	101	78-124	0.36	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		24.0	23.4	98	24.0	23.2	97	71-136	0.56	
4-Bromofluorobenzene (surr)		1.50	2.22	148	1.50	2.16	144	55-151	3.00	
Toluene-d8 (surr)		24.0	24.4	102	24.0	24.6	103	85-116	0.35	

Batch Information

Analytical Batch: VMS21814
Analytical Method: SW8260D
Instrument: VRA Agilent GC/MS 7890B/5977A
Analyst: S.S
Analytical Date/Time: 7/21/2022 9:00:00PM

Prep Batch: VXX38907
Prep Method: Vol. Extraction SW8260 Field Extracted L
Prep Date/Time: 7/15/2022 10:30:00AM
Prep Initial Wt./Vol.: 50.00g
Prep Extract Vol: 33.23mL

Print Date: 07/29/2022 4:08:21PM

Method Blank

Blank ID: MB for HBN 1840529 [VXX/38936]
Blank Lab ID: 1676210

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072013

Results by **SW8260D**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.200U	0.400	0.120	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	117	81-118		%
4-Bromofluorobenzene (surr)	102	85-114		%
Toluene-d8 (surr)	97.7	89-112		%

Batch Information

Analytical Batch: VMS21828
Analytical Method: SW8260D
Instrument: Agilent 7890-75MS
Analyst: S.S
Analytical Date/Time: 7/26/2022 4:41:00PM

Prep Batch: VXX38936
Prep Method: SW5030B
Prep Date/Time: 7/26/2022 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [VXX38936]
Blank Spike Lab ID: 1676211
Date Analyzed: 07/26/2022 17:26

Spike Duplicate ID: LCSD for HBN 1224072 [VXX38936]
Spike Duplicate Lab ID: 1676212
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1224072013

Results by **SW8260D**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	30	30.2	101	30	29.2	97	(79-120)	3.40	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30		104	30		103	(81-118)	1.70	
4-Bromofluorobenzene (surr)	30		105	30		104	(85-114)	1.20	
Toluene-d8 (surr)	30		97	30		101	(89-112)	3.40	

Batch Information

Analytical Batch: **VMS21828**
Analytical Method: **SW8260D**
Instrument: **Agilent 7890-75MS**
Analyst: **S.S**

Prep Batch: **VXX38936**
Prep Method: **SW5030B**
Prep Date/Time: **07/26/2022 06:00**
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

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Billable Matrix Spike Summary

Original Sample ID: 1224072013
MS Sample ID: 1224072014 BMS
MSD Sample ID: 1224072015 BMSD

Analysis Date: 07/26/2022 19:25
Analysis Date: 07/26/2022 18:10
Analysis Date: 07/26/2022 18:25
Matrix: Water (Surface, Eff., Ground)

QC for Samples:

Results by **SW8260D**

		Matrix Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	2.44	30.0	32.5	100	30.0	32.4	100	79-120	0.21	(< 20)

Batch Information

Analytical Batch: VMS21828
Analytical Method: SW8260D
Instrument: Agilent 7890-75MS
Analyst: S.S
Analytical Date/Time: 7/26/2022 6:10:00PM

Prep Batch: VXX38936
Prep Method: Volatiles Extraction 8240/8260
Prep Date/Time: 7/26/2022 6:00:00AM
Prep Initial Wt./Vol.: 5.00mL
Prep Extract Vol: 5.00mL

Method Blank

Blank ID: MB for HBN 1840153 [XXX/46654]
Blank Lab ID: 1674534

Matrix: Soil/Solid (dry weight)

QC for Samples:
1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	10.0U	20.0	9.00	mg/kg
Surrogates				
5a Androstane (surr)	93.2	60-120		%

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: HMW
Analytical Date/Time: 7/22/2022 10:43:00PM

Prep Batch: XXX46654
Prep Method: SW3550C
Prep Date/Time: 7/20/2022 4:59:51PM
Prep Initial Wt./Vol.: 30 g
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [XXX46654]
Blank Spike Lab ID: 1674535
Date Analyzed: 07/22/2022 22:54

Spike Duplicate ID: LCSD for HBN 1224072 [XXX46654]
Spike Duplicate Lab ID: 1674536
Matrix: Soil/Solid (dry weight)

QC for Samples: 1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **AK102**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	667	796	119	667	808	121	(75-125)	1.50	(< 20)
Surrogates									
5a Androstane (surr)	16.7		106	16.7		105	(60-120)	0.78	

Batch Information

Analytical Batch: **XFC16296**
Analytical Method: **AK102**
Instrument: **Agilent 7890B R**
Analyst: **DSD**

Prep Batch: **XXX46654**
Prep Method: **SW3550C**
Prep Date/Time: **07/20/2022 16:59**
Spike Init Wt./Vol.: 16.7 mg/kg Extract Vol: 5 mL
Dupe Init Wt./Vol.: 16.7 mg/kg Extract Vol: 5 mL

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Billable Matrix Spike Summary

Original Sample ID: 1224072006
MS Sample ID: 1224072007 BMS
MSD Sample ID: 1224072008 BMSD

Analysis Date: 07/23/2022 2:42
Analysis Date: 07/23/2022 2:53
Analysis Date: 07/23/2022 3:03
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **AK102**

		Matrix Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	12500	793	13174	82	790	11234	-161 *	60-140	15.70	(< 50)
Surrogates										
5a Androstane (surr)		19.8	18.2	92	19.8	18.0	91	50-150	1.10	

Batch Information

Analytical Batch: XFC16296
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: HMW
Analytical Date/Time: 7/23/2022 2:53:00AM

Prep Batch: XXX46654
Prep Method: Sonication Extraction Soil AK102
Prep Date/Time: 7/20/2022 4:59:51PM
Prep Initial Wt./Vol.: 30.23g
Prep Extract Vol: 5.00mL

Print Date: 07/29/2022 4:08:31PM

Method Blank

Blank ID: MB for HBN 1840192 [XXX/46659]
Blank Lab ID: 1674667

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072013, 1224072016, 1224072017

Results by **8270D SIM LV (PAH)**

Parameter	Results	LOQ/CL	DL	Units
1-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
2-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
Acenaphthene	0.0250U	0.0500	0.0150	ug/L
Acenaphthylene	0.0250U	0.0500	0.0150	ug/L
Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo(a)Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo[a]pyrene	0.0100U	0.0200	0.00620	ug/L
Benzo[b]Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Benzo[g,h,i]perylene	0.0250U	0.0500	0.0150	ug/L
Benzo[k]fluoranthene	0.0250U	0.0500	0.0150	ug/L
Chrysene	0.0250U	0.0500	0.0150	ug/L
Dibenzo[a,h]anthracene	0.0100U	0.0200	0.00620	ug/L
Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Fluorene	0.0250U	0.0500	0.0150	ug/L
Indeno[1,2,3-c,d] pyrene	0.0250U	0.0500	0.0150	ug/L
Naphthalene	0.0500U	0.100	0.0310	ug/L
Phenanthrene	0.0500U	0.100	0.0310	ug/L
Pyrene	0.0250U	0.0500	0.0150	ug/L
Surrogates				
2-Methylnaphthalene-d10 (surr)	61.5	42-86		%
Fluoranthene-d10 (surr)	72.4	50-97		%

Batch Information

Analytical Batch: XMS13245
Analytical Method: 8270D SIM LV (PAH)
Instrument: Agilent GC 7890B/5977A SWA
Analyst: NRB
Analytical Date/Time: 7/25/2022 11:47:00AM

Prep Batch: XXX46659
Prep Method: SW3535A
Prep Date/Time: 7/21/2022 3:05:49PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [XXX46659]
Blank Spike Lab ID: 1674668
Date Analyzed: 07/25/2022 12:08

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1224072013, 1224072016, 1224072017

Results by **8270D SIM LV (PAH)**

Blank Spike (ug/L)

Parameter	Spike	Result	Rec (%)	CL
1-Methylnaphthalene	2	1.27	63	(41-115)
2-Methylnaphthalene	2	1.25	62	(39-114)
Acenaphthene	2	1.46	73	(48-114)
Acenaphthylene	2	1.46	73	(35-121)
Anthracene	2	1.61	80	(53-119)
Benzo(a)Anthracene	2	1.55	77	(59-120)
Benzo[a]pyrene	2	1.70	85	(53-120)
Benzo[b]Fluoranthene	2	1.64	82	(53-126)
Benzo[g,h,i]perylene	2	1.95	98	(44-128)
Benzo[k]fluoranthene	2	1.81	91	(54-125)
Chrysene	2	1.66	83	(57-120)
Dibenzo[a,h]anthracene	2	1.97	98	(44-131)
Fluoranthene	2	1.49	75	(58-120)
Fluorene	2	1.54	77	(50-118)
Indeno[1,2,3-c,d] pyrene	2	1.93	97	(48-130)
Naphthalene	2	1.27	63	(43-114)
Phenanthrene	2	1.64	82	(53-115)
Pyrene	2	1.51	75	(53-121)
Surrogates				
2-Methylnaphthalene-d10 (surr)	2		62	(42-86)
Fluoranthene-d10 (surr)	2		72	(50-97)

