ALEUT

TECHNICAL MEMORANDUM

2025 WORK PLAN ADDENDUM

Date:	04/03/2025
Revision:	0
Project:	Hilcorp Beaver Creek Unit Pad 4, Cannery Loop Unit Pad 3, Kenai Gas Field, Swanson River Field, and Beluga River Unit Groundwater Monitoring Program
To:	Peter Campbell, Alaska Department of Environmental Conservation
From:	Marshall Farris, Hilcorp Alaska, LLC
Attachments	Attachment 1 – Figures Attachment 2 – Tables Attachment 3 – Standard Operating Procedures Attachment 4 – Laboratory Certifications Attachment 5 – Resumes

1. INTRODUCTION

This Work Plan Addendum describes the sampling activities that will be performed by Aleut Environmental Remediation, LLC (Aleut) as part of long-term groundwater monitoring at Beaver Creek Unit Pad 4 (BCU4), Cannery Loop Unit Pad 3 (CLU3), Kenai Gas Field (KGF), Swanson River Field (SRF), and Beluga River Unit (BRU) in Kenai and Cook Inlet, Alaska (Attachment 1, Figures 1-6) during the 2025 field effort. This Work Plan Addendum is intended to supplement the Final 2021 Groundwater Monitoring Program Work Plans (2021 Work Plans) prepared by Brice Engineering, LLC (Brice 2021a, 2021b), and the 2024 Work Plans prepared by Aleut (Aleut 2024c, 2024d, 2024e, 2024f), collectively referred to as the 2021 and 2024 Work Plans. Sites included in this project are BCU4 North, BCU4 South, CLU3, KGF Pad 14-6, KGF Pad 34-31, KGF Pad 41-7, KGF Pad 41-18, SRF Tank Settings (TS) 1-4, SRF TS 1-9, SRF TS 1-27, SRF TS 1-33, SRF TS 2-15, SRF TS 3-4, SRF TS 3-9, Soldotna Creek Unit (SCU) 21B-16, SCU 23B-03, SCU 312-09, Swanson River Unit (SRU) 43B-15, SRU 14-15, and BRU 224-13 (M Pad). Table 1-1 summarizes the Alaska Department of Environmental Conservation (ADEC) reference numbers and Hazard identification numbers (IDs) for each site.

Table 1-1: ADEC Reference Summary

SITE NAME	ADEC FILE NUMBER	ADEC HAZARD ID
BCU4 North	2320.38.081	26624
BCU4 South	2320.38.007	1005
CLU3	2320.38.012	2063
KGF Pad 14-6	2320.38.029	2434
KGF Pad 34-31	2320.38.031	3331
KGF Pad 41-7	2320.38.032	3191
KGF Pad 41-18	2320.38.033	3189
SRF TS 1-4	2334.38.018	441
SRF TS 1-9	2334.38.019	448
SRF TS 1-27	2334.38.020	442
SRF TS 1-33	2334.38.021	443
SRF TS 2-15	2334.38.022	444
SRF TS 3-4	2334.38.023	445
SRF TS 3-9	2334.38.024	446
SCU 21B-16	2334.38.063	27214
SCU 23B-03	2334.38.058	26526
SCU 312-09	2334.38.062	27210
SRU 14-15	2334.38.061	27209
SRU 43B-15	NA	NA
BRU 224-13 (M Pad)	2337.38.021	989

Notes:
NA = not assigned to ADEC contaminated sites – SRU 43B-15 under ADEC Spill Number 21239932801.

1.1 Site Background

Previous monitoring activities have been conducted at BCU4 and KGF since 1995, CLU3 since 1998, and SRF since 2000, as described in the 2023 and 2024 Groundwater Monitoring Program Reports for BCU4, CLU3, KGF, SRF, SCU, SRU, and BRU (Aleut 2023a, 2023b, 2024a, 2024b, 2025a, 2025b, 2025c, 2025d).

1.2 Key Personnel and Qualifications

Key personnel of this project, along with their roles and contact information, are provided in Table 1-2. Groundwater monitoring activities will be conducted by Aleut personnel who meet the requirements of ADEC Qualified Environmental Professionals (QEPs) in accordance with Title 18 Alaska Administrative Code (AAC) Chapter 75.333(b) (ADEC 2024a) or will be under the direct supervision of QEPs if not yet meeting ADEC Qualified Sampler or QEP experience requirements. Resumes are provided in Attachment 5.

Table 1-2: Key Personnel and Contact Information

NAME	ORGANIZATION	TITLE	PHONE NUMBER	EMAIL
Marshall Farris	Hilcorp	Project Manager	(907) 777-8308	marshall.farris@hilcorp.com
Jacob Nordwall	Hilcorp	Health and Safety Representative	(907) 777-8418	Jacob.nordwall@hilcorp.com
Chad Johnson	Hilcorp	BCU, CLU, KGF Foremen	(907) 283-1325	cjohnson@hilcorp.com
Jason Hobart	Hilcorp	KGF Field Environmental Specialist	(907) 283-1358	jhobart@hilcorp.com
Mike Chivers/ Mike Morgan	Hilcorp	BCU Lead Operators	(907) 283-1316 (907) 283-1317	mchivers@hilcorp.com/ mmorgan@hilcorp.com
Taylor Malone	Hilcorp	SRF, SCU, SRU Foreman	(907) 283-2541	tmalone@hilcorp.com
Andrew Tuttle/ Jesse Katzenberger	Hilcorp	SRF, SCU, SRU Lead Operators	(907) 283-2543	antuttle@hilcorp.com jekatzenberger@hilcorp.com
Joe Nightingale	Hilcorp	BRU Foreman	(907) 263-3930	jnightingale@hiclrop.com
Brandon Bauer/ Brian Woolley	Hilcorp	BRU Lead Operators	(907) 263-3905	bbauer@hilcorp.com bwoolley@hiclorp.com
Sara Hadden	Aleut	Project Chemist	(907) 350-0712	sara.hadden@aleutfederal.com
Quinn Meehan	Aleut	Project Manager	(808) 394-7940	quinn.meehan@aleutfederal.com
Brad Ramsay	Aleut	Field Support/ Environmental Scientist	(907) 310-3285	brad.ramsay@aleutfederal.com
Nathaniel Gingery	Aleut	Field Support/ Chemist	(907) 947-7905	nathaniel.gingery@aleutfederal.com
Ethan Gaddy	Aleut	Field Support/ Geologist	(252) 305-5496	ethan.gaddy@aleutfederal.com
Josie Chong Foo Yuen	Aleut	Field Support/ Chemist	(315) 927-9822	josie.chongfooyuen@aleutfederal.com
Anna Wen	Aleut	Field Support/ Environmental Scientist	(907) 223-5927	anna.wen@aleutfederal.com

1.3 Project Schedule

The proposed project schedule is provided in Table 1-3.

Table 1-3: Project Schedule

DESCRIPTION	DURATION (DAYS)	START DATE	END DATE
Planning			
Draft Work Plan	120	12/1/2025	3/30/2025
ADEC Review	30	3/31/2025	4/29/2025
Response to ADEC Comments	7	4/30/2025	5/6/2025
Final Work Plan	10	5/7/2025	5/16/2025
Field Work			
Spring/Early Summer Field Activities	26	5/19/2025	6/21/25
Late Summer Field Activities	22	8/15/2025	9/5/2025
Laboratory Analysis	130	6/5/2025	10/13/2025
Reporting			
Draft Reporting (5 Staggered Reports)	180	8/14/2025	2/10/2026
ADEC Reviews	120	11/12/2026	3/12/2026
Response to ADEC Comments	104	12/12/2025	3/26/2026
Final Reporting	90	01/11/2026	4/11/2026

2. REGULATORY FRAMEWORK

Analytical results from groundwater samples will be compared to the groundwater cleanup levels listed in 18 AAC 75.345, Table C as presented in 18 AAC 75 (ADEC 2024a). Analytical results from surface water samples will be used to calculate total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH), and these results will be compared to the criteria presented in 18 AAC 70.020 (ADEC 2024b). Laboratory reporting limits for the selected laboratories, SGS North America, Inc. (SGS) in Anchorage, Alaska and Bio-Chem Laboratory in Grand Rapids, MI, are also provided in Table 2-1. Waste characterization results for drilling cuttings and spent granular activated carbon (GAC) will be compared to the limits outlined in Title 40 of the Code of Federal Regulations Part 261, Section 24 (40 CFR 261.24; refer to Table 2-2).

Table 2-1: Groundwater Cleanup Levels and Surface Water Quality Criteria

ANALYTE	ANALYTICAL METHOD	PROJECT SCREENING LEVELS[1] (µg/L)	LAB DETECTION LIMIT[2] (µg/L)	LAB LIMIT OF DETECTION[2] (µg/L)	LAB LIMIT OF QUANTITATION[2] (µg/L)
GRO	AK101	2200	45	75	100
DRO	AK102	1500	200	450	600
RRO	AK103	1100	200	375	500
Benzene	SW8260	4.6	0.12	0.3	0.4
Toluene	SW8260	1100	0.31	0.75	1
Ethylbenzene	SW8260	15	0.31	0.75	1
Total xylenes	SW8260	190	1	2.25	3
n-Butylbenzene	SW8260	1000	0.31	0.75	1
sec-Butylbenzene	SW8260	2000	0.31	0.75	1
tert-Butylbenzene	SW8260	690	0.31	0.75	1
Isopropylbenzene (cumene)	SW8260	450	0.31	0.75	1
Naphthalene	SW8260	1.7	0.31	0.75	1
1,2,4-Trimethylbenzene	SW8260	56	0.31	0.75	1
1,3,5-Trimethylbenzene	SW8260	60	0.31	0.75	1
1-Methylnaphthalene	SW8270-SIM PAH	11	0.015	0.0375	0.05
2-Methylnaphthalene	SW8270-SIM PAH	36	0.015	0.0375	0.05
Acenaphthene	SW8270-SIM PAH	530	0.015	0.0375	0.05
Acenaphthylene	SW8270-SIM PAH	260	0.015	0.0375	0.05
Anthracene	SW8270-SIM PAH	1800	0.015	0.0375	0.05
Benz[a]anthracene	SW8270-SIM PAH	0.3	0.015	0.0375	0.05
Benzo[a]pyrene	SW8270-SIM PAH	0.25	0.0062	0.015	0.02
Benzo[b]fluoranthene	SW8270-SIM PAH	2.5	0.015	0.0375	0.05
Benzo[g,h,i]perylene	SW8270-SIM PAH	600	0.015	0.0375	0.05
Benzo[k]fluoranthene	SW8270-SIM PAH	25	0.015	0.0375	0.05
Chrysene	SW8270-SIM PAH	250	0.015	0.0375	0.05
Dibenz[a,h]anthracene	SW8270-SIM PAH	0.25	0.0062	0.015	0.02
Fluoranthene	SW8270-SIM PAH	800	0.015	0.0375	0.05
Fluorene	SW8270-SIM PAH	290	0.015	0.0375	0.05
Indeno[1,2,3-cd]pyrene	SW8270-SIM PAH	2.5	0.015	0.0375	0.05
Naphthalene	SW8270-SIM PAH	1.7	0.031	0.075	0.1
Phenanthrene	SW8270-SIM PAH	170	0.031	0.075	0.1
Pyrene	SW8270-SIM PAH	120	0.015	0.0375	0.05
Ethylene glycol	8015	40000	3000[3]	6000[3]	10000[3]
TAH	EPA 624	10[4]	NA	NA	NA
TAqH	EPA 625	15[4]	NA	NA	NA

Notes:

[1] Groundwater cleanup levels as listed in 18 AAC 75.345, Table C (ADEC 2024a), unless otherwise noted.

[2] Limits presented are from SGS, unless otherwise noted.

[3] Limits presented are for Bio-Chem Laboratory. Ethylene glycol is the only analyte that will be sent to this laboratory.

[4]Surface water quality criteria from 18 AAC 70.020 (ADEC 2024b).
µg/L = micrograms per liter
DRO = diesel range organics
GRO = gasoline range organics
RRO = residual range organics
TAH = total aromatic hydrocarbons, the sum of benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations
TAqH = total aqueous hydrocarbons, the sum of BTEX and PAH (excluding 1-methylnaphthalene and 2-methylnaphthalene) concentrations

Table 2-2: Waste Characterization Criteria

ANALYTE	ANALYTICAL METHOD	UNITS	WASTE CHARACTERIZATION CRITERA[1]
Arsenic	SW1311/SW6020B	mg/L	5
Barium	SW1311/SW6020B	mg/L	100
Cadmium	SW1311/SW6020B	mg/L	1
Chromium	SW1311/SW6020B	mg/L	5
Lead	SW1311/SW6020B	mg/L	5
Selenium	SW1311/SW6020B	mg/L	1
Silver	SW1311/SW6020B	mg/L	5
Benzene	SW1311/SW8260D	mg/L	0.5
Carbon tetrachloride	SW1311/SW8260D	mg/L	0.5
Chlorobenzene	SW1311/SW8260D	mg/L	100
Chloroform	SW1311/SW8260D	mg/L	6
1,2-dichloroethane	SW1311/SW8260D	mg/L	0.5
1,1-dichloroethene	SW1311/SW8260D	mg/L	0.7
2-butanone (MEK)	SW1311/SW8260D	mg/L	200
Tetrachloroethene	SW1311/SW8260D	mg/L	0.7
Trichloroethene	SW1311/SW8260D	mg/L	0.5
Vinyl chloride	SW1311/SW8260D	mg/L	0.2
1,4-dichlorobenzene	SW1311/SW8270E	mg/L	7.5
2,4-dinitrotoluene	SW1311/SW8270E	mg/L	0.13
Hexachlorobenzene	SW1311/SW8270E	mg/L	0.13
Hexachloro-1,3-butadiene	SW1311/SW8270E	mg/L	0.5
Hexachloroethane	SW1311/SW8270E	mg/L	3
Nitrobenzene	SW1311/SW8270E	mg/L	2
Pyridine	SW1311/SW8270E	mg/L	5
3&4-methyl phenol	SW1311/SW8270E	mg/L	200
2-methylphenol	SW1311/SW8270E	mg/L	200
Pentachlorophenol	SW1311/SW8270E	mg/L	100
2,4,5-trichlorophenol	SW1311/SW8270E	mg/L	400
2,4,6-trichlorophenol	SW1311/SW8270E	mg/L	2

Table 2-2: Waste Characterization Criteria

CHARACTERISTIC WASTE		
ANALYTE	**ANALYTICAL METHOD**	**WASTE CHARACTERIZATION CRITERIA**
pH	W9045B/ SW9040C	<2 or >12.5
Ignitability/flashpoint	SW1020A	Flash point below 60 °C

[1] TCLP limits are the maximum concentration of contaminants for the toxicity characteristic (EPA, May 1980)
< = less than
> = Greater than
°C = degrees Celsius
mg/L = milligrams per liter
TCLP = toxicity characteristic leaching procedure

3. FIELD ACTIVITIES

Visual site assessments; groundwater monitoring well inspections; maintenance (as needed); gauging, purging and sampling; free product recovery; and surface water sampling will be conducted in accordance with the ADEC *Field Sampling Guidance* (ADEC 2024c), procedures in the 2021 and 2024 Work Plans (Brice 2021a, 2021b; Aleut 2024c, 2024d, 2024e, 2024f), and the updated 2025 field activities described below. Table 3-1 summarizes the anticipated field activities for 2025, including the total number of wells at each site to be inspected and sampled/gauged, the number of wells anticipated to contain light non-aqueous phase liquid (LNAPL), and planned surface water samples. Table 3-2 identifies updates to the 2021 Work Plans (Brice 2021a, 2021b). No updates to the 2024 Work Plans are planned (Aleut 2024c, 2024d, 2024e, 2024f). All monitoring wells sampled on a biennial basis and wells scheduled for sampling once every four years are on opposite sampling schedules for 2025. The wells that will be sampled in 2025 and their associated sampling frequency are noted in the attached Well Status Table (Table 1, Attachment 2). Additionally, site-specific sampling information and 2025 recommendations are provided in the attached Well Status Table (Table 1, Attachment 2). The well locations and associated status (gauge only, sample, decommission, etc.) are identified for each site in Figures 7 through 26 (Attachment 1). The 2021 and 2024 Work Plans (Brice 2021a, 2021b; Aleut 2024c, 2024d, 2024e, 2024f) and this 2025 Work Plan Addendum will be provided in the field for field personnel.