Batch Information

Analytical Batch: **XMS13245**
Analytical Method: **8270D SIM LV (PAH)**
Instrument: **Agilent GC 7890B/5977A SWA**
Analyst: **NRB**

Prep Batch: **XXX46659**
Prep Method: **SW3535A**
Prep Date/Time: **07/21/2022 15:05**
Spike Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: Extract Vol:

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Billable Matrix Spike Summary

Original Sample ID: 1224072013
MS Sample ID: 1224072014 BMS
MSD Sample ID: 1224072015 BMSD

Analysis Date: 07/25/2022 14:52
Analysis Date: 07/25/2022 15:13
Analysis Date: 07/25/2022 15:33
Matrix: Water (Surface, Eff., Ground)

QC for Samples:

Results by **8270D SIM LV (PAH)**

		Matrix Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1-Methylnaphthalene	0.193	1.92	1.38	62	1.92	1.35	60	41-115	2.20	(< 20)
2-Methylnaphthalene	0.218	1.92	1.4	61	1.92	1.36	59	39-114	2.90	(< 20)
Acenaphthene	0.0223U	1.92	1.34	70	1.92	1.30	68	48-114	2.90	(< 20)
Acenaphthylene	0.0223U	1.92	1.33	69	1.92	1.30	67	35-121	2.90	(< 20)
Anthracene	0.0223U	1.92	1.42	74	1.92	1.38	72	53-119	3.40	(< 20)
Benzo(a)Anthracene	0.0135J	1.92	1.27	65	1.92	1.18	61	59-120	7.10	(< 20)
Benzo[a]pyrene	0.00895U	1.92	1.21	63	1.92	1.12	58	53-120	8.00	(< 20)
Benzo[b]Fluoranthene	0.0223U	1.92	1.26	65	1.92	1.12	59	53-126	11.00	(< 20)
Benzo[g,h,i]perylene	0.0223U	1.92	1.19	62	1.92	1.17	61	44-128	2.10	(< 20)
Benzo[k]fluoranthene	0.0223U	1.92	1.26	66	1.92	1.19	62	54-125	6.10	(< 20)
Chrysene	0.0223U	1.92	1.29	67	1.92	1.24	65	57-120	3.70	(< 20)
Dibenzo[a,h]anthracene	0.00895U	1.92	1.22	63	1.92	1.18	61	44-131	3.30	(< 20)
Fluoranthene	0.0223U	1.92	1.37	71	1.92	1.27	66	58-120	7.80	(< 20)
Fluorene	0.0192J	1.92	1.4	72	1.92	1.35	69	50-118	3.80	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0223U	1.92	1.2	62	1.92	1.12	58	48-130	6.60	(< 20)
Naphthalene	0.206	1.92	1.32	58	1.92	1.31	58	43-114	0.46	(< 20)
Phenanthrene	0.0447U	1.92	1.44	75	1.92	1.40	73	53-115	2.60	(< 20)
Pyrene	0.0223U	1.92	1.38	72	1.92	1.25	65	53-121	9.30	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		1.92	1.18	61	1.92	1.12	58	42-86	5.60	
Fluoranthene-d10 (surr)		1.92	1.38	72	1.92	1.25	65	50-97	10.00	

Batch Information

Analytical Batch: XMS13245
Analytical Method: 8270D SIM LV (PAH)
Instrument: Agilent GC 7890B/5977A SWA
Analyst: NRB
Analytical Date/Time: 7/25/2022 3:13:00PM

Prep Batch: XXX46659
Prep Method: 3535 Solid Phase Ext for 8270 PAH SIM LV
Prep Date/Time: 7/21/2022 3:05:49PM
Prep Initial Wt./Vol.: 260.00mL
Prep Extract Vol: 1.00mL

Print Date: 07/29/2022 4:08:35PM

Method Blank

Blank ID: MB for HBN 1840194 [XXX/46660]
Blank Lab ID: 1674672

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072013, 1224072016, 1224072017

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	0.300U	0.600	0.200	mg/L
Surrogates				
5a Androstane (surr)	81.5	60-120		%

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: DSD
Analytical Date/Time: 7/26/2022 1:57:00PM

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 7/21/2022 4:20:07PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [XXX46660]
Blank Spike Lab ID: 1674673
Date Analyzed: 07/26/2022 14:07

Spike Duplicate ID: LCSD for HBN 1224072 [XXX46660]
Spike Duplicate Lab ID: 1674674
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1224072013, 1224072016, 1224072017

Results by **AK102**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	20	20.1	101	20	18.4	92	(75-125)	9.10	(< 20)
Surrogates									
5a Androstane (surr)	0.4		96	0.4		93	(60-120)	3.00	

Batch Information

Analytical Batch: **XFC16297**
Analytical Method: **AK102**
Instrument: **Agilent 7890B R**
Analyst: **DSD**

Prep Batch: **XXX46660**
Prep Method: **SW3520C**
Prep Date/Time: **07/21/2022 16:20**
Spike Init Wt./Vol.: 0.4 mg/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: 0.4 mg/L Extract Vol: 1 mL

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Billable Matrix Spike Summary

Original Sample ID: 1224072013
MS Sample ID: 1224072014 BMS
MSD Sample ID: 1224072015 BMSD

Analysis Date: 07/26/2022 15:50
Analysis Date: 07/26/2022 16:00
Analysis Date: 07/26/2022 16:10
Matrix: Water (Surface, Eff., Ground)

QC for Samples:

Results by **AK102**

		Matrix Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	0.881	19.2	18.1	90	19.2	19.7	98	75-125	8.30	(< 30)
Surrogates										
5a Androstane (surr)		0.385	.342	89	0.385	0.372	97	50-150	8.30	

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK102
Instrument: Agilent 7890B R
Analyst: DSD
Analytical Date/Time: 7/26/2022 4:00:00PM

Prep Batch: XXX46660
Prep Method: Cnt. Liq/Liq Ext. for AK102/3 Low Vol
Prep Date/Time: 7/21/2022 4:20:07PM
Prep Initial Wt./Vol.: 260.00mL
Prep Extract Vol: 1.00mL

Print Date: 07/29/2022 4:08:40PM

Method Blank

Blank ID: MB for HBN 1840194 [XXX/46660]
Blank Lab ID: 1674672

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1224072013, 1224072016, 1224072017

Results by **AK103**

Parameter	Results	LOQ/CL	DL	Units
Residual Range Organics	0.250U	0.500	0.200	mg/L
Surrogates				
n-Triacontane-d62 (surr)	88.8	60-120		%

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK103
Instrument: Agilent 7890B R
Analyst: DSD
Analytical Date/Time: 7/26/2022 1:57:00PM

Prep Batch: XXX46660
Prep Method: SW3520C
Prep Date/Time: 7/21/2022 4:20:07PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [XXX46660]
Blank Spike Lab ID: 1674673
Date Analyzed: 07/26/2022 14:07

Spike Duplicate ID: LCSD for HBN 1224072 [XXX46660]
Spike Duplicate Lab ID: 1674674
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1224072013, 1224072016, 1224072017

Results by **AK103**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Residual Range Organics	20	19.8	99	20	18.7	93	(60-120)	5.90	(< 20)
Surrogates									
n-Triacontane-d62 (surr)	0.4		99	0.4		95	(60-120)	3.80	

Batch Information

Analytical Batch: **XFC16297**
Analytical Method: **AK103**
Instrument: **Agilent 7890B R**
Analyst: **DSD**

Prep Batch: **XXX46660**
Prep Method: **SW3520C**
Prep Date/Time: **07/21/2022 16:20**
Spike Init Wt./Vol.: 0.4 mg/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: 0.4 mg/L Extract Vol: 1 mL

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Billable Matrix Spike Summary

Original Sample ID: 1224072013
MS Sample ID: 1224072014 BMS
MSD Sample ID: 1224072015 BMSD

Analysis Date: 07/26/2022 15:50
Analysis Date: 07/26/2022 16:00
Analysis Date: 07/26/2022 16:10
Matrix: Water (Surface, Eff., Ground)

QC for Samples:

Results by **AK103**

		Matrix Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Residual Range Organics	0.743	19.2	18.3	91	19.2	19.7	99	60-140	7.40	(< 30)
Surrogates										
n-Triacontane-d62 (surr)		0.385	.372	97	0.385	0.403	105	50-150	8.00	

Batch Information

Analytical Batch: XFC16297
Analytical Method: AK103
Instrument: Agilent 7890B R
Analyst: DSD
Analytical Date/Time: 7/26/2022 4:00:00PM

Prep Batch: XXX46660
Prep Method: Cnt. Liq/Liq Ext. for AK102/3 Low Vol
Prep Date/Time: 7/21/2022 4:20:07PM
Prep Initial Wt./Vol.: 260.00mL
Prep Extract Vol: 1.00mL

Print Date: 07/29/2022 4:08:46PM

Method Blank

Blank ID: MB for HBN 1840235 [XXX/46666]
Blank Lab ID: 1674882

Matrix: Soil/Solid (dry weight)

QC for Samples:
1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **8270D SIM (PAH)**

Parameter	Results	LOQ/CL	DL	Units
1-Methylnaphthalene	0.0125U	0.0250	0.00625	mg/kg
2-Methylnaphthalene	0.0125U	0.0250	0.00625	mg/kg
Acenaphthene	0.0125U	0.0250	0.00625	mg/kg
Acenaphthylene	0.0125U	0.0250	0.00625	mg/kg
Anthracene	0.0125U	0.0250	0.00625	mg/kg
Benzo(a)Anthracene	0.0125U	0.0250	0.00625	mg/kg
Benzo[a]pyrene	0.0125U	0.0250	0.00625	mg/kg
Benzo[b]Fluoranthene	0.0125U	0.0250	0.00625	mg/kg
Benzo[g,h,i]perylene	0.0125U	0.0250	0.00625	mg/kg
Benzo[k]fluoranthene	0.0125U	0.0250	0.00625	mg/kg
Chrysene	0.0125U	0.0250	0.00625	mg/kg
Dibenzo[a,h]anthracene	0.0125U	0.0250	0.00625	mg/kg
Fluoranthene	0.0125U	0.0250	0.00625	mg/kg
Fluorene	0.0125U	0.0250	0.00625	mg/kg
Indeno[1,2,3-c,d] pyrene	0.0125U	0.0250	0.00625	mg/kg
Naphthalene	0.0100U	0.0200	0.00500	mg/kg
Phenanthrene	0.0125U	0.0250	0.00625	mg/kg
Pyrene	0.0125U	0.0250	0.00625	mg/kg
Surrogates				
2-Methylnaphthalene-d10 (surr)	87.1	58-103		%
Fluoranthene-d10 (surr)	82.8	54-113		%

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Instrument: Agilent 8890 GC/MS US2210A024
Analyst: NRB
Analytical Date/Time: 7/27/2022 3:20:00PM

Prep Batch: XXX46666
Prep Method: SW3550C
Prep Date/Time: 7/26/2022 8:12:30AM
Prep Initial Wt./Vol.: 22.5 g
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1224072 [XXX46666]
Blank Spike Lab ID: 1674883
Date Analyzed: 07/27/2022 15:36

Matrix: Soil/Solid (dry weight)

QC for Samples: 1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **8270D SIM (PAH)**

Blank Spike (mg/kg)

Parameter	Spike	Result	Rec (%)	CL
1-Methylnaphthalene	0.111	0.107	96	(43-111)
2-Methylnaphthalene	0.111	0.110	99	(39-114)
Acenaphthene	0.111	0.111	100	(44-111)
Acenaphthylene	0.111	0.111	100	(39-116)
Anthracene	0.111	0.111	100	(50-114)
Benzo(a)Anthracene	0.111	0.106	95	(54-122)
Benzo[a]pyrene	0.111	0.109	98	(50-125)
Benzo[b]Fluoranthene	0.111	0.114	102	(53-128)
Benzo[g,h,i]perylene	0.111	0.112	101	(49-127)
Benzo[k]fluoranthene	0.111	0.111	100	(56-123)
Chrysene	0.111	0.104	94	(57-118)
Dibenzo[a,h]anthracene	0.111	0.115	103	(50-129)
Fluoranthene	0.111	0.0938	84	(55-119)
Fluorene	0.111	0.104	94	(47-114)
Indeno[1,2,3-c,d] pyrene	0.111	0.112	101	(49-130)
Naphthalene	0.111	0.105	95	(38-111)
Phenanthrene	0.111	0.109	98	(49-113)
Pyrene	0.111	0.0931	84	(55-117)
Surrogates				
2-Methylnaphthalene-d10 (surr)	0.111		87	(58-103)
Fluoranthene-d10 (surr)	0.111		79	(54-113)

Batch Information

Analytical Batch: **XMS13250**
Analytical Method: **8270D SIM (PAH)**
Instrument: **Agilent 8890 GC/MS US2210A024**
Analyst: **NRB**

Prep Batch: **XXX46666**
Prep Method: **SW3550C**
Prep Date/Time: **07/26/2022 08:12**
Spike Init Wt./Vol.: 0.111 mg/kg Extract Vol: 5 mL
Dupe Init Wt./Vol.: Extract Vol:

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Matrix Spike Summary

Original Sample ID: 1224035005
MS Sample ID: 1675289 MS
MSD Sample ID: 1675290 MSD

Analysis Date: 07/27/2022 16:58
Analysis Date: 07/27/2022 17:14
Analysis Date: 07/27/2022 17:30
Matrix: Soil/Solid (dry weight)

QC for Samples: 1224072002, 1224072003, 1224072004, 1224072005, 1224072006, 1224072009, 1224072010, 1224072011

Results by **8270D SIM (PAH)**

		Matrix Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1-Methylnaphthalene	0.0156U	0.139	0.116	84	0.137	0.116	85	43-111	0.21	(< 20)
2-Methylnaphthalene	0.0156U	0.139	0.118	85	0.137	0.117	86	39-114	0.94	(< 20)
Acenaphthene	0.0156U	0.139	0.125	91	0.137	0.124	91	44-111	1.30	(< 20)
Acenaphthylene	0.0156U	0.139	0.123	89	0.137	0.121	89	39-116	1.70	(< 20)
Anthracene	0.0156U	0.139	0.127	92	0.137	0.127	93	50-114	0.05	(< 20)
Benzo(a)Anthracene	0.0156U	0.139	0.119	86	0.137	0.121	89	54-122	2.00	(< 20)
Benzo[a]pyrene	0.0156U	0.139	0.122	88	0.137	0.125	92	50-125	2.70	(< 20)
Benzo[b]Fluoranthene	0.0156U	0.139	0.127	92	0.137	0.128	94	53-128	0.87	(< 20)
Benzo[g,h,i]perylene	0.0156U	0.139	0.121	87	0.137	0.124	91	49-127	3.10	(< 20)
Benzo[k]fluoranthene	0.0156U	0.139	0.118	85	0.137	0.123	90	56-123	4.70	(< 20)
Chrysene	0.0156U	0.139	0.113	81	0.137	0.116	85	57-118	2.40	(< 20)
Dibenzo[a,h]anthracene	0.0156U	0.139	0.124	90	0.137	0.129	94	50-129	3.40	(< 20)
Fluoranthene	0.0156U	0.139	0.103	74	0.137	0.103	75	55-119	0.04	(< 20)
Fluorene	0.0156U	0.139	0.116	84	0.137	0.116	85	47-114	0.38	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0156U	0.139	0.120	87	0.137	0.124	91	49-130	3.30	(< 20)
Naphthalene	0.0124U	0.139	0.111	80	0.137	0.112	82	38-111	0.45	(< 20)
Phenanthrene	0.0156U	0.139	0.121	88	0.137	0.121	88	49-113	0.34	(< 20)
Pyrene	0.0156U	0.139	0.103	74	0.137	0.103	76	55-117	0.92	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		0.139	0.108	78	0.137	0.109	80	58-103	1.00	
Fluoranthene-d10 (surr)		0.139	0.0992	72	0.137	0.0999	73	54-113	0.59	

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Instrument: Agilent 8890 GC/MS US2210A024
Analyst: NRB
Analytical Date/Time: 7/27/2022 5:14:00PM

Prep Batch: XXX46666
Prep Method: Sonication Extr Soil 8270 PAH SIM 5ml
Prep Date/Time: 7/26/2022 8:12:00AM
Prep Initial Wt./Vol.: 22.60g
Prep Extract Vol: 5.00mL