Table 3-1: 2025 Site Summary

SITE NAME	WELLS TO BE INSPECTED[1]	WELLS TO BE SAMPLED[2] AND GAUGED	WELLS TO BE GAUGED ONLY	ANTICIPATED LNAPL WELLS	SURFACE WATER SAMPLES	NUMBER OF WELLS TO BE DECOMMISSIONED/ REPLACED
BCU4 North	5	5	0	0	0	0
BCU4 South	16	4	12	2	0	0
CLU3	14	7	7	0	0	1[3]
KGF Pad 14-6	26	12	14	2	8	1[3]
KGF Pad 34-31	16	10	6	0	0	0
KGF Pad 41-7	16	15	1	0	7	0
KGF Pad 41-18	14	9	5	0	5	0
SRF TS 1-4	8	7	1	2	1	0
SRF TS 1-9	12	6	6	3	0	0
SRF TS 1-27	7	4	3	0	0	0
SRF TS 1-33	11	6	5	0	0	1[4]
SRF TS 2-15	5	1	4	0	0	0
SRF TS 3-4	12	6	6	2	0	0
SRF TS 3-9	14	8	6	3	0	0
SCU 21B-16	1	1	0	0	2	0
SCU 23B-03	3	3	0	0	0	0
SCU 312-09	3	3	0	0	0	0
SRU 14-15	1	1	0	0	0	0
SRU 43B-15	3	3	0	0	0	0
BRU 224-13 (M Pad)	3	3	0	1	0	0

Notes:

[1] Maintenance to be conducted as needed.

[2] Primary samples only, quality control (QC) not included in totals.

[3] Decommission only. Well is not scheduled for replacement.

[4] Replacement well.

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
Section 3.1 Monitoring Well Inspection and Maintenance	If sheen/product is indicated in an anticipated LNAPL well (indicated in Table 1, Attachment 2), product recovery activities will be conducted as needed and no samples will be collected. Product recovery efforts will be conducted using a poly bailer. Poly bailers will be deployed to remove product with as much product and as little water removed as possible. Sorbent socks in LNAPL wells will be removed, assessed, and recorded. Sorbent socks containing less than 50 percent (%) saturation will be flipped and placed back down the well after gauging activities are complete. Removed sorbent socks will be disposed of in an oily-waste bag segregated by site and labeled with the site name and well. A new sorbent sock will be placed in the well if necessary.	None
Section 3.2 Monitoring Well Gauging Procedures	Groundwater levels will be gauged in all viable monitoring wells at each site (i.e., BCU4 North, CLU3, KGF 14-6, SRF TS 1-4, SCU 23B-03, etc.) within a 12-hour time period.	Standard Operating Procedure (SOP)-10 Groundwater Gauging, Monitoring, and Sampling
Section 3.3 Monitoring Well Decommissioning, Installation, and Development	If redevelopment of a well is necessary, SOP-9 will be referenced. Well decommissioning and/or installation activities included in the 2025 scope are identified in Table 3-1, the Well Status Table (Table 1, Attachment 2), and Figures 10, 17, and 21 (Attachment 1). Well MW-A at KGF 14-6 is located outside the monitoring well network and was recommended for decommissioning. This will be performed in conjunction with 2025 drilling activities. Any other well maintenance requiring a drill rig will be identified during the 2025 gauging and sampling event and addressed during drilling activities.	SOP-9 Monitoring Well Installation, Development, and Decommissioning

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
Section 3.4 Analytical Sampling	A summary of the analytical methods and associated glassware are included in the Summary of Analyses table (Table 3, Attachment 2) Analytical Waste Sampling Procedures: Waste characterization samples will be collected from spent GAC and containerized waste soil cuttings prior to transferring to Hilcorp for disposal. A five-point composite sediment sample will be collected from each waste stream (e.g., the spent GAC and soil cuttings as separate waste streams) and placed into the laboratory-supplied jar. Waste characterization samples will be analyzed for ignitability (SW1020), toxicity characteristic leaching procedure (TCLP) VOCs (SW8260), TCLP SVOCs (SW8270), TCLP metals (SW6020), and pH (SW9045).	SOP-10 Groundwater Gauging, Monitoring, and Sampling
Section 3.4.1 Groundwater Sampling Procedures	If no sheen/product is indicated in an anticipated LNAPL well (Table 1, Attachment 2) and this is the first or second time the well is being sampled, the well will be sampled for petroleum-related VOCs (including BTEX) and PAHs, unless otherwise specified in the Well Status Table (Table 1, Attachment 2).	SOP-10 Groundwater Gauging, Monitoring, and Sampling
Section 3.4.2 Surface Water Sampling Procedures (Brice 2021a only)	None	SOP-11 Surface Water Sampling

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
Section 3.4.3 Analytical Methods and Quality Assurance/Quality Control (Section 3.4.2 in Brice 2021b)	At a minimum, one field duplicate (FD) sample will be collected for every 10 or fewer primary samples, for each matrix sampled, and for each target analyte. FDs will be collected at the same location as the primary sample and will be submitted to the laboratory blind with unique sample IDs. When possible, a FD will be included with every sample delivery group (SDG) and each facility will be represented in separate SDGs (KGF sites may be represented in the same SDG). FDs will be designated by adding a “Z” after the sample location (e.g., KGF417-MW27RZ-25, SRF215-TS215OZ-25, etc.). A sample collection time of 1 hour before sample collection will be created for the duplicate and recorded on the sample labels and Chain-of-Custody (CoC) forms to ensure it is a blind duplicate. Matrix spike (MS)/matrix spike duplicate (MSD) samples will be collected at a frequency of 5% (one MS/MSD set for every 20 or fewer primary samples). When possible, an MS/MSD set will be included with every SDG. One trip blank will accompany each cooler that contains samples for volatile analyses (AK101, SW8260D, etc.). Trip blanks will be identified as TB01-DATE (e.g., TB01-070225, TB02-070225 and TB01-071525, TB02-072125, etc.).	SOP-14 Quality Control Samples

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
Section 3.4.4 Sample Identification (Section 3.4.3 in Brice 2021b)	Collected samples will be assigned a unique field-sample ID reflecting the sample year and location. Groundwater samples will be numbered with unique identifiers as follows: • The first set of digits designates the site identification (e.g., "CLU3" for CLU3, "BCU4N" for BCU4 North, "BCU4S" for BCU4 South, "KGF146" KGF Pad 14-6, "KGF417" KGF Pad 41-7, "KGF4118" KGF Pad 41-18, "SRF14" for SRF TS 1-4, "SRF19" for SRF TS 1-9, "SRF127" for SRF TS 1-27, "SRF133" for SRF TS 1-33, "SRF215" for SRF TS 2-15, "SRF34" for SRF TS 3-4, "SRF39" for SRF TS 3-9, "SCU21B16" for SCU 21B-16, "SCU23B03" for SCU 23B-03, "SCU31209" for SCU 312-09, "SRU1415" for SRU 14-15, "SRU43B15" for SRU 43B-15, and "BRUM" for BRU 224-13 [M Pad]) • The second set of digits indicates the sample location (e.g., "AP4" for monitoring well AP-4, "MW21R2" for monitoring well MW-21R2, "FS14E" for monitoring well FS1-4E, "TS127L" for monitoring well TS1-27L, or "SW01" for surface water sample location 1, etc.) • The third set of digits indicates the last two digits of the fiscal year (e.g., "25" for 2025) • A fourth set of digits will be used if a sample is collected more than once in the same fiscal year (e.g., "-2" for a sample collected at another time, "-3" if a sample needs to be collected again, etc.) Examples of sample IDs are as follows: • BCU4S-AP10R-25 • CLU3-PZ1-25 • KGF3431-MW11-25 • SRF133-FS133F-25 • SRF39-TS39CR-25 • SRU1415-MW01-25-2	None
Section 3.5 Sample Handling and Chain-of-Custody	Samples will be transported to Anchorage by vehicle, Hilcorp aircraft, or commercial airline.	SOP-17 Sample Management
Section 3.6 Decontamination	None	SOP-15 Equipment Decontamination

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
Section 3.7 Waste Management	Estimated waste stream quantities were updated in the attached Anticipated Waste Streams Table (Table 2, Attachment 2).	None
Section 3.8 Field Documentation	Field personnel will document sample handling activities, observations, and data using digital field sampling records, including field forms (e.g., field instrument calibration logs, visual site assessments, well inspection/maintenance/groundwater gauging, groundwater sampling, surface water sampling, CoCs, waste-tracking log, etc.) and photographs.	SOP-18 Logbook Documentation and Field Notes
Section 3.9 Reporting and Documentation	After completion of field activities and receipt of all analytical laboratory data, separate reports will be generated for BCU, CLU, KGF, SRF, and BRU. Additionally, the wetlands downgradient/west of KGF Pad 14-6 will be inspected monthly by environmental Hilcorp or contractor staff. The monthly inspection documentation will be included in the biennial report. Forms will be provided to ADEC separately if visual signs of contamination are identified. Further, the KGF report will include an evaluation of the well constructions at KGF Pad 41-7. The monitoring well network at this site will be reviewed to determine screened intervals in relation to soil stratigraphy since a potential pathway may exist between the upper and lower water-bearing zones.	None

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
	Addition to the 2025 Work Plan Addendum: Land Survey: Monitoring wells can be affected by freeze-thaw processes creating frost heaving that vertically affects the original well installment. If any well is heaved or jacked to the extent the well cover cannot be closed and locked, the change in well condition will be documented during groundwater monitoring activities and the well casing cut down prior to the survey effort. The vertical position of all wells will be re-surveyed to ensure accurate top-of-casing elevations. The elevation, ground surface elevation, and top-of-casing elevation at all viable BCU, CLU, KGF, SRF, and BRU monitoring wells will be surveyed utilizing the previously established survey control monuments and their respective values, based on historical data made available by Hilcorp. Elevations will be determined using third order differential leveling, using an automatic level. Northing and easting will also be surveyed at monitoring wells not previously surveyed and historical position locations will be reused for any monitoring well previously surveyed. Horizontal positions will be determined using real-time-kinematic Global Navigation Satellite System surveying techniques. The survey will be performed with a horizontal accuracy of 1.0 foot and vertical accuracy of 0.01 feet. Geospatial data resulting from the surveys will be provided in North American Datum (NAD) of 1983 (2011) (more specifically, IGS08 [Epoch 20010.0000]) Northing and Easting, in U.S. survey feet. Elevations will be provided in the North American Vertical Datum of 1988, in feet. Features created from the survey data will be projected in the NAD 1983 (2011) Alaska State Plane, Zone 4.	

Table 3-2 2025 Updates to the 2021 Work Plans

FIELD ACTIVITY	UPDATE(S)	UPDATED REFERENCE[2]
2021 Work Plans (Brice 2021a, 2021b)[1]	**2025 Work Plan Addendum**	
Section 6.1.2 KGF Pad 14-6 Previous Investigation and Monitoring Activities	Between the last two sampling events (2021 and 2023) at KGF Pad 14-6, surface water sample locations SW-1, SW-2, SW-3, SW-6, SW-7 and SW-8 had exceedances of TAH and/or TAqH with additional exceedances also occurring in prior years (Aleut 2024a). The primary contaminant driving the exceedance is toluene, which is not a typical contaminant associated with natural gas condensates. Toluene can be produced by microbial processes in oxygen-deficient water bodies and soils high in organic matter such as wetlands (Beller, et al 2018). Review of surface water data from 2021 and 2023 shows detections of toluene in nearly all surface water samples while benzene, ethylbenzene, and xylenes were not detected in any of these samples, indicating a biogenic toluene source. Toluene to BTEX (T/BTEX) ratios provide a method to further evaluate a biogenic versus petrogenic origin, with ratios greater-than 0.7 indicating a biogenic source (Bureau Veritas 2019, Richards and Sandau 2017). The T/BTEX ratios were calculated for all KGF Pad 14-6 surface water samples collected during 2021 and 2023. The limits of detection (LODs) were conservatively used for non-detected results so a high bias was not introduced to the ratios. The T/BTEX ratios ranged from 0.16 to 0.96, straddling the 0.7 indicator, although all results with TAH and TAqH exceedances had ratios ranging from 0.76 to 0.96, providing evidence for a biogenic toluene source at these locations. The ratios for results with lower detected values of toluene are skewed low based on use of LODs for non-detected results. Benzene, ethylbenzene, and xylenes were not detected in any surface water samples and the true absence of these chemicals would result in a T/BTEX ratio of 1. TAH and TAqH will continue to be calculated for KGF Pad 14-6 surface water to evaluate potential off-pad migration and impacts to surface water above Alaska Water Quality Standards; however, past TAH and TAqH exceedances driven by toluene detections are likely attributed to natural wetland conditions.	

Notes:

[1] Sections referenced from the 2021 Work Plans (Brice 2021a, 2021b).

[2] Referenced SOPs are included in Attachment 3.

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4. DATA QUALITY MANAGEMENT

The purpose of the data quality management program is to establish the analytical and documentation protocols to be used when reviewing and analyzing data collected for this project. The overall QC objectives for the laboratory activities are to develop and implement procedures for obtaining and evaluating data in an accurate, precise, and complete manner so that measurement data and laboratory procedures provide information that is comparable to and representative of actual field conditions. Data quality will be evaluated by the Project Chemist based on the data quality indicators, including precision, accuracy, representativeness, completeness, and comparability. Data validation will be performed using the QC criteria in the 2021 and 2024 Work Plans (Brice 2021a, 2021b; Aleut 2024c, 2024d, 2024e, 2024f), the Guidelines for Data Reporting (ADEC 2022), specific analytical method guidance, and laboratory control limits for precision and accuracy. An ADEC Laboratory Data Review Checklist will be completed for each SDG as part of data validation.

5. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2022. Guidelines for Data Reporting. Technical Memorandum 22-001. August.

ADEC. 2024a. 18 Alaska Administrative Code (AAC) 75, Oil and Other Hazardous Substances Pollution Control Regulations. January.

ADEC. 2024b. 18 AAC 70, Water Quality Standards, as amended through April 28, 2024.

ADEC. 2024c. Field Sampling Guidance. Division of Spill Prevention and Response. Contaminated Sites Program. August.

Aleut Remediation, LLC (Aleut). 2023a. 2023 Groundwater Monitoring Program Report, Beaver Creek Unit Pad 4, Kenai Peninsula, Alaska. September.

Aleut. 2023b. 2023 Groundwater Monitoring Program Report, Cannery Loop Unit Pad 3, Kenai Peninsula, Alaska. September.

Aleut. 2024a. 2023 Groundwater Monitoring Program Report, Kenai Gas Field, Kenai Peninsula, Alaska. May.

Aleut. 2024b. 2023 Groundwater Monitoring Program Report, Swanson River Field, Kenai Peninsula, Alaska. May.

Aleut. 2024c. Hilcorp Swanson River Field SRU 14-15 Groundwater Monitoring 2024 Work Plan. July.

Aleut. 2024d. Hilcorp Swanson River Field SRU 43B-15 Groundwater Monitoring Work Plan. July.

Aleut. 2024e. Hilcorp Beluga River Unit M Pad Groundwater Monitoring 2024 Work Plan. August.

Aleut. 2024f. Hilcorp Swanson River Field SCU 21B-16 Surface Water and Pore Water Sampling 2024 Work Plan. August.

Aleut. 2025a. 2024 21B-16 Surface Water and Pore Water Sampling Report, Swanson River Field, Soldotna Creek Unit. January.

Aleut 2025b. 2024 Unit Pad 14-15 Groundwater Sampling Report, Swanson River Field, Swanson River Unit. January.

Aleut. 2025c. 2024 43B-15 Groundwater Sampling Report, Swanson River Field, Swanson River Unit. February.

Aleut. 2025d. 2024 224-13 M Pad Well Installation and Groundwater Sampling Report, Beluga River Unit. February.

Beller, et al. 2018. Discovery of Enzyme for Toluene Synthesis from Anoxic Microbial Communities. March.

Brice Engineering, LLC (Brice). 2021a. 2021 Groundwater Monitoring Program Work Plan, Kenai Peninsula Sites, Alaska, Beaver Creek Unit, Cannery Loop Unit, and Kenai Gas Field Contaminated Sites. June.

Brice. 2021b. 2021 Groundwater Monitoring Program Work Plan, Kenai Peninsula Sites, Alaska, Swanson River Field Tank Settings, Kenai, Alaska. June.

Bureau Veritas. 2019. Remtech 2019, Conference Biogenic Toluene, A Laboratory’s Perspective. https://esaa.org/wp-content/uploads/2021/04/19-Sheppard.pdf

Richards, Phillip I. and Sandau, Court D. 2017. Forensic Source Attribution for Toluene in Environmental Samples. Environmental Toxicology and Chemistry—Volume 37, Number 3—pp. 729–737, 2018. Accepted 15 October 2017.

U.S. Environmental Protection Agency (EPA). 1980. 40 CFR 261.24 Toxicity Characteristic. As amended July 14 2006.

ATTACHMENTS

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Attachment 1 Figures

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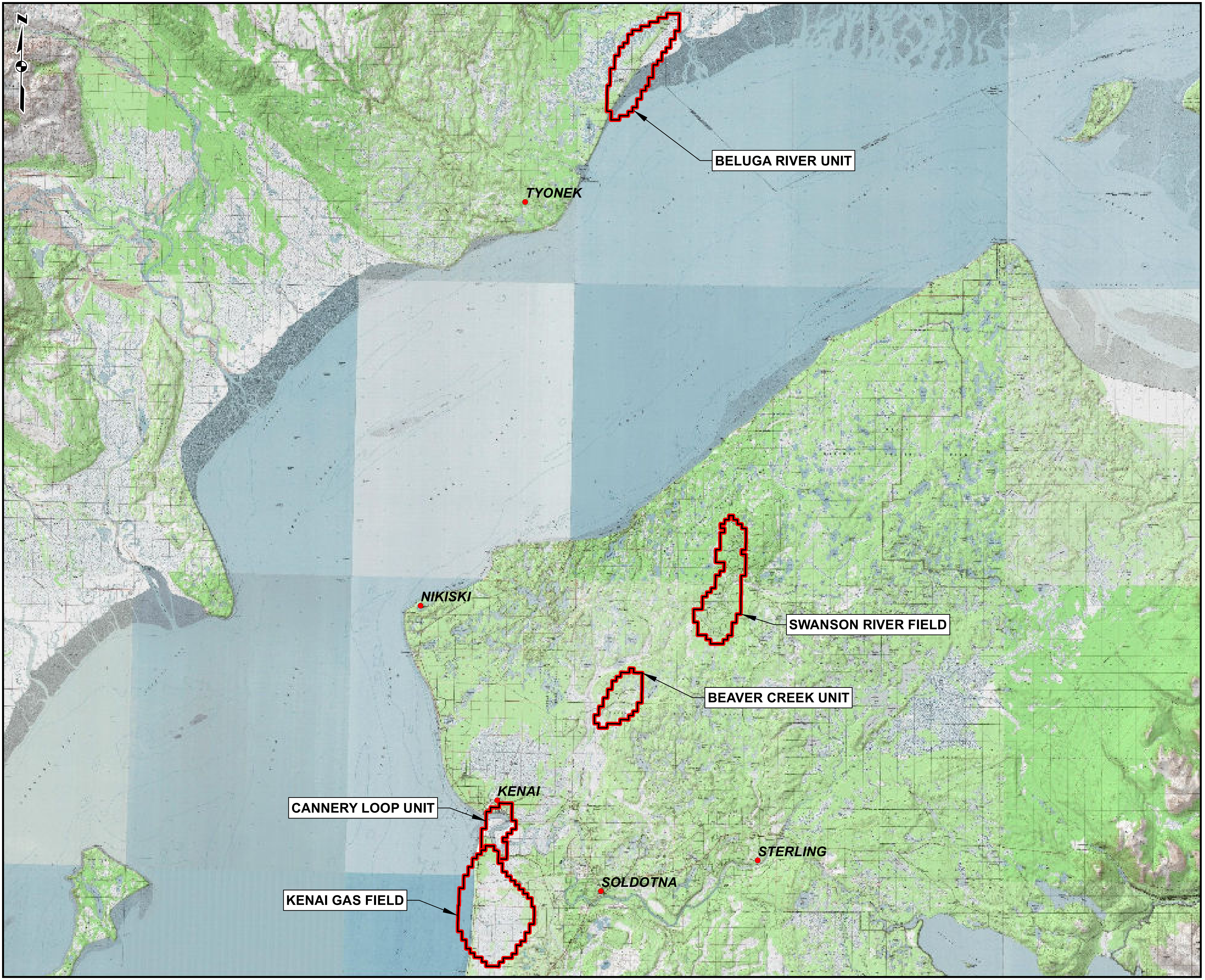
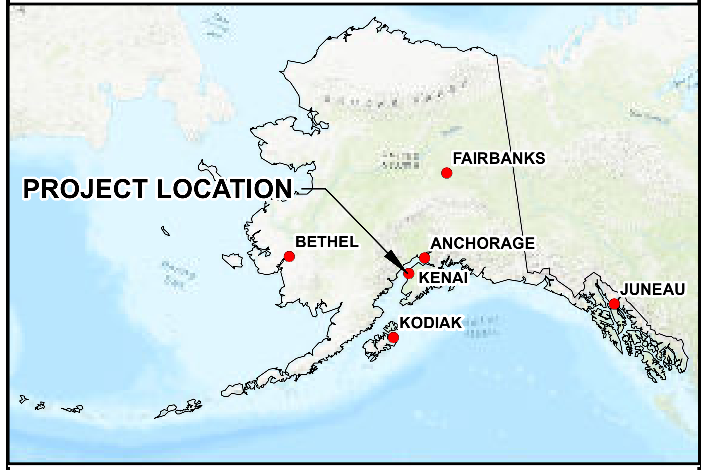
1 INCH

2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM

KENAI PENINSULA, ALASKA

STATE AND SITE VICINITY





Legend

● Major Cities

▭ Unit Boundary

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10. 8.

References

1. Imagery source: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Unit boundary layer was downloaded from the Alaska Division of Oil and Gas Open Data website. Last updated August 2022.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

30,000 15,000 0 30,000
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 1
P.M.: Q.M.	DRAWN: K.T.	

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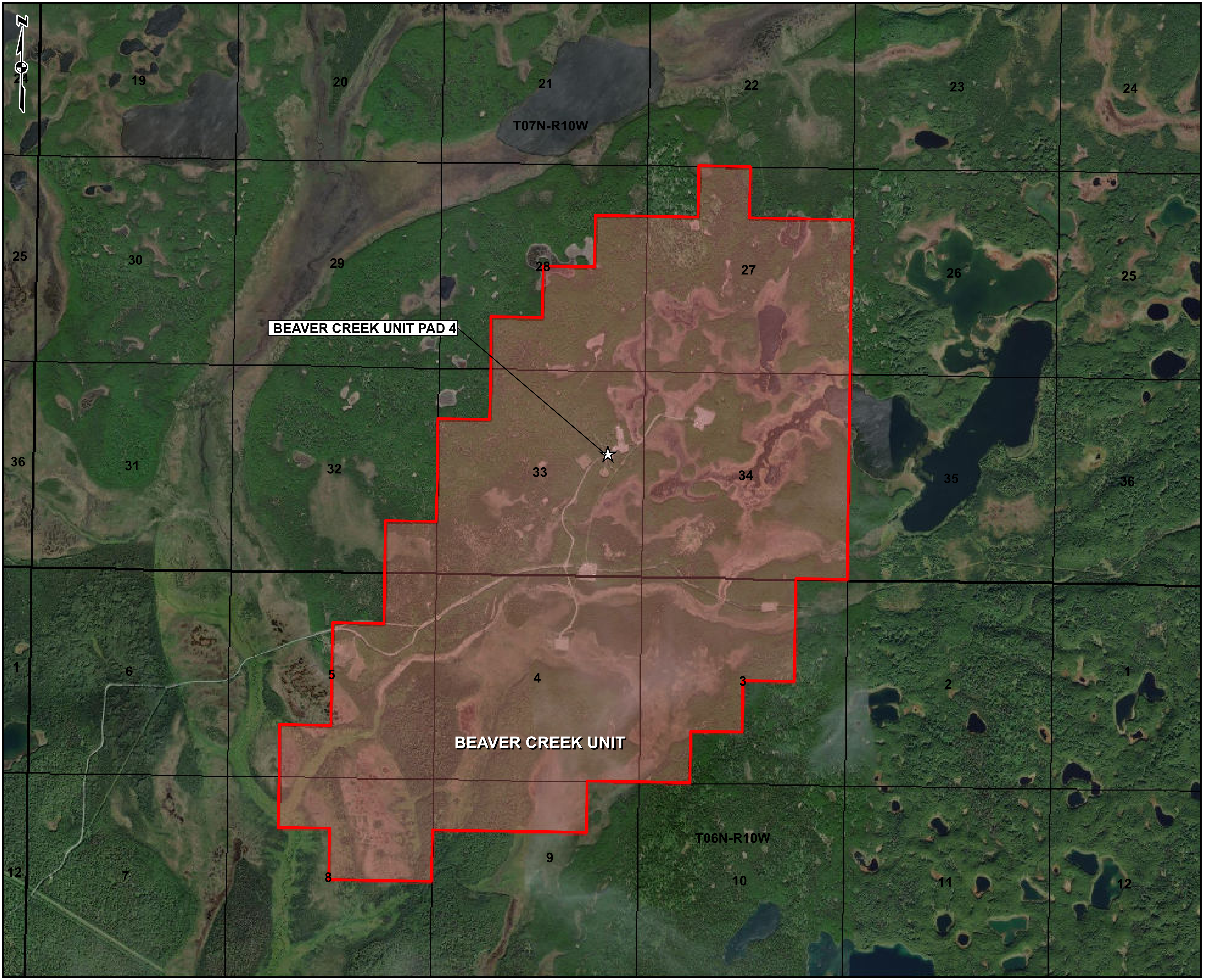
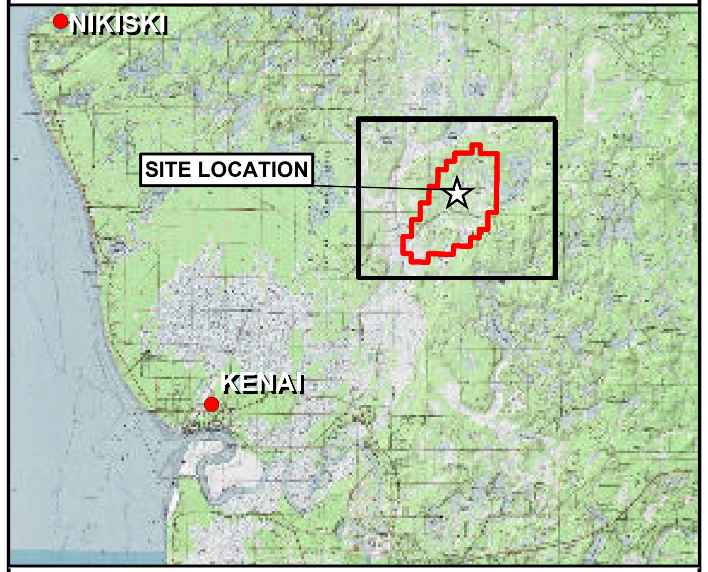
1 INCH

2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
BEAVER CREEK UNIT PAD 4 NORTH
KENAI PENINSULA, ALASKA

SITE MAP





Legend

☆ Project Locaiton

● Towns and Cities

🟥 Unit Boundary

☐ Public Land Survey System Section

☐ Public Land Survey System Township

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Unit boundary layer was downloaded from the Alaska Division of Oil and Gas Open Data website. Last updated August 2022.
3. Public Land Survey System Section/Township shapefiles were downloaded from the Kenai Peninsula Borough, Alaska GeoHub. Last updated May 2023.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

2,500 1,250 0 2,500
SCALE IN FEET

PROJECT No.: 311168	DATE: 1/7/2025	FIGURE: 2
P.M.: Q.M.	DRAWN: K.T.	