Print Date: 07/29/2022 4:08:53PM

Billable Matrix Spike Summary

Original Sample ID: 1224072006
MS Sample ID: 1224072007 BMS
MSD Sample ID: 1224072008 BMSD

Analysis Date: 07/28/2022 9:20
Analysis Date: 07/28/2022 9:36
Analysis Date: 07/28/2022 9:52
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **8270D SIM (PAH)**

		Matrix Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1-Methylnaphthalene	38.7	0.133	32.5	-4720 *	0.133	24.0	-11100 *	43-111	30.20 *	(< 20)
2-Methylnaphthalene	51.9	0.133	43.8	-6130 *	0.133	30.5	-16200 *	39-114	35.90 *	(< 20)
Acenaphthene	0.595U	0.133	0.732J	551 *	0.133	0.592J	446 *	44-111	21.20 *	(< 20)
Acenaphthylene	0.595U	0.133	0.394J	297 *	0.133	0.313J	236 *	39-116	22.90 *	(< 20)
Anthracene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	50-114	0.00	(< 20)
Benzo(a)Anthracene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	54-122	0.00	(< 20)
Benzo[a]pyrene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	50-125	0.00	(< 20)
Benzo[b]Fluoranthene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	53-128	0.00	(< 20)
Benzo[g,h,i]perylene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	49-127	0.00	(< 20)
Benzo[k]fluoranthene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	56-123	0.00	(< 20)
Chrysene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	57-118	0.00	(< 20)
Dibenzo[a,h]anthracene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	50-129	0.00	(< 20)
Fluoranthene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	55-119	0.00	(< 20)
Fluorene	0.879J	0.133	0.916J	28 *	0.133	0.697J	-137 *	47-114	27.10 *	(< 20)
Indeno[1,2,3-c,d] pyrene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	49-130	0.00	(< 20)
Naphthalene	30.9	0.133	25.5	-4100 *	0.133	17.7	-9940 *	38-111	35.80 *	(< 20)
Phenanthrene	0.306J	0.133	0.380J	55	0.133	0.321J	11 *	49-113	16.80	(< 20)
Pyrene	0.595U	0.133	0.595U	0 *	0.133	0.00	0 *	55-117	0.00	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		0.133	0.360	271 *	0.133	0.254	191 *	58-103	34.60	
Fluoranthene-d10 (surr)		0.133	0.0988	74	0.133	0.0970	73	54-113	1.90	

Batch Information

Analytical Batch: XMS13250
Analytical Method: 8270D SIM (PAH)
Instrument: Agilent 8890 GC/MS US2210A024
Analyst: NRB
Analytical Date/Time: 7/28/2022 1:02:00AM

Prep Batch: XXX46666
Prep Method: Sonication Extr Soil 8270 PAH SIM 5ml
Prep Date/Time: 7/26/2022 8:12:30AM
Prep Initial Wt./Vol.: 22.55g
Prep Extract Vol: 5.00mL

Analytical Batch: XMS13252
Analytical Method: 8270D SIM (PAH)
Instrument: Agilent 8890 GC/MS US2210A024
Analyst: NRB
Analytical Date/Time: 7/28/2022 9:36:00AM

Prep Batch: XXX46666
Prep Method: Sonication Extr Soil 8270 PAH SIM 5ml
Prep Date/Time: 7/26/2022 8:12:30AM
Prep Initial Wt./Vol.: 22.55g
Prep Extract Vol: 5.00mL

1224072

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Profile #: P# 376266 Int.: JM

Instructions: Sections 1 - 5 must be filled out.

Section 1

CLIENT:	BRICE ENGINEERING		
CONTACT:	Victoria Pennick	PHONE #:	907-205-9892
PROJECT NAME:	AKARNG Savoonga RA 2022	Project Number: 550500 NPDL WO#: 22-067	
REPORTS TO:	Victoria Pennick Brice Engineering 3700 Centerpoint Drive, Anchorage, 99503	E-MAIL:	vpennick@briceenvironmental.com
INVOICE TO:	Brice Engineering LLC 5015 Business Park Blvd, Suite 3000 Anchorage, Alaska 99503-7146 accountspayable@calistacorp.com	QUOTE #: P.O. #:	376266 550501-002

Section 2

Section 3 — Preservative: MeOH | None | None | None

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Sample Type (Comp / Grab / MI)	Analysis*: BTEX 8260D	DRO AK102	PAH 8270DSIM		TCLP Metals 1311/6020 (WC only)				MS/MSD	REMARKS/LOC ID
	22SAV-TempBlank	7/15/2022	8:00	SQ	1	NA										
1AC	22SAV-TB01	7/15/2022	8:05	SQ	3	NA	x									
2AB	22SAV-B01-3	7/15/2022	9:30	SO	2	Grab	x	x	x							B01
3AB	22SAV-B91-3	7/15/2022	9:31	SO	2	Grab	x	x	x							B91
4AB	22SAV-B02-3	7/15/2022	9:35	SO	2	Grab	x	x	x							B02
5AB	22SAV-B03-3	7/15/2022	9:40	SO	2	Grab	x	x	x							B03
6AD 7AD 8AD	22SAV-SW01-1.5	7/15/2022	10:30	SO	4	Grab	x	x	x						x	SW01
9AB	22SAV-SW02-2.5	7/15/2022	1035	SO	2	Grab	x	x	x							SW02
10AB	22SAV-SW03-2	7/15/2022	10:40	SO	2	Grab	x	x	x							SW03
11AB	22SAV-SW04-2	7/15/2022	10:45	SO	2	Grab	x	x	x							SW04
12A	22SAV-WC01	7/14/2022	17:30	SO	1	Comp					x					Waste Characterization

NOTE:
*The following analyses require specific method and/or compound list: BTEX, Metals, PFAS

Comments:

Section 4

DOD Project? YES NO

Data Deliverables Requested

Deliverables: Level IV .pdf, AK SEDD, Brice EQEDD

Turnaround Time Requested

Standard
Rush X
Requested Rush Report Date:_____

SGS Sample Receipt (Lab Use Only)

Delivery Method: Client Commercial

Did each cooler have a corresponding COC? Yes No

Chain of Custody Seal Condition: INTACT BROKEN ABSENT

COC Seal Location(s): 1-F, 1-A

Section 5

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
Alexander Garhart	7/19/2022	9:00	
	7/19/22	1355	

Cooler ID	Temperature (°C)	Therm. ID
22SAV-01	2.4	D30

Note: If temp. is outside 0-6° and samples were not taken <8 hours ago OR are waste samples, Client or PM should initial here or attach an email change order to proceed with analysis. If ice is present, note on form F102B.

If more than three coolers are received, or for documentation of non-compliant coolers, use form FS-0029.

Intials: JM

Laboratory Use Only

http://www.sgs.com/terms-and-conditions

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Profile #: _____ Int.: _____

Page 2 of 2 Cooler ID: 22SAV-01

Instructions: Sections 1 - 5 must be filled out.

Section 1

CLIENT:	BRICE ENGINEERING		
CONTACT:	Victoria Pennick	PHONE #:	907-205-9892
PROJECT NAME:	AKARNG Savoonga RA 2022	Project Number: 550500 NPDL WO#: 22-067	
REPORTS TO:	Victoria Pennick Brice Engineering 3700 Centerpoint Drive, Anchorage, 99503	E-MAIL:	vpennick@briceenvironmental.com
INVOICE TO:	Brice Engineering LLC 5015 Business Park Blvd, Suite 3000 Anchorage, Alaska 99503-7146 accountspayable@calistacorp.com	QUOTE #: P.O. #:	376266 550501-002

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Sample Type (Comp / Grab / MI)	Preservative: HCL	Preservative: HCL	Preservative: None	Analysis*: BTEX 8260D	Analysis*: DRO/RRO LV AK102/AK103	Analysis*: PAH LV 8270D-SIM	Analysis*: MS/MSD	REMARKS/LOC ID
13AG 14AG 15AG	22SAV-WP05	7/17/2022	16:05	WG	21	Grab				X	X	X	x	WP-05
16AG	22SAV-WP95	7/17/2022	16:10	WG	7	Grab				X	X	X		WP-05
17AG	22SAV-WP01	7/17/2022	18:09	WG	7	Grab				X	X	X		WP-01
*	22SAV-TB02	7/17/2022	0800	WQ	3					X				

NOTE:
*The following analyses require specific method and/or compound list: BTEX, Metals, PFAS

Comments: * Per Tori P. 7/19/22

Section 4

DOD Project? YES NO

Data Deliverables Requested

Deliverables: Level IV .pdf, AK SEDD, Brice EQEDD

Turnaround Time Requested

Standard

Rush X

Requested Rush Report Date: _____

SGS Sample Receipt (Lab Use Only)

Delivery Method: Client Commercial

Did each cooler have a corresponding COC? Yes No

Chain of Custody Seal Condition: INTACT BROKEN ABSENT

COC Seal Location(s): 1-F, 1-R

Section 5

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
Alexander Garhart	7/19/2022	9:00	
	7/19/22	15:58	

Laboratory Use Only

Cooler ID	Temperature (°C)	Therm. ID
22SAV-01	2.4	058

Note: If temp. is outside 0-6° and samples were not taken <8 hours ago OR are waste samples, Client or PM should initial here or attach an email change order to proceed with analysis. If ice is present, note on form F102B.