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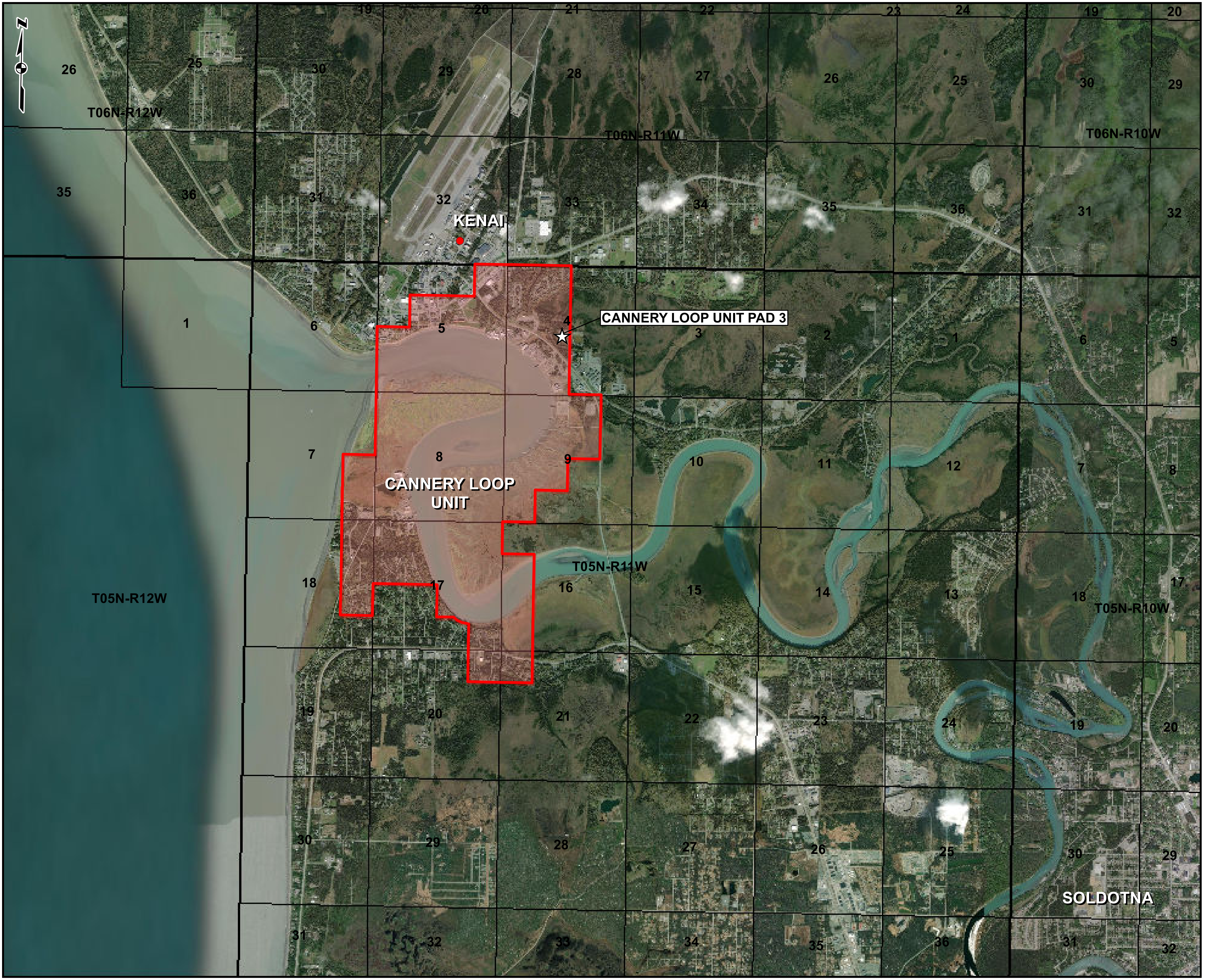
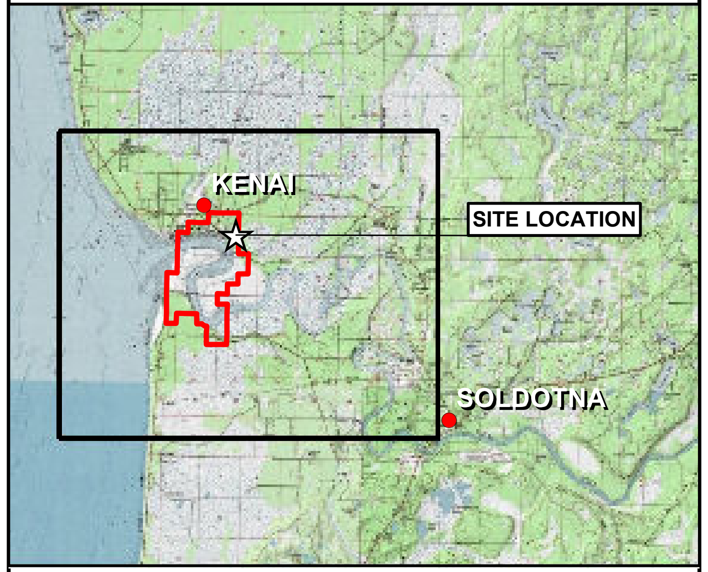


2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
CANNERY LOOP UNIT PAD 3
KENAI PENINSULA, ALASKA

SITE MAP



Legend

☆	Project Locaiton
●	Towns and Cities
□	Unit Boundary
□	Public Land Survey System Section
□	Public Land Survey System Township

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Unit boundary layer was downloaded from the Alaska Division of Oil and Gas Open Data website. Last updated August 2022.
3. Public Land Survey System Section/Township shapefiles were downloaded from the Kenai Peninsula Borough, Alaska GeoHub. Last updated May 2023.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

4,000 2,000 0 4,000
SCALE IN FEET

PROJECT No.: 311168	DATE: 1/7/2025	FIGURE: 3
P.M.: Q.M.	DRAWN: K.T.	

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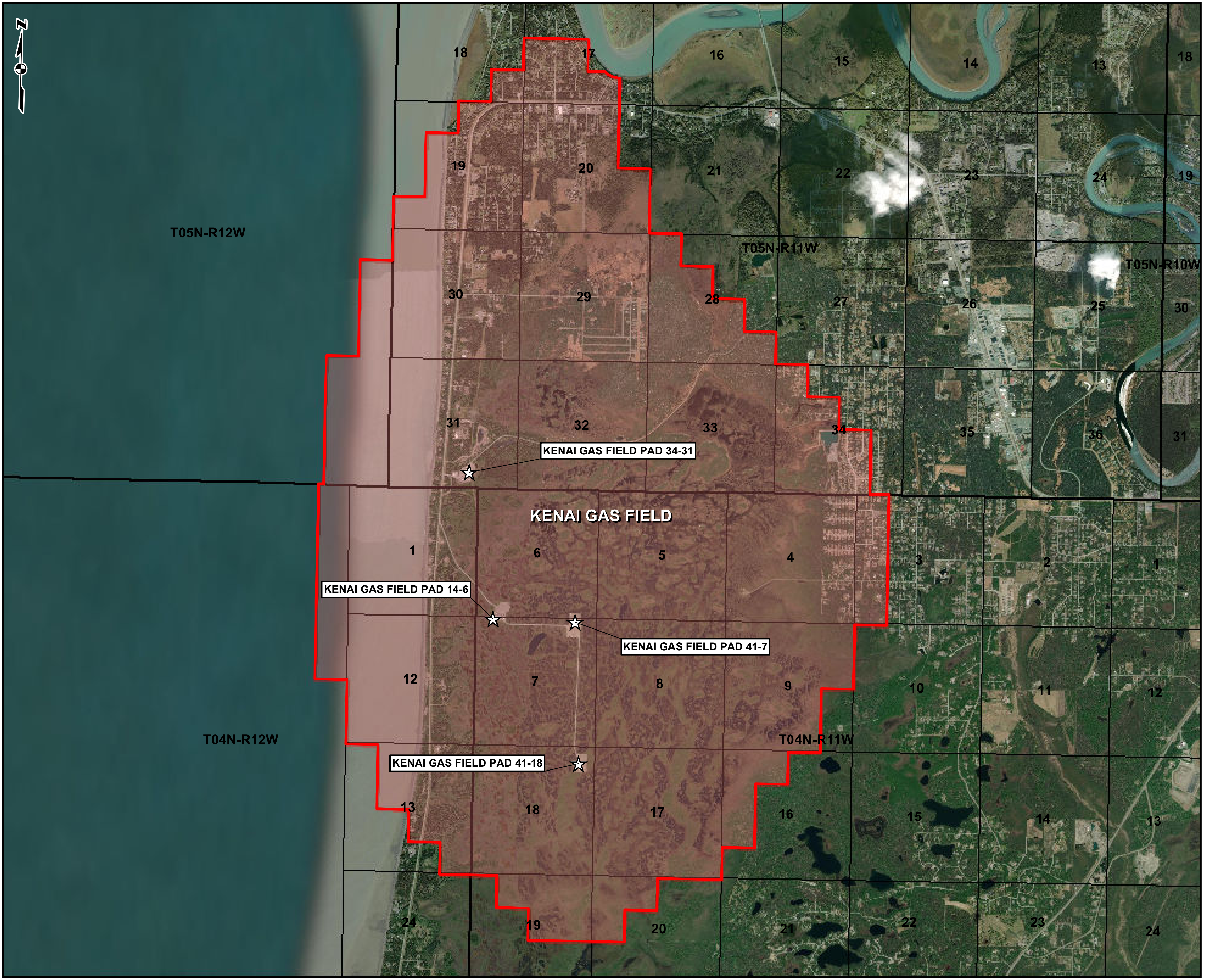

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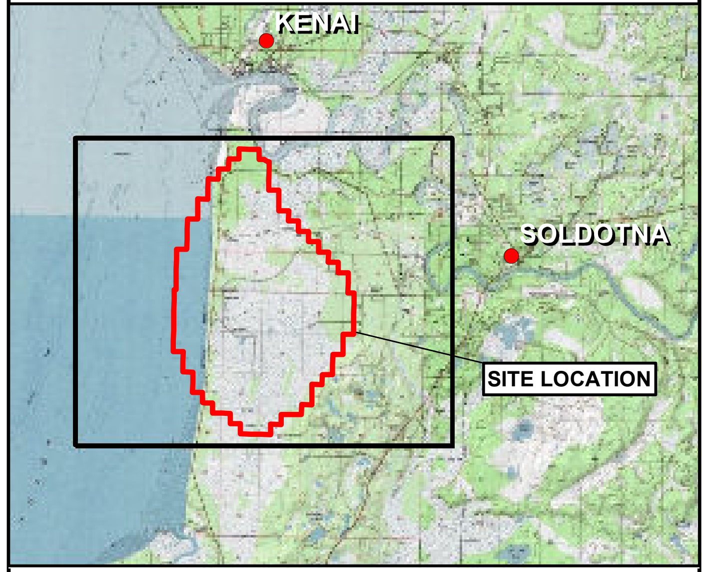
2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
KENAI GAS FIELD
KENAI PENINSULA, ALASKA

SITE MAP



Legend

☆ Project Locaiton

● Towns and Cities

🟥 Unit Boundary

☐ Public Land Survey System Section

☐ Public Land Survey System Township

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Unit boundary layer was downloaded from the Alaska Division of Oil and Gas Open Data website. Last updated August 2022.
3. Public Land Survey System Section/Township shapefiles were downloaded from the Kenai Peninsula Borough, Alaska GeoHub. Last updated May 2023.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

4,000 2,000 0 4,000
SCALE IN FEET

PROJECT No.: 311168
DATE: 1/7/2025
FIGURE: 4
P.M.: Q.M.
DRAWN: K.T.

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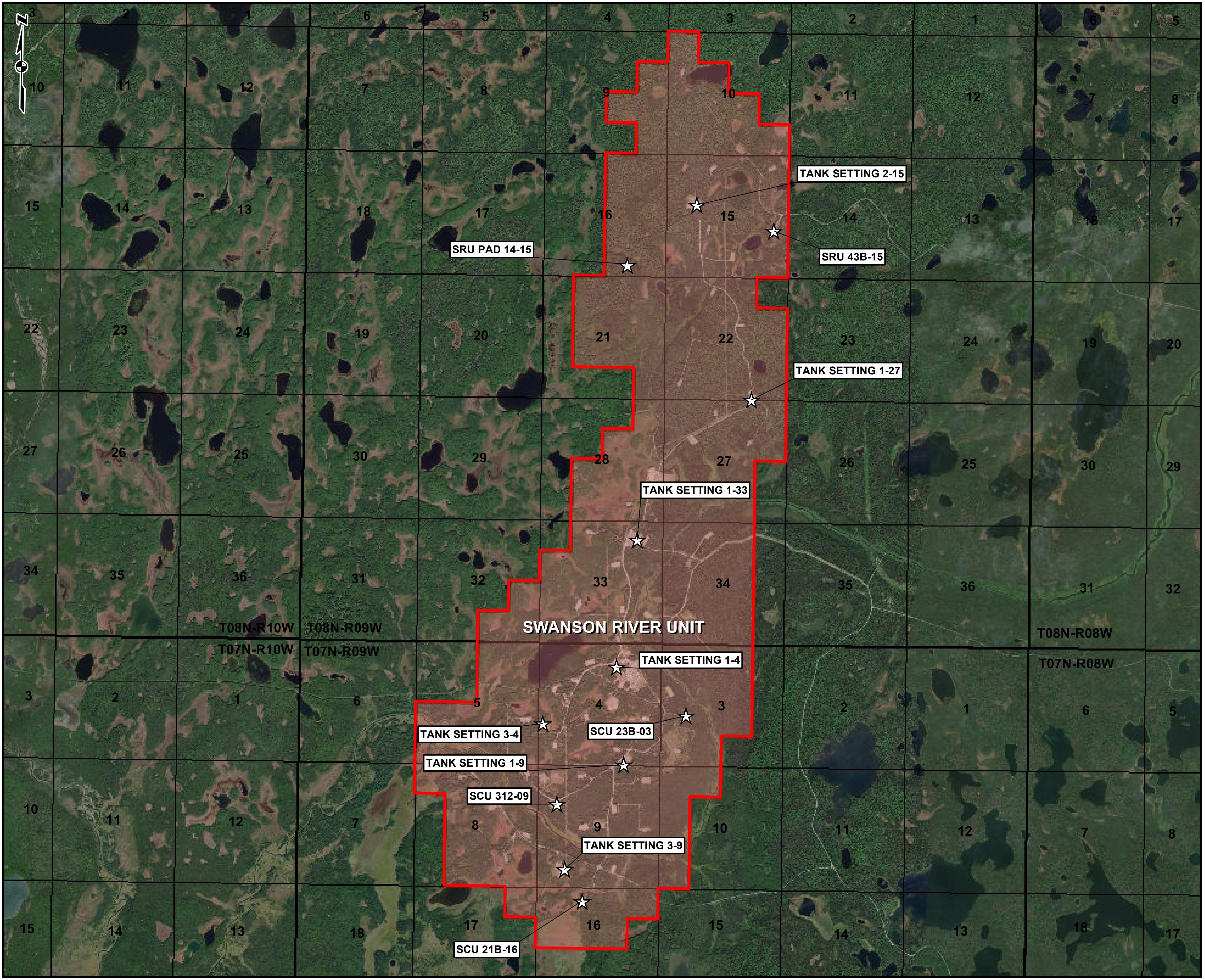
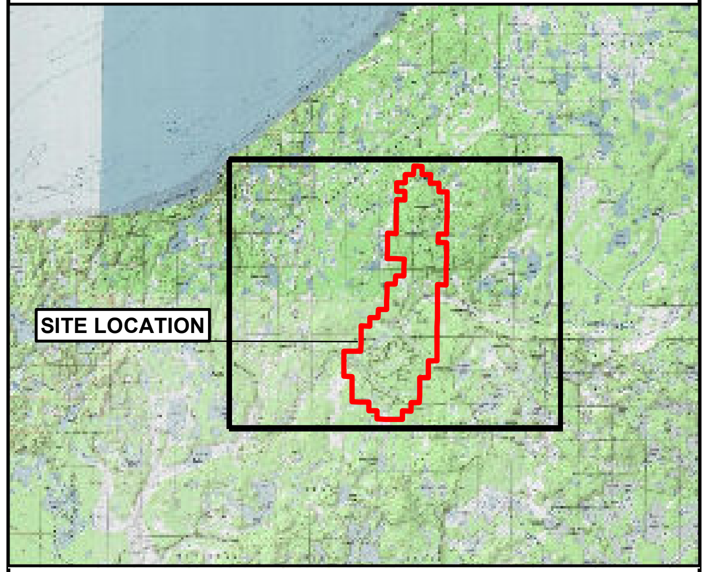
2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SITE MAP





Legend

☆ Project Locaiton

🟥 Unit Boundary

☐ Public Land Survey System Section

☐ Public Land Survey System Township

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Unit boundary layer was downloaded from the Alaska Division of Oil and Gas Open Data website. Last updated August 2022.
3. Public Land Survey System Section/Township shapefiles were downloaded from the Kenai Peninsula Borough, Alaska GeoHub. Last updated May 2023.

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ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

4,000 2,000 0 4,000
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 5
P.M.: Q.M.	DRAWN: K.T.	

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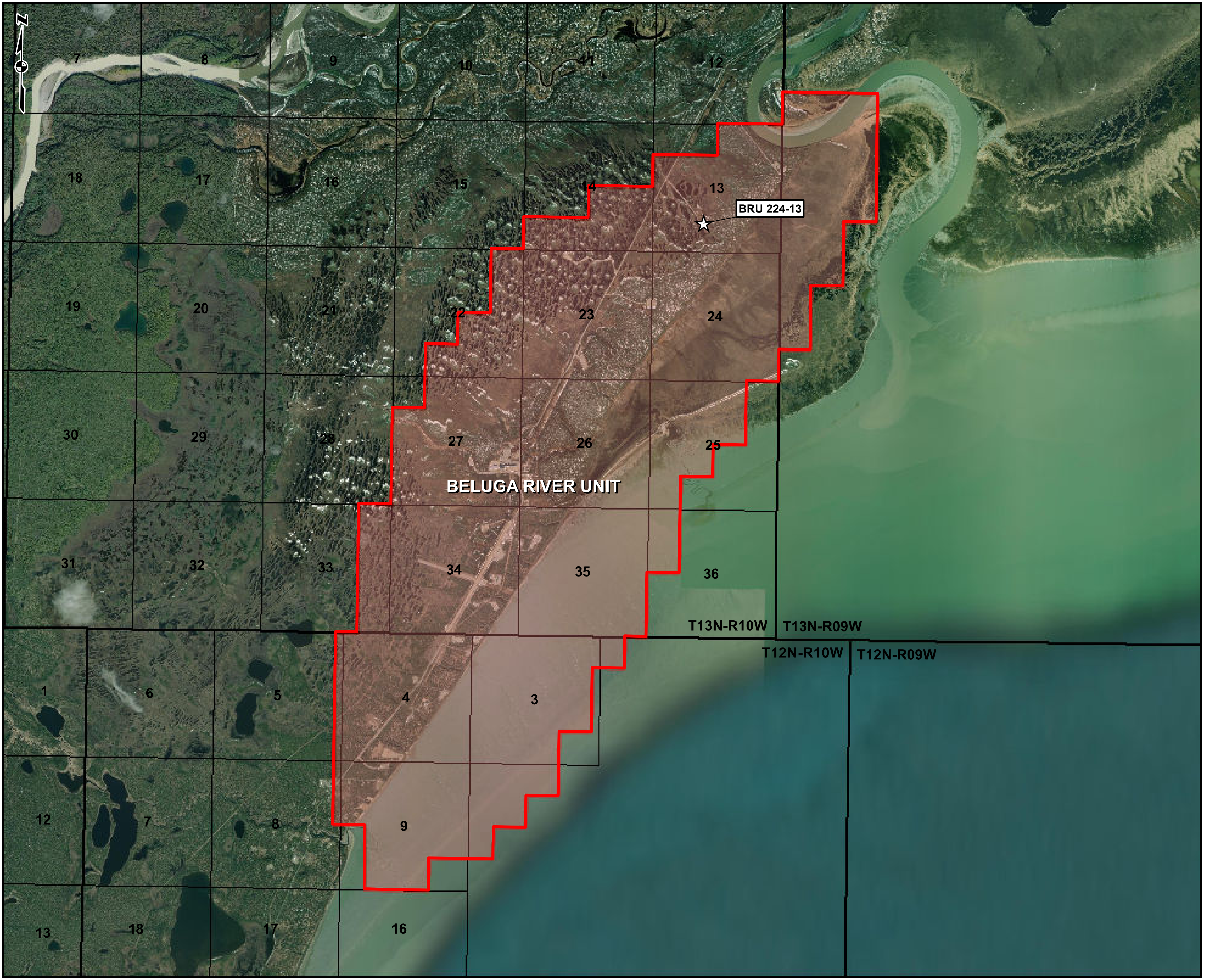
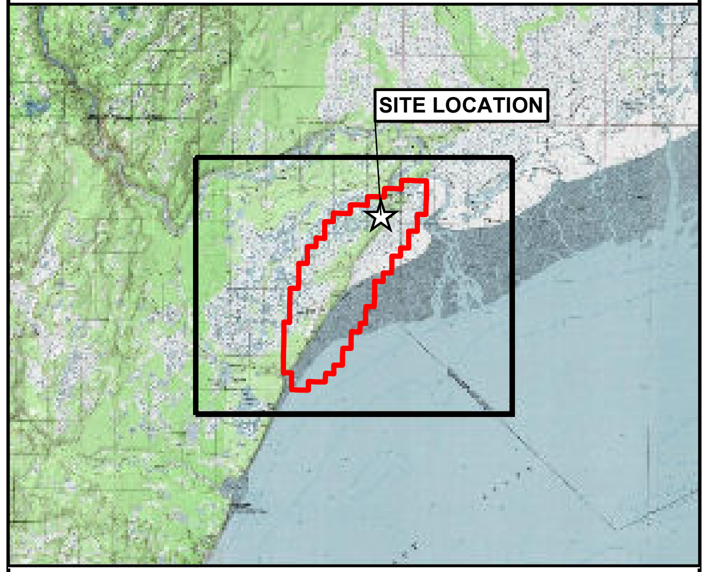
2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
BELUGA RIVER UNIT
KENAI PENINSULA, ALASKA

SITE MAP





Legend

☆ Project Locaiton

🟥 Unit Boundary

☐ Public Land Survey System Section

☐ Public Land Survey System Township

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Unit boundary layer was downloaded from the Alaska Division of Oil and Gas Open Data website. Last updated August 2022.
3. Public Land Survey System Section/Township shapefiles were downloaded from the Kenai Peninsula Borough, Alaska GeoHub. Last updated May 2023.

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

4,000 2,000 0 4,000
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 6
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
BEAVER CREEK UNIT PAD 4 NORTH
KENAI PENINSULA, ALASKA

BEAVER CREEK UNIT PAD 4 NORTH WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge and Sample
●	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
➔	Approximate Groundwater Flow Direction
100.0	Groundwater Contour with Elevation (feet)
☐	Structure Location

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2024 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

40 20 0 40
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/6/2025	FIGURE: 7
P.M.: Q.M.	DRAWN: K.T.	

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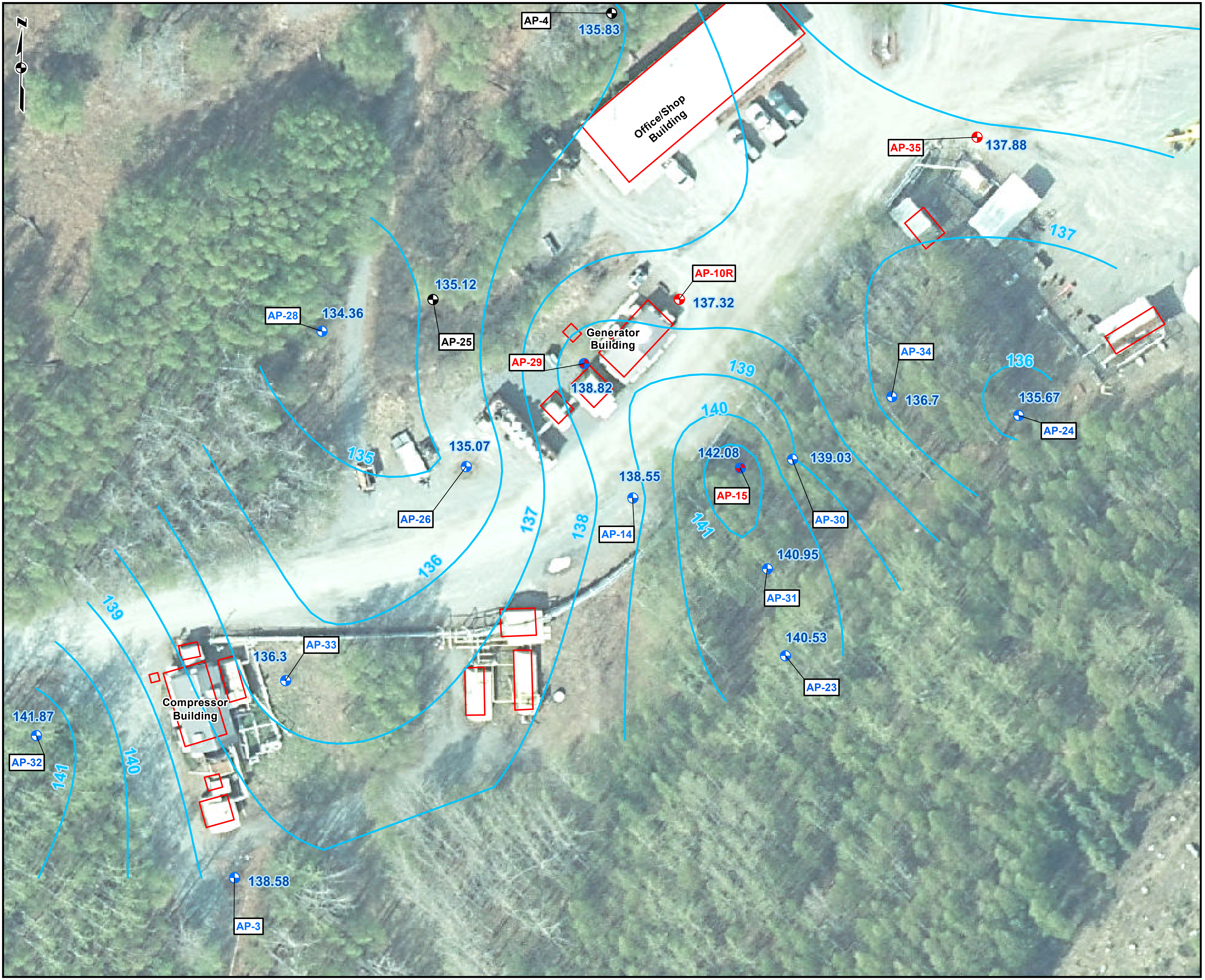

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
BEAVER CREEK UNIT PAD 4 SOUTH
KENAI PENINSULA, ALASKA

BEAVER CREEK UNIT PAD 4 SOUTH WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

◐	Gauge Only
◐	Gauge and Sample
◐	Gauge and Sample; Previously Exceeds Cleanup Levels
◐	Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected
XX.XX	Groundwater Elevation (feet)
—100.0—	Groundwater Contour with Elevation (feet)
☐	Structure Location

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

45 22½ 0 45
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/6/2025	FIGURE: 8
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
CANNERY LOOP UNIT PAD 3
KENAI PENINSULA, ALASKA

CANNERY LOOP UNIT PAD 3 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge Only
●	Gauge and Sample
●	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
→	Approximate Groundwater Flow Direction
100.0	Groundwater Contour with Elevation (feet)
🟥	Structure Location
⌐ ⌐	Former Reserve Pit Outline (approximate)

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Although groundwater was gauged at wells PZ-1 and PZ-2, they were not included in the groundwater model because they have historically displayed inconsistent groundwater levels.
8. Well PZ-2 has been observed dry in 2021 and 2023. If condition remains the same in 2025, then the well can be decommissioned.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

50 25 0 50
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/6/2025	FIGURE: 9
P.M.: Q.M.	DRAWN: K.T.	