If more than three coolers are received, or for documentation of non-compliant coolers, use form FS-0029.

Intials: _____

http://www.sgs.com/terms-and-conditions

COOLER RECEIPT FORM
(ONE PER COOLER)

Brice ANC 8(a) Engineering

Please email this form and the completed CoC records to the Brice Project Chemist within 24 hours of sample receipt.

COC Number	
Cooler Number/Name on COC	
Temperature (temp blank, °C)	2.4
Temperature (cooler, °C)	
Thermometer type/ID	D59
Laboratory/Location	595 Anchorage
Laboratory SDG	

1.	Were custody seals present and intact?	N/A	(Yes) No
	If yes, how many and where? Front 1 Back 1		
	Signature/date present on custody seals?		(Yes) No
2.	Were custody papers taped to lid inside cooler?		(Yes) No
3.	Were custody papers properly filled out (ink, signed, etc.)?		(Yes) No
4.	Custody forms signed/dated and properly accepted/relinquished?		(Yes) No
5.	Has the shipper/tracking number been documented on the paperwork?		(Yes) No
6.	Was sufficient ice used (if appropriate)?	N/A	(Yes) No
	Type used: ☐ Wet ☑ Gel Still frozen? (Yes) No		
7.	Were all samples/bottles sealed in separate plastic bags?	N/A	(Yes) No
8.	Did all bottles arrive in good condition? (intact, not leaking, etc.)		(Yes) No
9.	Were all bottle labels complete (sample ID, date, analysis, preservative, etc.) ?		(Yes) No
10.	Did all bottle labels agree with the custody papers?		(Yes) No
11.	Were the appropriate containers used for the analyses?		(Yes) No
12.	Are all VOA vials free of headspace > 6mm in diameter?	N/A	(Yes) No
	If no, note samples and number of vials affected below.		
	If no, are there vials without headspace to perform the analysis?	N/A	(Yes) No
13.	Was sufficient volume sent in each bottle to perform analysis?	N/A	(Yes) No
14.	If there are volatiles present, is there a trip blank present in this cooler?	N/A	(Yes) No
15.	Is the temperature within 0-6°C?	N/A	(Yes) No
16.	Were labels correctly associated with pre-tared containers (not placed directly on jars for methanol-preserved volatiles)?	N/A	(Yes) No
17.	Were non-volatile sample checked for appropriate preservation?	N/A	(Yes) No
18.	Were methanol-preserved soil containers accompanied by an unpreserved aliquot for percent moisture content?	N/A	(Yes) No
	(If checked at the bench, include prep logs or narrative with final report.)		

Explain any discrepancies/deficiencies (attach additional sheets if required):

If discrepancies/deficiencies are noted, was the Brice chemist contacted*?

Chemist: _____ Date/Time: _____ Contact Method: phone email

***Email or phone notes should be included with final report, if applicable, or at a minimum documented in the case narrative.**

e-Sample Receipt Form

SGS Workorder #:	1224072	1224072

Review Criteria	Condition (Yes, No, N/A	Exceptions Noted below
Chain of Custody / Temperature Requirements	*Note:* Temperature and COC seal information is found on the chain of custody form	
DOD only: Did all sample coolers have a corresponding COC?	Yes	
If <0°C, were sample containers ice free?	N/A	
Note containers received with ice:		
Identify any containers received at non-compliant temperature: *(Use form FS-0029 if more space is needed)*		
Holding Time / Documentation / Sample Condition Requirements	*Note:* Refer to form F-083 "Sample Guide" for specific holding times and sample containers.	
Were samples received within analytical holding time?	Yes	
Do sample labels match COC? Record discrepancies. ***Note:*** *If information on containers differs from COC, default to COC information for login. If times differ <1hr, record details & login per COC.*	Yes	
Were analytical requests clear? *(i.e. method is specified for analyses with multiple option for method (Eg, BTEX 8021 vs 8260, Metals 6020 vs 200.8)*	Yes	
Were proper containers (type/mass/volume/preservative)used? Note: Exemption for metals analysis by 200.8/6020 in water.	Yes	
Volatile Analysis Requirements (VOC, GRO, LL-Hg, etc.)		
Were all soil VOAs received with a corresponding % solids container?	Yes	
Were Trip Blanks (e.g., VOAs, LL-Hg) in cooler with samples?	Yes	No soil trip blank received.
Were all water VOA vials free of headspace (e.g., bubbles ≤ 6mm)?	Yes	
Were all soil VOAs field extracted with Methanol+BFB?	Yes	

Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.

Additional notes (if applicable):

Sample Containers and Preservatives

Container Id	Preservative	Container Condition
1224072001-A	HCL to pH < 2	OK
1224072001-B	HCL to pH < 2	OK
1224072001-C	HCL to pH < 2	OK
1224072002-A	No Preservative Required	OK
1224072002-B	Methanol field pres. 4 C	OK
1224072003-A	No Preservative Required	OK
1224072003-B	Methanol field pres. 4 C	OK
1224072004-A	No Preservative Required	OK
1224072004-B	Methanol field pres. 4 C	OK
1224072005-A	No Preservative Required	OK
1224072005-B	Methanol field pres. 4 C	OK
1224072006-A	No Preservative Required	OK
1224072006-B	Methanol field pres. 4 C	OK
1224072006-C	No Preservative Required	OK
1224072006-D	No Preservative Required	OK
1224072007-A	No Preservative Required	OK
1224072007-B	Methanol field pres. 4 C	OK
1224072007-C	No Preservative Required	OK
1224072007-D	No Preservative Required	OK
1224072008-A	No Preservative Required	OK
1224072008-B	Methanol field pres. 4 C	OK
1224072008-C	No Preservative Required	OK
1224072008-D	No Preservative Required	OK
1224072009-A	No Preservative Required	OK
1224072009-B	Methanol field pres. 4 C	OK
1224072010-A	No Preservative Required	OK
1224072010-B	Methanol field pres. 4 C	OK
1224072011-A	No Preservative Required	OK
1224072011-B	Methanol field pres. 4 C	OK
1224072012-A	No Preservative Required	OK
1224072013-A	HCL to pH < 2	OK
1224072013-B	HCL to pH < 2	OK
1224072013-C	HCL to pH < 2	OK
1224072013-D	HCL to pH < 2	OK
1224072013-E	HCL to pH < 2	OK
1224072013-F	No Preservative Required	OK
1224072013-G	No Preservative Required	OK
1224072014-A	HCL to pH < 2	OK
1224072014-B	HCL to pH < 2	OK
1224072014-C	HCL to pH < 2	OK
1224072014-D	HCL to pH < 2	OK
1224072014-E	HCL to pH < 2	OK
1224072014-F	No Preservative Required	OK
1224072014-G	No Preservative Required	OK
1224072015-A	HCL to pH < 2	OK
1224072015-B	HCL to pH < 2	OK
1224072015-C	HCL to pH < 2	OK
1224072015-D	HCL to pH < 2	OK
1224072015-E	HCL to pH < 2	OK
1224072015-F	No Preservative Required	OK
1224072015-G	No Preservative Required	OK
1224072016-A	HCL to pH < 2	OK
1224072016-B	HCL to pH < 2	OK
1224072016-C	HCL to pH < 2	OK
1224072016-D	HCL to pH < 2	OK
1224072016-E	HCL to pH < 2	OK
1224072016-F	No Preservative Required	OK
1224072016-G	No Preservative Required	OK
1224072017-A	HCL to pH < 2	OK
1224072017-B	HCL to pH < 2	OK
1224072017-C	HCL to pH < 2	OK
1224072017-D	HCL to pH < 2	OK
1224072017-E	HCL to pH < 2	OK
1224072017-F	No Preservative Required	OK
1224072017-G	No Preservative Required	OK

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition

Container Condition Glossary

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

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM - The container was received damaged.
FR - The container was received frozen and not usable for Bacteria or BOD analyses.
IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.
NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
QN - Insufficient sample quantity provided.