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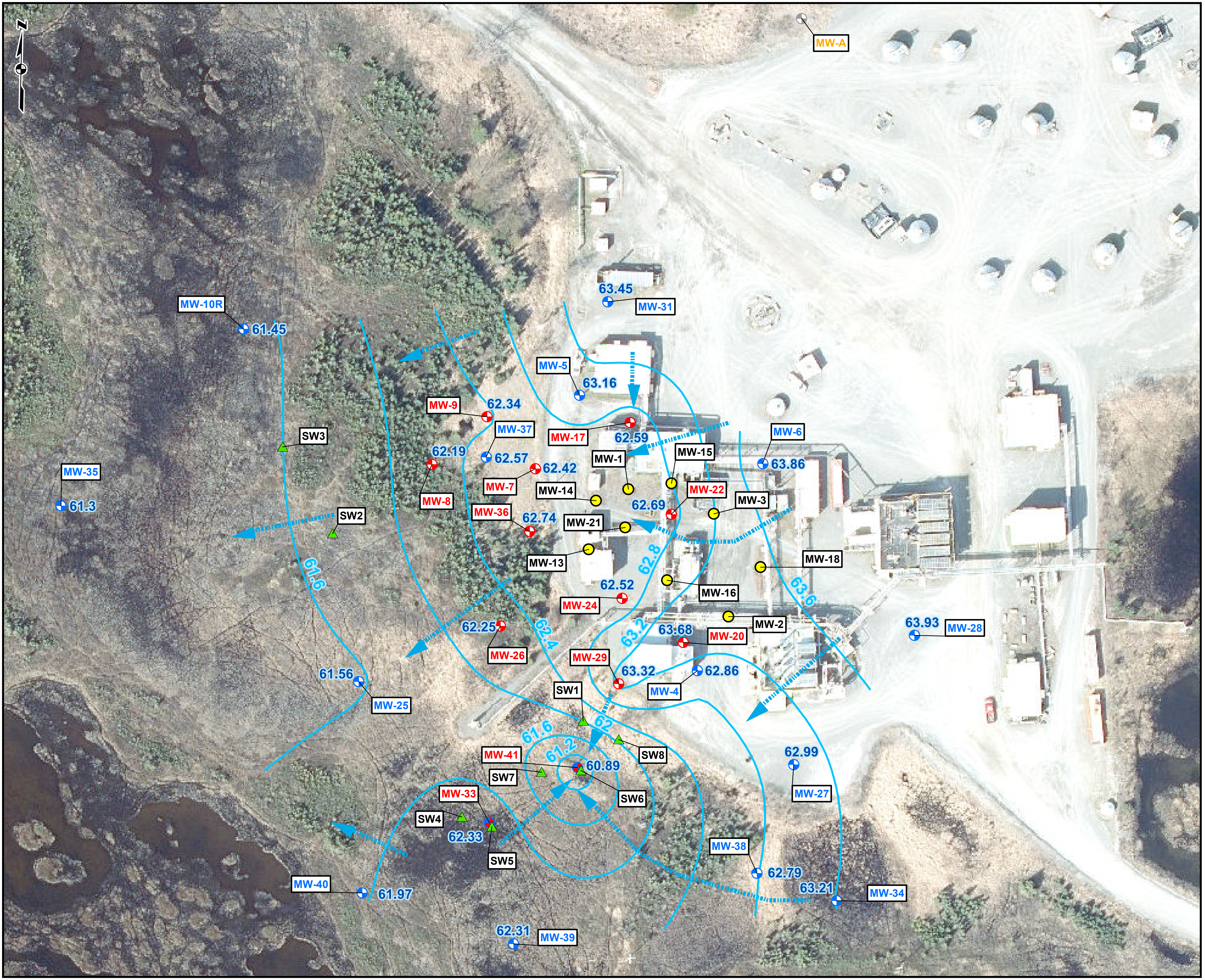

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
KENAI GAS FIELD
KENAI PENINSULA, ALASKA

KENAI GAS FIELD PAD 14-6 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

▲	Surface Water Sample Location
Monitoring Well Location	
●	HVE System
⊕	Decommission
⊕	Gauge Only
⊕	Gauge and Sample; Previously Exceeds Cleanup Levels
⊕	Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected
XX.XX	Groundwater Elevation (feet)
—100.0—	Groundwater Contour with Elevation (feet)
➡	Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Water levels at wells MW-33 and MW-41 were adjusted for the approximate specific gravity (0.80) of the 0.01 feet and 1.53 feet of light non-aqueous phase liquid measured in these wells in 2023, respectively.
8. Although HVE wells are not included in the scope of the groundwater monitoring program, they are included for historic preservation.
9. Well MW-A is located outside the groundwater monitoring well network and recommended for decommissioning once other wells are identified for decommission/installation.
10. Monitor condition of well MW-8 for suspected sheared riser.
11. Replace collar on well MW-17 monument.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

85 42½ 0 85
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 10
P.M.: Q.M.	DRAWN: K.T.	

2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
KENAI GAS FIELD
KENAI PENINSULA, ALASKA

KENAI GAS FIELD PAD 34-31
WELL LOCATIONS AND
GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge Only
●	Gauge and Sample
●	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
➜	Approximate Groundwater Flow Direction
-100.0-	Groundwater Contour with Elevation (feet)
⌐ ┘	Approximate Extent of Excavation to Remove Eastern Reserve Pit (1996)

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Replace well plug at MW-14 with locking J-plug.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

100 50 0 100
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 11
P.M.: Q.M.	DRAWN: K.T.	

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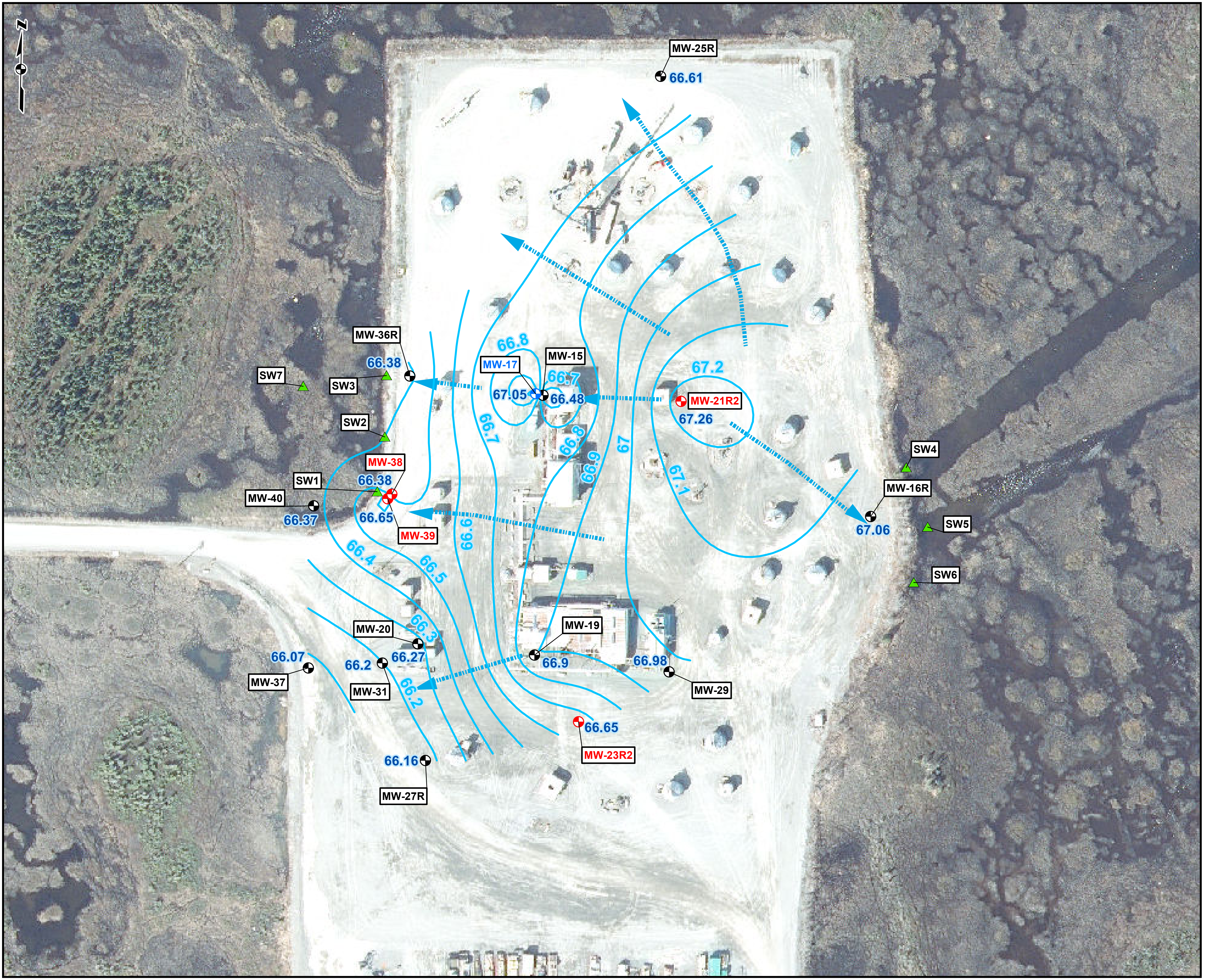

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
KENAI GAS FIELD
KENAI PENINSULA, ALASKA

KENAI GAS FIELD PAD 41-7 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

▲	Surface Water Sample Location

Monitoring Well Location

⊕	Gauge Only
⊕	Gauge and Sample
⊕	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
➔	Approximate Groundwater Flow Direction
–100.0–	Groundwater Contour with Elevation (feet)

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Monitor condition of MW-37 due to previously observed loose PVC.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

100 50 0 100
SCALE IN FEET

PROJECT No.: 311168	DATE: 1/6/2025	FIGURE: 12
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
KENAI GAS FIELD
KENAI PENINSULA, ALASKA

KENAI GAS FIELD PAD 41-18 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

▲ Surface Water Sample Location

Monitoring Well Location

- ⊕ Gauge Only
- ⊕ Gauge and Sample
- ⊕ Gauge and Sample; Previously Exceeds Cleanup Levels

XX.XX Groundwater Elevation (feet)

➤ Approximate Groundwater Flow Direction

100.0 Groundwater Contour with Elevation (feet)

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

80 40 0 80
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/6/2025	FIGURE: 13
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 1-4 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

▲ Surface Water Sample Location

Monitoring Well Location

- ◉ Gauge Only
- ◉ Gauge and Sample
- ◉ Gauge and Sample; Previously Exceeds Cleanup Levels
- ◉ Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected

XX.XX Groundwater Elevation (feet)

—100.0— Groundwater Contour with Elevation (feet)

➤ Approximate Groundwater Flow Direction

☐ Structure Location

▨ Former Structure Location

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and ADEC Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (NAVD88). Map in NAD83 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

80 40 0 80
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/6/2025	FIGURE: 14
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 1-9 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

⊕	Gauge Only
⊕	Gauge and Sample
⊕	Gauge and Sample; Previously Exceeds Cleanup Levels
⊕	Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected
XX.XX	Groundwater Elevation (feet)
100.0	Groundwater Contour with Elevation (feet)
➤	Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on 31 May 2017.
3. All presented groundwater results are based on findings from 2023 activities and compared to Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
4. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
5. Groundwater contours were generated with Surfer 16 software using kriging.
6. Water level at monitoring well FS1-9F was adjusted for the approximate specific gravity (0.84) of the 0.34 feet of light non-aqueous phase liquid measured during gauging activities.
7. PVC casing on well FS1-9F needs to be cut down and add a well plug.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

80 40 0 80
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 15
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 1-27 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge Only
●	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
–100.0–	Groundwater Contour with Elevation (feet)
➤	Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Condition of TS1-27L should be monitored. Re-development may be necessary due to the slow flowrate and possible biological infiltration. Monument collar and lid may need to be replaced.

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

60 30 0 60
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 16
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 1-33 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

● Proposed Replacement Well

● Decommission

● Gauge Only

● Gauge and Sample

● Gauge and Sample; Previously Exceeds Cleanup Levels

XX.XX Groundwater Elevation (feet)

—100.0— Groundwater Contour with Elevation (feet)

▪▪▪▪▶ Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. TS1-33Q was observed to be destroyed in 2023. Well is scheduled for decommission and should be replaced.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

100 50 0 100
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/18/2025	FIGURE: 17
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 2-15 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge Only
●	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
100.0	Groundwater Contour with Elevation (feet)
➤	Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

60 30 0 60
SCALE IN FEET

PROJECT No.: 311168	DATE: 1/7/2025	FIGURE: 18
P.M.: Q.M.	DRAWN: K.T.	

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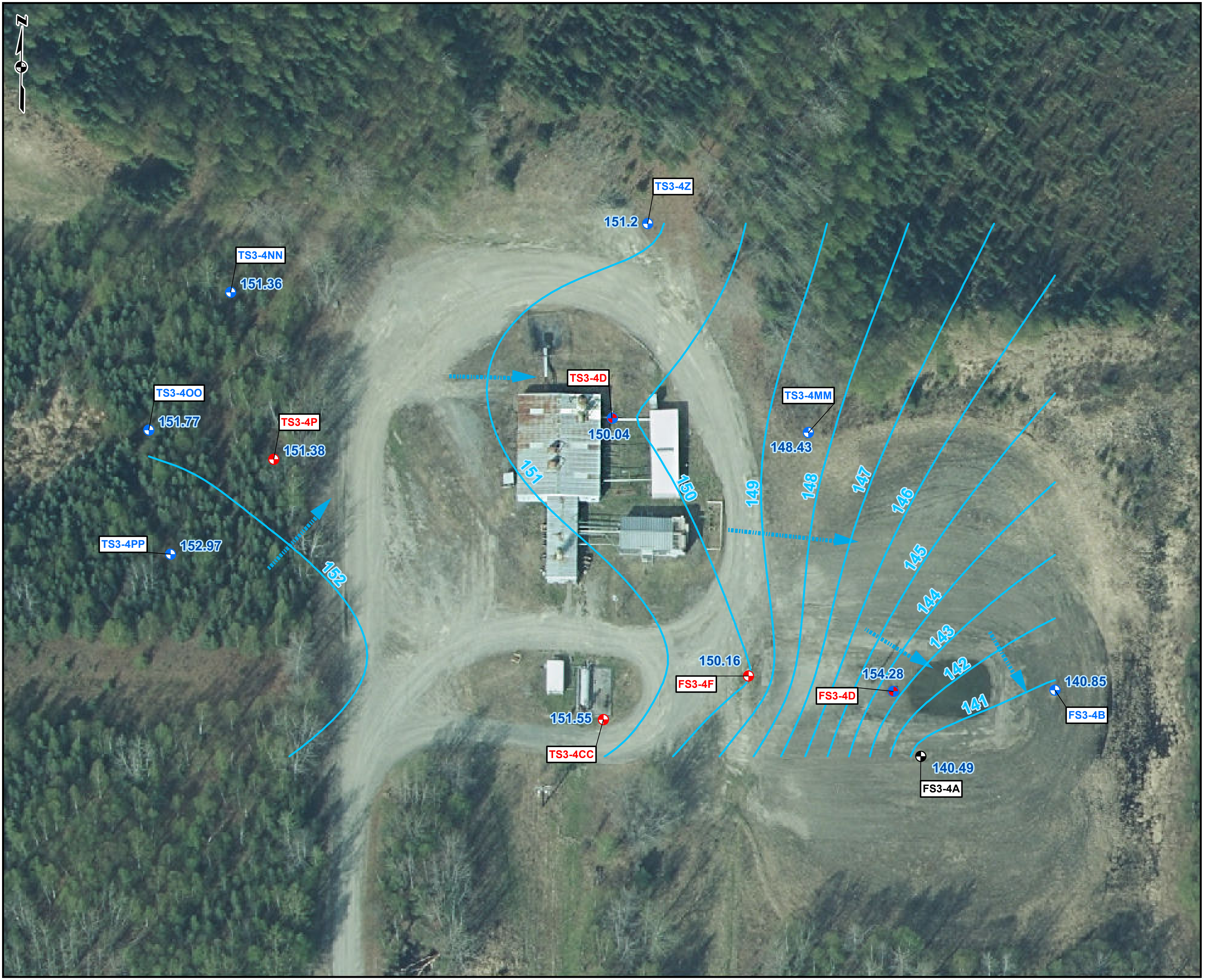

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 3-4 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

- ◍ Gauge Only
- ◍ Gauge and Sample
- ◍ Gauge and Sample; Previously Exceeds Cleanup Levels
- ◍ Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected

XX.XX Groundwater Elevation (feet)

—100.0— Groundwater Contour with Elevation (feet)

➔ Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Monitoring well FS3-4D was not used in the groundwater model because groundwater could not be measured due to more than 1 foot of light nonaqueous phase liquid present at the time of gauging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

60 30 0 60
SCALE IN FEET

PROJECT No.: 311168
DATE: 2/28/2025
P.M.: Q.M.
DRAWN: K.T.
FIGURE: 19

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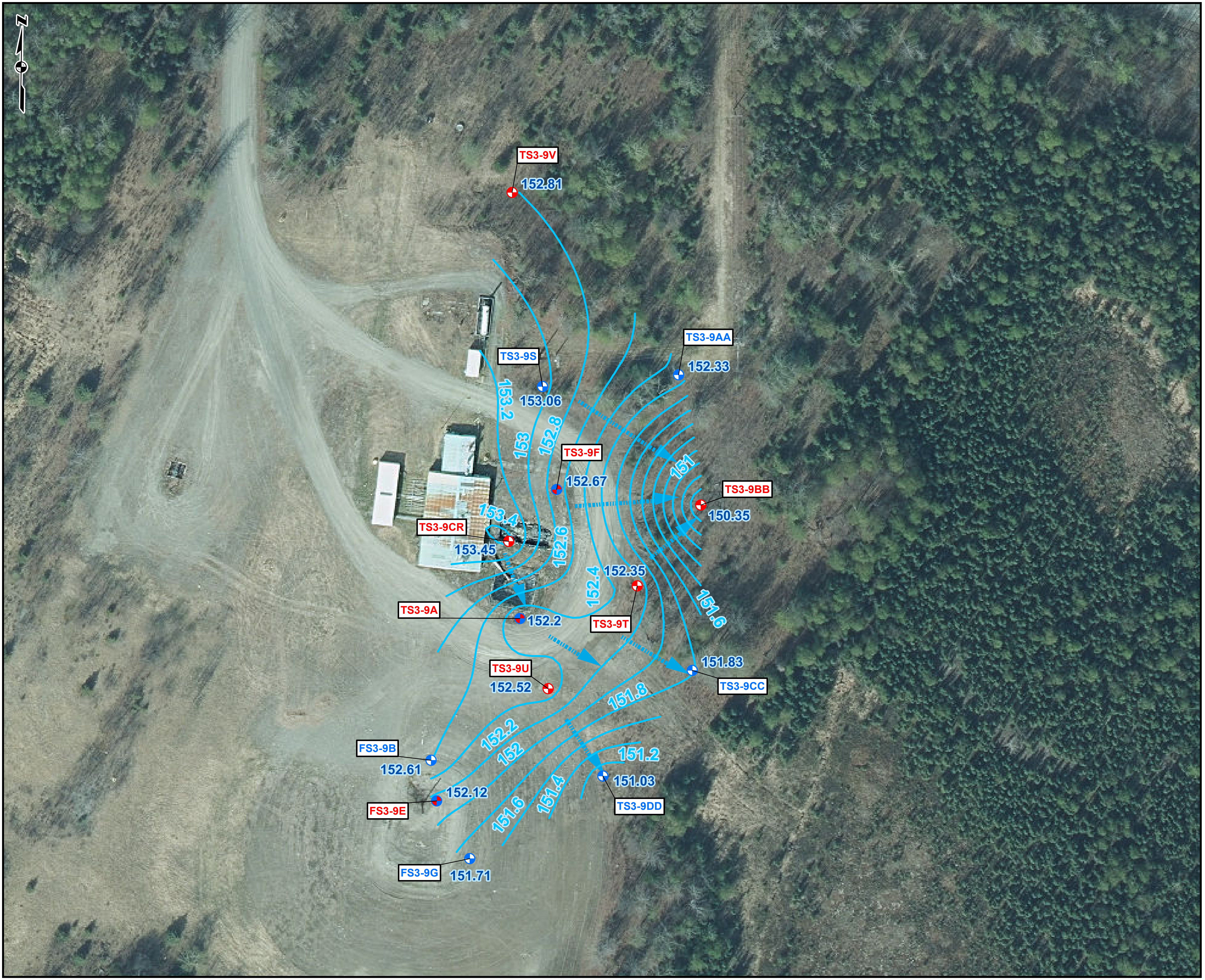

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD TANK SETTING 3-9 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge Only
●	Gauge and Sample; Previously Exceeds Cleanup Levels
●	Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected
XX.XX	Groundwater Elevation (feet)
100.0	Groundwater Contour with Elevation (feet)
➤	Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.
7. Water level at monitoring well TS3-9A was adjusted for the approximate specific gravity (0.84) of the 0.14 feet of light non-aqueous phase liquid measured during gauging activities.

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

80 40 0 80
SCALE IN FEET

PROJECT No.: 311168	DATE: 1/6/2025	FIGURE: **20**
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD SCU 21B-16 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

▲ Surface Water Sample Locations

Monitoring Well Location

◎ Decommissioned 2021

◐ Gauge and Sample

XX.XX Groundwater Elevation (feet)

→ Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2024. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2024 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater flow direction was georeferenced from Figure 4 SCU 21B-16 2023 2023 Excavation, Sampling, and Backfill Report. Swanson River Field, Sterling, Alaska. May 2024.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

60 30 0 60
SCALE IN FEET

PROJECT No.: 311168
DATE: 3/18/2025
FIGURE: 21
P.M.: Q.M.
DRAWN: K.T.

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD SCU 23B-03 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

- ● Gauge and Sample
- ● Gauge and Sample; Previously Exceeds Cleanup Levels
- XX.XX Groundwater Elevation (feet)
- —100.0— Groundwater Contour with Elevation (feet)
- ➤ Approximate Groundwater Flow Direction

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

60 30 0 60
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: 22
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD SCU 312-09 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

●	Gauge and Sample
🔴	Gauge and Sample; Previously Exceeds Cleanup Levels
XX.XX	Groundwater Elevation (feet)
100.0	Groundwater Contour with Elevation (feet)
➤	Approximate Groundwater Flow Direction
▭	Structure Location

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2023. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2023 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

40 20 0 40
SCALE IN FEET

PROJECT No.: 311168	DATE: 2/28/2025	FIGURE: **23**
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD SRU PAD 14-15 WELL LOCATION

Legend

Monitoring Well Location

● Gauge and Sample

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2022 by Susitna Environmental, LLC. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2024 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

30 15 0 30
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/13/2025	FIGURE: 24
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING
PROGRAM WORK PLAN ADDENDUM
SWANSON RIVER FIELD
KENAI PENINSULA, ALASKA

SWANSON RIVER FIELD SRU 43B-15 WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

◐	Gauge and Sample
XX.XX	Groundwater Elevation (feet)
▸	Approximate Groundwater Flow Direction
-100.0-	Groundwater Contour with Elevation (feet)

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2024. All other site feature locations are approximate.
2. Imagery acquired from Quantum Spatial Inc. Imagery was taken on May 18 and July 15, 2021.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2024 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

30 15 0 30
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/13/2025	FIGURE: 25
P.M.: Q.M.	DRAWN: K.T.	

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2025 ANNUAL GROUNDWATER MONITORING PROGRAM WORK PLAN ADDENDUM
BELUGA RIVER UNIT
KENAI PENINSULA, ALASKA

BELUGA RIVER UNIT 224-13 M PAD WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION

Legend

Monitoring Well Location

⊕	Gauge and Sample
●	Gauge; Previously Contained LNAPL, Sample if no LNAPL Detected
XX.XX	Groundwater Elevation (feet)
➔	Approximate Groundwater Flow Direction
—100.0—	Groundwater Contour with Elevation (feet)

Notes

1. For conceptual purposes only. All viable wells were surveyed in 2024. All other site feature locations are approximate.
2. Imagery source credits: ESRI 2023.
3. Map produced using ESRI ArcMap v. 10.8.
4. All presented groundwater results are based on findings from 2024 activities and compared to the Alaska Department of Environmental Conservation (ADEC) Table C groundwater cleanup levels (ADEC 2023).
5. Groundwater elevations are expressed in feet (North American Vertical Datum of 1988). Map in North American Datum of 1983 (2011) Alaska State Plane Zone 4.
6. Groundwater contours were generated with Surfer 16 software using kriging.

ALEUT

ALASKA STATE PLANE COORDINATE SYSTEM ZONE 4, U.S. SURVEY FEET
HORIZONTAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

40 20 0 40
SCALE IN FEET

PROJECT No.: 311168	DATE: 3/6/2025	FIGURE: 26
P.M.: Q.M.	DRAWN: K.T.	

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Attachment 2 Tables

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Hilcorp Beaver Creek Unit Pad 4, Cannery Loop Unit Pad 3, Kenai Gas Field, Swanson River Field, and Beluga River Unit Groundwater Monitoring Program
2025 Work Plan Addendum
Kenai Peninsula, Alaska
Table 1: 2025 Well Status

Well ID	Date Well Gauged	Date Well Sampled	Sampling Frequency	QC		Sample ID	Method(s)	Analyte(s)	Contamination Level (LNAPL, High, Moderate, Low, None)	Maintenance Recommendation(s)
				Dup	MS/ MSD					
Beaver Creek Unit Pad 4 North										
AP-4	9/15/2024	6/27/2023	Biennial			BCU4NS-AP4-25	AK101	GRO	None	
							AK102/AK103	DRO/RRO		
AP-35	9/15/2024	9/15/2024	Annual		X	BCU4N-AP35-25	AK101	GRO	Moderate	
							AK102/AK103	DRO/RRO		
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, naphthalene, and xylenes		
AP-36	9/15/2024	6/27/2023	Biennial			BCU4N-AP36-25	AK101	GRO	None	
							AK102/AK103	DRO/RRO		
AP-38	9/15/2024	6/27/2023	Biennial			BCU4N-AP38-25	AK101	GRO	Low	
							AK102/AK103	DRO/RRO		
AP-39	9/15/2024	9/15/2024	Annual	X		BCU4N-AP39-25	AK101	GRO	High	
							AK102/AK103	DRO/RRO		
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, naphthalene, and xylenes		
Beaver Creek Unit Pad 4 South										
AP-3	6/15/2023	6/27/2023	Every 4 years	Gauge only					Low	
AP-4	6/15/2023	6/27/2023	Every 4 years	See BCU4 North.					Low	
AP-10	Decommissioned in 2016.									
AP-10R	6/15/2023	6/28/2023	Biennial			BCU4S-AP10R-25	AK102	DRO	Moderate	
							SW8260D	Ethylbenzene and naphthalene		
AP-14	6/15/2023	6/28/2023	Every 4 years	Gauge only					Low	
AP-15	6/15/2023	Never sampled	Biennial	Gauge and product recovery					LNAPL	
AP-23	6/15/2023	10/4/2010	Gauge only	Gauge only					None	
AP-24	6/15/2023	10/5/2010	Gauge only	Gauge only					None	
AP-25	6/15/2023	6/27/2023	Biennial			BCU4S-AP25-25	AK102	DRO	Low	
							SW8260D	Ethylbenzene and naphthalene		
AP-26	6/15/2023	9/16/2013	Gauge only	Gauge only					None	
AP-27	Decommissioned in 2021.									
AP-28	6/15/2023	6/27/2023	Every 4 years	Gauge only					Low	
AP-29	6/15/2023	Never sampled	Biennial	Gauge and product recovery					LNAPL	
AP-30	6/15/2023	6/27/2023	Every 4 years	Gauge only					Low	
AP-31	6/15/2023	6/27/2023	Every 4 years	Gauge only					None	
AP-32	6/15/2023	9/17/2013	Gauge only	Gauge only					Low	
AP-33	6/15/2023	6/27/2023	Every 4 years	Gauge only					Low	
AP-34	6/15/2023	6/27/2023	Every 4 years	Gauge only					Low	
Cannery Loop Unit Pad 3										
MW-1	6/16/2023	6/29/2023	Every 4 years	Gauge only					Low	
MW-2	6/16/2023	6/29/2023	Biennial	X		CLU3-MW2-25	AK102	DRO	Low	
							SW8260D	1,2,4-trimethylbenzene, ethylbenzene, and naphthalene		
MW-3	6/16/2023	6/29/2023	Biennial			CLU3-MW3-25	AK102	DRO	Low	
MW-4	6/16/2023	6/29/2023	Every 4 years	Gauge only					Low	
MW-5	6/16/2023	6/29/2023	Biennial			CLU3-MW5-25	AK102	DRO	Low	
MW-6	6/16/2023	7/8/2021	Every 4 years		X	CLU3-MW6-25	AK102	DRO	Low	
							SW8260D	1,2,4-trimethylbenzene, ethylbenzene, and naphthalene		
MW-7	6/16/2023	4/14/2008	Gauge only	Gauge only					None	
MW-8	6/16/2023	6/29/2023	Biennial			CLU3-MW8-25	AK102	DRO	None	
MW-9	6/16/2023	1/23/2008	Gauge only	Gauge only					None	
MW-10	6/16/2023	4/15/2008	Gauge only	Gauge only					None	
MW-11	6/16/2023	4/14/2008	Gauge only	Gauge only					None	
MW-12	6/16/2023	6/29/2023	Every 4 years	Gauge only					None	
MW-13	Decommissioned in 2017.									
MW-C	Not located in 2015 or 2017.									
PZ-1	6/16/2023	6/29/2023	Biennial			CLU3-PZ1-25	AK102	DRO	Moderate	
							SW8260D	1,2,4-trimethylbenzene, ethylbenzene, and naphthalene		
PZ-2	6/16/2023	7/11/2019	Biennial			CLU3-PZ2-25	AK102	DRO	Moderate	Monitor condition. If observed dry, it may be decommissioned.
							SW8260D	1,2,4-trimethylbenzene, ethylbenzene, and naphthalene		
PZ-3	Abandoned in 2006.									