APPENDIX D
SURVEY DATA

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National Guard Federal Scout Armory Remedial Action: Survey Data Table

Survey Fieldwork - 07/19/2022

Equipment: **Trimble R12i/R10-2 GNSS Dual Frequency Receivers**
Coordinate System: **Alaska State Plane Coordinate System, Zone 9**
Geodetic Datum: **NAD83(2011) EPOCH 2010.0000**
Vertical Datum: **NAVD88**
Basis of Coordinates and Elevation: **RPK A (PID: BBCN80)**

(survey feet) (rms)

Survey ID	Location ID	Feature	Description	Northing	Easting	Elevation	GNSS Vector Observation Start Time	GNSS Vector Horizontal Precision	GNSS Vector Vertical Precision	PDOP
104	RPK A	Survey Control Monument	Stamped RPK A 9234LS 2011; held 2011 shared solution fixed in elevation and position	3,543,472.87	1,561,284.88	24.57	-	-	-	-
5001	B01	Confirmation Sample	Ground elevation measured; sample 3' below ground surface (bgs)	3,543,143.26	1,562,132.95	43.26	7/19/2022 10:30	0.05	0.03	1.3
5002	B02	Confirmation Sample	Ground elevation measured; sample 3' below ground surface (bgs)	3,543,154.40	1,562,134.90	43.08	7/19/2022 10:34	0.02	0.03	2.1
5003	B03	Confirmation Sample	Ground elevation measured; sample 3' below ground surface (bgs)	3,543,157.88	1,562,130.82	43.33	7/19/2022 10:35	0.09	0.07	2.0
5004	SW01	Confirmation Sample	Ground elevation measured; sample 1.5' below ground surface (bgs)	3,543,155.54	1,562,135.09	43.07	7/19/2022 10:36	0.03	0.05	2.1
5005	SW02	Confirmation Sample	Ground elevation measured; sample 2.5' below ground surface (bgs)	3,543,148.52	1,562,138.08	43.09	7/19/2022 10:36	0.02	0.03	1.7
5006	SW03	Confirmation Sample	Ground elevation measured; sample 2' below ground surface (bgs)	3,543,143.44	1,562,128.04	43.31	7/19/2022 10:38	0.02	0.03	1.4
5007	SW04	Confirmation Sample	Ground elevation measured; sample 2' below ground surface (bgs)	3,543,150.62	1,562,121.65	43.07	7/19/2022 10:38	0.03	0.04	1.8
5008	-	Excavation Edge		3,543,149.30	1,562,120.08	43.17	7/19/2022 10:39	0.02	0.03	2.1
5009	-	Excavation Edge		3,543,140.59	1,562,131.94	43.19	7/19/2022 10:40	0.02	0.03	1.4
5010	-	Excavation Edge		3,543,151.36	1,562,140.91	43.18	7/19/2022 10:40	0.05	0.03	1.6
5011	-	Excavation Edge		3,543,159.59	1,562,129.73	43.43	7/19/2022 10:42	0.10	0.09	1.9
5012	WP-01	Temporary Well Point	Ground elevation measured; 2.0' stickup elevation. Co-located with TP-03	3,543,102.62	1,562,128.46	43.53	7/19/2022 10:44	0.03	0.03	1.2
5013	WP-02	Temporary Well Point	Ground elevation measured; 1.7' stickup elevation. Co-located with TP-07	3,543,145.24	1,562,154.79	42.69	7/19/2022 10:48	0.02	0.02	1.3
5014	WP-03	Temporary Well Point	Ground elevation measured; 1.7' stickup elevation. Co-located with TP-08	3,543,167.54	1,562,158.13	41.44	7/19/2022 10:49	0.02	0.02	1.3
5015	WP-04	Temporary Well Point	Ground elevation measured; 1.8' stickup elevation. Co-located with TP-09	3,543,189.11	1,562,133.69	41.69	7/19/2022 10:50	0.02	0.03	1.7
5016	WP-05	Temporary Well Point	Ground elevation measured; 1.3' stickup elevation. Co-located with TP-10	3,543,191.30	1,562,060.95	41.59	7/19/2022 10:51	0.01	0.02	1.2
5017	TP-02	Test Pit	Depth of 3'	3,543,170.42	1,562,142.53	42.79	7/19/2022 10:53	0.02	0.04	1.7
5018	TP-04	Test Pit	Depth of 3'	3,543,090.96	1,562,111.16	44.66	7/19/2022 10:57	0.02	0.03	1.2
5019	TP-05	Test Pit	Depth of 3'	3,543,103.90	1,562,093.85	44.60	7/19/2022 10:58	0.02	0.03	1.4
5020	TP-06	Test Pit	Depth of 2.5'	3,543,120.24	1,562,072.46	43.96	7/19/2022 10:59	0.02	0.02	1.2
5021	TP-01	Test Pit	Depth of 3'	3,543,158.26	1,562,139.08	43.15	7/19/2022 11:00	0.03	0.04	1.8
5022	TP-02	Test Pit	Depth of 3'	3,543,170.52	1,562,142.49	42.73	7/19/2022 11:03	0.02	0.04	2.1
5023	-	Feature of Interest	Building corner	3,543,164.19	1,562,143.33	46.39	7/19/2022 11:07	0.04	0.06	1.5
5024	-	Feature of Interest	Building corner	3,543,204.53	1,562,089.69	46.43	7/19/2022 11:08	0.04	0.04	2.0
5025	-	Feature of Interest	Building corner	3,543,188.12	1,562,077.35	46.56	7/19/2022 11:08	0.04	0.03	1.5
5026	-	Feature of Interest	Building corner	3,543,150.43	1,562,127.84	48.54	7/19/2022 11:09	0.04	0.03	1.5
5027	-	Feature of Interest	Building corner	3,543,162.25	1,562,136.76	48.67	7/19/2022 11:10	0.08	0.06	2.2

Survey ID	Location ID	Feature	Description	Northing	Easting	Elevation	GNSS Vector Observation Start Time	GNSS Vector Horizontal Precision	GNSS Vector Vertical Precision	PDOP
5028	-	Feature of Interest	North corner of ramp end	3,542,862.62	1,564,219.69	25.47	7/19/2022 11:12	0.02	0.03	1.4
5029	-	Ground Control Point	North corner of ramp end	3,543,154.75	1,562,154.57	42.77	7/19/2022 11:13	0.03	0.04	1.4
5030	-	Ground Control Point	Triangular rock	3,543,193.65	1,562,166.84	41.86	7/19/2022 11:14	0.01	0.02	1.4
5031	-	Ground Control Point	Center of wood block	3,543,205.15	1,562,074.02	41.19	7/19/2022 11:16	0.02	0.03	1.4
5032	-	Ground Control Point	Center of monitoring well casing	3,543,139.83	1,562,024.17	42.95	7/19/2022 11:17	0.01	0.02	1.4
5033	-	Ground Control Point	Center of painted rock	3,543,090.84	1,562,111.34	44.85	7/19/2022 11:18	0.01	0.02	1.4
5034	-	Ground Control Point	Center of orange spray paint	3,543,149.14	1,562,119.87	43.09	7/19/2022 11:21	0.02	0.03	1.7
5035	-	Feature of Interest	Edge of 30 supersack stockpile	3,542,862.28	1,564,212.92	25.55	7/19/2022 12:50	0.02	0.02	1.3
5036	-	Feature of Interest	Edge of 30 supersack stockpile	3,542,855.45	1,564,208.65	26.59	7/19/2022 12:50	0.02	0.03	1.2
5037	-	Feature of Interest	Edge of 30 supersack stockpile	3,542,851.39	1,564,209.37	26.87	7/19/2022 12:50	0.02	0.03	1.2
5038	-	Feature of Interest	Edge of 30 supersack stockpile	3,542,834.56	1,564,228.10	25.65	7/19/2022 12:50	0.02	0.02	1.2
5039	-	Feature of Interest	Edge of 30 supersack stockpile	3,542,846.44	1,564,237.79	25.30	7/19/2022 12:51	0.02	0.03	1.2
5040	-	Feature of Interest	Edge of 30 supersack stockpile	3,542,862.25	1,564,221.08	25.00	7/19/2022 12:51	0.02	0.02	1.2

From: opus
To: Dylan Hickey
Subject: OPUS solution : 05532001.22o OP1667337270185
Date: Tuesday, November 1, 2022 1:16:33 PM

FILE: 05532001.22o OP1667337270185

NGS OPUS SOLUTION REPORT
==========

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

USER: dylan.hickey@briceenvironmental.co DATE: November 01, 2022
RINEX FILE: 0553200s.22o TIME: 21:16:10 UTC

SOFTWARE: page5 2008.25 master295.pl 160321 START: 2022/07/19 18:20:00
EPHEMERIS: igs22192.eph [precise] STOP: 2022/07/19 22:30:00
NAV FILE: brdc2000.22n OBS USED: 11813 / 12238 : 97%
ANT NAME: TRMR10-2 NONE # FIXED AMB: 56 / 59 : 95%
ARP HEIGHT: 1.5426 OVERALL RMS: 0.016(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) ITRF2014 (EPOCH:2022.5475)

X:	-2795022.726(m)	0.004(m)	-2795023.943(m)	0.004(m)
Y:	-468344.084(m)	0.010(m)	-468343.054(m)	0.010(m)
Z:	5694797.732(m)	0.007(m)	5694798.096(m)	0.007(m)

LAT:	63 41 46.21153	0.008(m)	63 41 46.18691	0.008(m)
E LON:	189 30 44.34034	0.009(m)	189 30 44.25178	0.009(m)
W LON:	170 29 15.65966	0.009(m)	170 29 15.74822	0.009(m)
EL HGT:	12.085(m)	0.004(m)	12.868(m)	0.004(m)
ORTHO HGT:	7.500(m)	0.354(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES (UTM (Zone 02))	STATE PLANE COORDINATES (SPC (5009 AK 9))
Northing (Y) [meters]	7063259.772	1080052.630
Easting (X) [meters]	525330.055	475880.625
Convergence [degrees]	0.45927222	-0.43718889
Point Scale	0.99960786	0.99990712
Combined Factor	0.99960597	0.99990523

US NATIONAL GRID DESIGNATOR: 2VNR2533063260(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DL6423	AB11 NOME_ANVILAK2006 CORS ARP	N643352.198	W1652224.358	267126.9
DL7650	AC50 BALDYMTN__AK2007 CORS ARP	N653313.869	W1643359.553	350628.5

DL7647 AC31 BALD_HEAD_AK2006 CORS ARP N643816.725 W1621420.758 414319.7

NEAREST NGS PUBLISHED CONTROL POINT

DI9673 SVAA N634117.223 W1702858.289 928.8

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

Shared Solution

Held fixed for survey.

PID: BBCN80
Designation: RPK A
Stamping: RPK A 9234LS 2011
Stability: Most reliable; expected to hold position well
Setting: In rock outcrop or ledge
Description: The station is set flush in bedrock between the Bering Sea and Rodney Kinney Road, 73.3 m (240.4 ft) NW from a pull out on the road, and 68.4 m (224.5 ft) NNW from the intersection of the road and a ramp to the tundra.
Observed: 2011-06-24T18:14:00Z more obs Original
Source: OPUS - page5 1209.04

Close-up View

REF_FRAME:	EPOCH:	SOURCE:	UNITS:	SET PROFILE	DETAILS
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID12B)	m		

LAT:	63° 41' 46.21351"	± 0.002	m
LON:	-170° 29' 15.66268"	± 0.005	m
ELL HT:	12.075	± 0.009	m
X:	-2795022.674	± 0.006	m
Y:	-468344.033	± 0.004	m
Z:	5694797.750	± 0.007	m
ORTHO HT:	7.490	± 0.016	m

	UTM 2	SPC 5009(AK 9)
NORTHING:	7063259.832m	1080052.691m
EASTING:	525330.013m	475880.584m
CONVERGENCE:	0.45927151°	-0.43718980°
POINT SCALE:	0.99960786	0.99990712
COMBINED FACTOR:	0.99960597	0.99990523

CONTRIBUTED BY

erik
JOA Surveys, LLC

Horizon View

The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

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APPENDIX E
CONCEPTUAL SITE MODEL

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Print Form

Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: AKARNG Savoonga Federal Scout Armory

File Number: 670.38.002

Completed by: Brice Engineering, 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: Heating oil lines

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:

Current and future recreational and subsistence users may potentially ingest soil by consuming fine particles that adhere to skin surfaces, particularly on the hands.

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:

Current and future residents, construction workers, site visitors, trespassers, and subsistence harvesters and consumers may potentially come into contact with soil containing contaminants listed in Appendix B of the ADEC Guidance on Developing CSMs (ADEC 2017)

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 groundwater 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:

In the absence of a determination in accordance with 18 AAC 75.350, supra-permafrost porewater could be considered a potential future drinking water source, therefore the ingestion of groundwater is a potentially complete exposure pathway for future receptors.

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: Complete

Comments:

Incidental ingestion of surface water could occur during recreation activities or subsistence harvesting.

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:

Contaminants have the potential to bioaccumulate. Phenanthrene in soil and benz[a]anthracene in supra-permafrost porewater are present in concentrations below 1/10 of their respective screening levels. The exposure pathway is considered insignificant.

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:

Volatile compounds have been detected in soil and supra-permafrost porewater. Savoonga has a cold climate and most buildings are elevated off the ground surface, which reduces the potential effects of outdoor air inhalation.

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 present at the site and are currently unoccupied, however, may be occupied in the future. Savoonga has a cold climate and most buildings are elevated off the ground surface, reducing the potential effects of indoor air inhalation.

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 deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

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

Comments:

Dermal contact with surface water and porewater could occur during recreation activities, subsistence harvesting, or construction activities.

Inhalation of Volatile Compounds in Tap Water

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

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

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

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

Comments:

Supra-permafrost porewater could be considered a potential future drinking water source, therefore, there is a complete current or future inhalation of tap water vapor pathway. Detected volatile contaminant concentrations in supra-permafrost porewater are all below 1/10 of the screening levels; therefore, these exposure pathways are considered insignificant.

Surface water is not used currently for domestic purposes at the Savoonga FSA. However, this pathway is considered potentially complete for future receptors due to presence of volatile compounds in surface soils that could migrate to surface 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.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

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

Comments:

Inhalation of particulates by all receptors is considered a potentially complete exposure pathway. Soil disturbance could re-suspend dust that may be inhaled, rendering this exposure pathway potentially complete. However, it should be noted that under current and likely future conditions, the climate and vegetation minimize this potential exposure pathway.

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:

Current and future receptors could be exposed to chemicals in sediment via incidental ingestion or dermal contact during recreation activities or subsistence harvesting.

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

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: AKARNG Savoonga Federal Scout Armory

Completed By: Brice Engineering, LLC

Date Completed: October 2022

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

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

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

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

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

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

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil — check soil	☑ soil	☑ Incidental Soil Ingestion	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Migration to subsurface — check soil		☑ Dermal Absorption of Contaminants from Soil	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Migration to groundwater — check groundwater		☑ Inhalation of Fugitive Dust	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Volatilization — check air									
	☑ Runoff or erosion — check surface water									
	☑ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil — check soil	☑ groundwater	☑ Ingestion of Groundwater	F	F	F	F	F	F	
	☑ Migration to groundwater — check groundwater		☑ Dermal Absorption of Contaminants in Groundwater	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Volatilization — check air		☑ Inhalation of Volatile Compounds in Tap Water	F	F	F	F	F	F	
	☑ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Ground-water	☑ Direct release to groundwater — check groundwater	☑ air	☑ Inhalation of Outdoor Air	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Volatilization — check air		☑ Inhalation of Indoor Air	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Flow to surface water body — check surface water		☑ Inhalation of Fugitive Dust	C/F	C/F	C/F	C/F	C/F	C/F	
	☑ Flow to sediment — check sediment									
	☑ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Surface Water	☐ Direct release to surface water — check surface water	☑ surface water	☑ Ingestion of Surface Water	C/F	C/F	C/F	C/F	C/F	C/F	
	☐ Volatilization — check air		☑ Dermal Absorption of Contaminants in Surface Water	C/F	C/F	C/F	C/F	C/F	C/F	
	☐ Sedimentation — check sediment		☑ Inhalation of Volatile Compounds in Tap Water	F	F	F	F	F	F	F
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment	☑ sediment	☑ Direct Contact with Sediment	C/F	C/F	C/F	C/F	C/F	C/F	
	☐ Resuspension, runoff, or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
		☑ biota	☑ Ingestion of Wild or Farmed Foods	I	I	I	I	I	I	

APPENDIX F
REGULATORY CORRESPONDENCE

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ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites and Prevention Preparedness and Response Programs

Contaminated Media Transport and Treatment or Disposal Approval Form

HAZARD ID # or SPILL ID #	NAME OF CONTAMINATED SITE OR SPILL	
670.38.002 / 3099	AKARNG Savoonga FSA	
CONTAMINATED SITE OR SPILL LOCATION – ADDRESS OR OTHER APPROPRIATE DESCRIPTION		
Unnamed Road, Savoonga, AK 99769 / Latitude 63.695351, Longitude -170.482766		
CURRENT PHYSICAL LOCATION OF MEDIA	**SOURCE OF THE CONTAMINATION (DAY TANK, FIRE TRAINING PIT, LUST, ETC.)**	
Savoonga, AK	Spills or leaks of heating oil from ASTs	
CONTAMINANTS OF CONCERN	**ESTIMATED VOLUME**	**DATE(S) GENERATED**
Petroleum (DRO, RRO, GRO, VOC, PAH)	30 tons	July 2022
POST TREATMENT ANALYSIS REQUIRED *(such as GRO, DRO, RRO, VOCs, metals, PFAS, and/or Chlorinated Solvents)*		
N/A, soil will be disposed of at a landfill		
COMMENTS OR OTHER IMPORTANT INFORMATION		
Soil is contained in 1-cy supersacks and will be transported by barge to Seattle, Washington, then by rail to the disposal facility in Arlington, Oregon.		

TREATMENT FACILITY, LANDFILL, AND/OR FINAL DESTINATION OF MEDIA	PHYSICAL ADDRESS/PHONE NUMBER
Columbia Ridge Landfill	8177 Cedar Springs Ln, Arlington, OR 97812 / (541) 454-2030
RESPONSIBLE PARTY	**ADDRESS/PHONE NUMBER**
AKARNG	P.O. Box 5169, JBER AK 99505 / (907) 428-7696
WASTE MANAGEMENT CO. / ORGANIZER	**ADDRESS/PHONE NUMBER**
Brice Engineering, LLC (Contractor)	3700 Centerpoint Dr. Suite 800, Anchorage, AK 99503 (907) 227-7390

***Note, disposal of polluted soil in a landfill requires prior approval from the landfill operator and ADEC Solid Waste Program.**

Monica Oakley
Name of the Person Requesting Approval (printed)

PM/Brice Engineering
Title/Association

Monica Oakley Digitally signed by Monica Oakley Date: 2022.08.12 09:00:50 -08'00'
Signature

8/12/22
Date

907-227-7390
Phone Number

----------DEC USE ONLY----------

Based on the information provided, ADEC approves transport of the above mentioned material. The Responsible Party or their consultant must submit to the DEC Project Manager a copy of weight receipts of the loads transported and a post treatment analytical report, if disposed of at an approved treatment facility. The contaminated soil shall be transported as a covered load in compliance with 18 AAC 60.015.

Flannery Ballard
DEC Project Manager Name (printed)

EPS III
Project Manager Title

Flannery Ballard Digitally signed by Flannery Ballard Date: 2022.08.17 08:20:33 -08'00'
Signature

8/17/2022
Date

907-465-5368
Phone Number

Instructions to Complete
Contaminated Media Transport and Treatment or Disposal Approval Form

The Alaska Department of Environmental Conservation (DEC) must approve the movement or disposal of contaminated soil and water from a site in accordance with 18 Alaska Administrative Code (AAC) 75.325(i), 18 AAC 75.370(b), and 18 AAC 78.274(b). The *Contaminated Media Transport and Treatment or Disposal Approval Form* should be used to document this approval. Soil treatment facilities regulated under 18 AAC 75.365 are required by their Operations Plans to only accept contaminated soil for which an approval form has been signed by a DEC project manager.

Site information can be found on the Contaminated Site Database (www.alaska.gov/Applications/SPAR/PublicMVC/CSP/Search/) or the Spills Database (http://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/SpillSearch).

Instructions to Complete:

1. **Hazard ID or Spill ID #:** For a contaminated site, the Hazard ID can be found on the Contaminated Sites Database. For a spill, the Spill ID can be found in the subject line of letters from DEC or the Spills Database. If the waste originates from multiple sites, all Hazard IDs or Spill IDs must be listed.

2. **Name of Contaminated Site or Spill:** For a contaminated site, the official site name can be found on the Contaminated Sites Database. For a spill, the official name of the spill is found in the subject line of letters from DEC or the Spills Database.

3. **Contaminated Site or Spill Location – Address or Other Appropriate Description:** This address or description captures the origin of the contaminated media or the location of the spill. For a contaminated site, the address or other appropriate description can be found on the Contaminated Sites Database. For a spill, this can be found on the Spill Report or the Spills Database.

4. **Current Physical Location of the Media:** Provide the physical location where the contaminated media (soil, water, etc.) is currently stored. This location may be the same as location provided in the "Contaminated Site or Spill Location", or it could be a hazardous waste facility or other location/staging area agreed upon in the DEC-approved work plan.

5. **Source of Contamination (Day Tank, Fire Training Pit, LUST, etc.):** List all sources which contributed to the contamination in the media being transported. Sources can include previous releases that have comingled. If the source is unknown, state "Unknown".

6. **Contaminants of Concern (CoCs):** List all contaminants detected above the most stringent Method 2 Tables B1 and B2 soil cleanup levels in 18 AAC 75.341(c) and (d), the Table C groundwater cleanup levels in 18 AAC 75.345, and other applicable action levels (e.g., TCLP results). Attach the laboratory data package for the contaminated media that is being disposed of and, if applicable, a data summary table or narrative to this form. Data gathered during site characterization activities may be sufficient to determine the CoCs. There are situations in which generator knowledge of the contaminant source may be accepted by a treatment or disposal facility in lieu of analytical sample results, such as, diesel-impacted media from a heating oil tank. If you are using generator knowledge in lieu of analytical sample results, include a statement which documents this knowledge in the Comments section.

7. **Estimated Volume:** Include the total volume of contaminated media to be transported; for instance, “Nine 55-gallon drums” or “”25 cubic yards of soil.”

8. **Date(s) Generated:** Provide the date the media was generated (e.g., excavated, pumped out of the ground, etc.). If the media was generated over multiple days, list the range of dates.

9. **Post Treatment Analysis Required (such as GRO, DRO, RRO, VOCs, PAHs, metals, PFAS, chlorinated solvents, etc.):** Provide the list of all contaminants that exceed the most stringent Method 2 cleanup levels. For DEC-approved soil treatment facilities in Alaska, specific post treatment analyses will be determined by the facility based upon the contaminants and requirements of their Operations Plan. If the media are being transported to a landfill or permitted liquid waste facility without off-site treatment, include “Not Applicable”.

10. **Comments or Other Important Information:** Provide any other information which needs to be conveyed.
    a. If generator knowledge of the CoCs is being used in lieu of sample analytical results, an explanation needs to be provided in this field.
    b. If the material is going to be placed in a landfill in Alaska, include a statement that the landfill has agreed to accept the material and provide the contact information for the landfill point of contact. If the material is going to be placed in a Class 2 or 3 landfill, attach the DEC Solid Waste Program’s approval letter to this form.
    c. If the media is going to an intermediate location or facility prior to its final destination, describe the complete transportation route with intermediate locations in this field.

11. **Treatment Facility, Landfill, and/or Final Destination of Media:** Include the name of the facility, landfill, or the final destination of the media. A list of DEC-approved Alaskan soil treatment facilities is available at www.dec.alaska.gov/spar/csp/offsite-remediation/. If multiple treatment facilities will be used, use separate forms to document what media will go to which facility. For material that will go to a waste transfer facility prior to disposal at another facility, the final destination should be listed.
    a. **Physical Address/Phone Number:** Provide the physical location and telephone number of the facility, landfill, or the final destination of the media.

12. **Responsible Party:** Provide the name of the party responsible for the contaminated site or spill.
    a. **Address/Phone Number:** Provide the mailing address and telephone number of the responsible party.

13. **Waste Management Co./Organizer:** Provide the name of company or person shipping and/or organizing the shipment of the media.
    a. **Address/Phone Number:** Provide the mailing address and telephone number of the waste management company or organizer.

Submit this completed form along with all necessary attachments to the assigned DEC project manager for approval, or contact the Contaminated Sites Program at (907) 269-7558 or the Prevention, Preparedness and Response Program at (907) 269-7557.

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