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				Dup	MS/MSD					
Kenai Gas Field Pad 14-6										
MW-1	HVE System									
MW-2	HVE System									
MW-3	HVE System									
MW-4	6/16/2023	6/24/2023	Every 4 years	Gauge only					Low	
MW-5	6/16/2023	9/24/2014	Gauge only	Gauge only					None	
MW-6	6/16/2023	6/24/2023	Every 4 years	Gauge only					Low	
MW-7	6/16/2023	6/24/2023	Biennial	X		KGF146-MW7-25	AK102/AK103	DRO/RRO	High	Visual site assessment will include a focus on the wetlands downgradient of MW-7
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dioxane, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-8	6/16/2023	6/24/2023	Biennial			KGF146-MW8-25	AK102/AK103	DRO/RRO	Moderate	Monitor condition for suspected sheared riser.
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-9	6/16/2023	6/25/2023	Biennial			KGF146-MW9-25	AK102/AK103	DRO/RRO	High	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-10R	6/16/2023	6/24/2023	Every 4 years	Gauge only					Low	
MW-11	Decommissioned in 2020.									
MW-12	Decommissioned in 2020.									
MW-13	HVE System									
MW-14	HVE System									
MW-15	HVE System									
MW-16	HVE System									
MW-17	6/16/2023	6/24/2023	Biennial			KGF146-MW17-25	AK102/AK103	DRO/RRO	Moderate	Replace the collar on well monument.
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-18	HVE System									
MW-19	Abandoned in 2011.									
MW-20	6/16/2023	6/24/2023	Biennial			KGF146-MW20-25	AK102/AK103	DRO/RRO	High	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-21	HVE System									
MW-22	6/16/2023	6/24/2023	Biennial			KGF146-MW22-25	AK102/AK103	DRO/RRO	High	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dioxane, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-23	Destroyed and decommissioned in 2022.									
MW-24	6/16/2023	6/24/2023	Biennial			KGF146-MW24-25	AK102/AK103	DRO/RRO	High	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-25	6/16/2023	6/24/2023	Every 4 years	Gauge only					Moderate	
MW-26	6/16/2023	6/24/2023	Biennial			KGF146-MW26-25	AK102/AK103	DRO/RRO	High	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-27	6/16/2023	9/23/2014	Gauge only	Gauge only					None	
MW-28	6/16/2023	6/23/2023	Every 4 years	Gauge only					Low	
MW-29	6/16/2023	6/24/2023	Biennial			KGF146-MW29-25	AK102/AK103	DRO/RRO	Moderate	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-30	Decommissioned in 2020.									
MW-31	6/16/2023	9/24/2014	Gauge only	Gauge only					None	
MW-32	Abandoned in 2005.									
MW-33	6/16/2023	7/3/2021	Biennial			KGF146-MW33-25	AK102/AK103	DRO/RRO	LNAPL	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
MW-34	6/16/2023	9/23/2014	Gauge only	Gauge only					None	
MW-35	6/16/2023	6/25/2023	Every 4 years	Gauge only					Low	
MW-36	6/16/2023	6/25/2023	Biennial		X	KGF146-MW36-25	AK102/AK103	DRO/RRO	Moderate	
							SW8260D	1,4-dioxane		
MW-37	6/16/2023	6/25/2023	Every 4 years	Gauge only					Low	
MW-38	6/16/2023	9/23/2014	Gauge only	Gauge only					None	
MW-39	6/16/2023	9/23/2014	Gauge only	Gauge only					None	
MW-40	6/16/2023	6/25/2023	Every 4 years	Gauge only					Low	
MW-41	6/16/2023	7/2/2021	Biennial			KGF146-MW41-25	AK101	GRO	LNAPL	Gauge and product recovery. Collect sample if no LNAPL present.
							AK102/AK103	DRO/RRO		
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
SW	Surface water	6/23/2023	Biennial			KGF146-SW1-25 - KGF146-SW8-25	EPA 624	BTEX	NA	
							EPA 625	PAHs		
Kenai Gas Field Pad 34-31										
MW-A	Abandoned in 2017.									
MW-C	Decommissioned in 2017.									
MW-E	Decommissioned in 2017.									
MW-1	6/16/2023	6/23/2023	Biennial			KGF3431-MW1-25	AK102	DRO	Moderate	
MW-2	6/16/2023	6/24/2023	Biennial			KGF3431-MW2-25	AK102	DRO	Moderate	
MW-3	Abandoned in 2000.									
MW-4	6/16/2023	6/23/2023	Biennial			KGF3431-MW4-25	AK102	DRO	Moderate	
MW-5	6/16/2023	6/23/2023	Every 4 years	Gauge only					Low	
MW-6	6/16/2023	6/23/2023	Biennial			KGF3431-MW6-25	AK102	DRO	Moderate	
MW-7	6/16/2023	6/23/2023	Biennial			KGF3431-MW7-25	AK102	DRO	Moderate	
MW-8	6/16/2023	6/23/2023	Biennial			KGF3431-MW8-25	AK102	DRO	Moderate	
MW-9	6/16/2023	6/23/2023	Biennial			KGF3431-MW9-25	AK102	DRO	Moderate	
MW-10	6/16/2023	6/23/2023	Biennial			KGF3431-MW10-25	AK102	DRO	Moderate	
							SW8260D	1,2,4-trimethylbenzene and naphthalene		
MW-11	6/16/2023	6/23/2023	Biennial			KGF3431-MW11-25	AK102	DRO	Low	
MW-12	6/16/2023	6/23/2023	Biennial			KGF3431-MW12-25	AK102	DRO	Low	
MW-13	6/16/2023	Never sampled	Gauge only	Gauge only					None	
MW-14	6/16/2023	Never sampled	Gauge only	Gauge only					None	Replace plug with locking J-plug.
MW-15	6/16/2023	6/23/2023	Every 4 years	Gauge only					Low	
MW-16	6/16/2023	6/23/2023	Every 4 years	Gauge only					Low	
MW-17	6/16/2023	9/2/2008	Gauge only	Gauge only					None	

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				Dup	MS/ MSD					
Kenai Gas Field Pad 41-7										
MW-1	Decommissioned 2008.									
MW-2	Decommissioned in 2020.									
MW-3	Decommissioned in 2020.									
MW-4	Decommissioned in 2020.									
MW-5	Decommissioned in 2020.									
MW-6	Decommissioned 2008.									
MW-7	Decommissioned 2008.									
MW-8	Decommissioned 2008.									
MW-9	Abandoned in 2008.									
MW-10	Decommissioned in 2020.									
MW-11	Decommissioned in 2020.									
MW-12	Abandoned in 2017.									
MW-13	Decommissioned in 2020.									
MW-14	Abandoned in 2007.									
MW-15	6/16/2023	6/25/2023	Biennial			KGF417-MW15-25	AK102	DRO	None	
MW-16R	6/16/2023	6/25/2023	Biennial			KGF417-MW16R-25	AK102	DRO	Low	
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-17	6/16/2023	12/2/2009	Gauge only	Gauge only					High	
MW-18	Decommissioned in 2008.									
MW-19	6/16/2023	6/26/2023	Biennial			KGF417-MW19-25	AK102	DRO	Low	
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-20	6/16/2023	6/26/2023	Biennial			KGF417-MW20-25	AK102	DRO	Low	
MW-21	Decommissioned in 2012.									
MW-21R	Decommissioned in 2021.									
MW-21R2	6/16/2023	6/25/2023	Biennial			KGF417-MW21R2-25	AK102	DRO	Moderate	
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-22	Decommissioned in 2012.									
MW-22R	Abandoned in 2017.									
MW-23	Abandoned in 2017.									
MW-23R	Decommissioned in 2021.									
MW-23R2	6/16/2023	6/26/2023	Biennial			KGF417-MW23R2-25	AK102	DRO	High	
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-24	Decommissioned in 2020.									
MW-25	Abandoned in 2021.									
MW-25R	6/16/2023	6/24/2023	Biennial			KGF417-MW25R-25	AK102	DRO	None	
MW-26	Abandoned in 2017.									
MW-27	Decommissioned in 2021.									
MW-27R	6/16/2023	6/26/2023	Biennial			KGF417-MW27R-25	AK101	GRO	Low	
							AK102/AK103	DRO/RRO		
							SW8260D	1,2,4-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-28	Abandoned in 2017.									
MW-29	6/16/2023	6/26/2023	Biennial			KGF417-MW29-25	AK102	DRO	None	
MW-30	Decommissioned in 2017.									
MW-31	6/16/2023	6/25/2023	Biennial			KGF417-MW31-25	AK101	GRO	Low	
							AK102/AK103	DRO/RRO		
MW-32	Abandoned in 2020.									
MW-33	Decommissioned in 2021.									
MW-34	Decommissioned in 2017.									
MW-35	Abandoned in 2017.									
MW-36	Decommissioned in 2021.									
MW-36R	6/16/2023	6/25/2023	Biennial			KGF417-MW36R-25	AK102	DRO	Low	
MW-37	6/16/2023	6/25/2023	Biennial			KGF417-MW37-25	AK102	DRO	None	Monitor condition for loose PVC.
MW-38	6/16/2023	6/28/2023	Biennial			KGF417-MW38-25	AK101	GRO	High	
							AK102/AK103	DRO/RRO		
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, benzo(a)pyrene, and naphthalene		
MW-39	6/16/2023	6/26/2023	Biennial			KGF417-MW39-25	AK101	GRO	High	
							AK102/AK103	DRO/RRO		
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, benzo(a)pyrene, and naphthalene		
MW-40	6/16/2023	6/25/2023	Biennial			KGF417-MW40-25	AK101	GRO	Low	
							AK102/AK103	DRO/RRO		
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes		
							SW8270E SIM	1-methylnaphthalene, benzo(a)pyrene, and naphthalene		
SW	Surface water	6/24/2023	Biennial			KGF417-SW1-25 - KGF417-SW7-25	EPA 624	BTEX	NA	
							EPA 625	PAHs		

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				Dup	MS/ MSD					
Kenai Gas Field 41-18										
MW-A	Decommissioned in 2012.									
MW-C	Abandoned in 2017.									
MW-1	Decommissioned in 2012.									
MW-2	6/16/2023	6/26/2023	Every 4 years	Gauge only					Low	
MW-3	Decommissioned in 2012.									
MW-3R	Decommissioned in 2021.									
MW-3R2	6/16/2023	6/23/2023	Biennial			KGF4118-MW3R2-25	AK102	DRO	Moderate	
MW-4	6/16/2023	6/26/2023	Biennial			KGF4118-MW4-25	AK102	DRO	Low	
MW-5	Decommissioned in 2020.									
MW-6	Abandoned in 2020.									
MW-7	Decommissioned in 2020.									
MW-8R	6/16/2023	9/26/2014	Gauge only	Gauge only					None	
MW-9	6/16/2023	6/28/2023	Biennial			KGF4118-MW9-25	AK102	DRO	Moderate	
							SW8260D	Benzene		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-10	6/16/2023	9/26/2014	Gauge only	Gauge only					Low	
MW-11	Decommissioned in 2012.									
MW-11R	6/16/2023	6/28/2023	Biennial			KGF4118-MW11R-25	AK102	DRO	Moderate	
MW-12	6/16/2023	6/28/2023	Every 4 years	Gauge only					Low	
MW-13	Decommissioned in 2017.									
MW-14	6/16/2023	6/26/2023	Biennial			KGF4118-MW14-25	AK102	DRO	Low	
MW-15	6/16/2023	6/28/2023	Biennial			KGF4118-MW15-25	AK102	DRO	Moderate	
							SW8260D	Benzene		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-16	6/16/2023	6/24/2023	Biennial			KGF4118-MW16-25	AK102	DRO	Moderate	
							SW8260D	Benzene		
							SW8270E SIM	1-methylnaphthalene and naphthalene		
MW-17	Decommissioned in 2021.									
MW-17R	6/16/2023	6/28/2023	Biennial			KGF4118-MW17R-25	AK102	DRO	Low	
MW-18	Decommissioned in 2021.									
MW-18R	6/16/2023	6/28/2023	Every 4 years	Gauge only					Low	
MW-19	6/16/2023	6/28/2023	Biennial			KGF4118-MW19-25	AK102	DRO	Low	
SW	Surface water	6/28/2023	Biennial			KGF4118-SW1-25 - KGF4118-SW5-25	EPA 624	BTEX	NA	
							EPA 625	PAHs		
Swanson River Tank Setting 1-4										
FS1-4E	6/14/2023	6/17/2023	Biennial			SRF14-FS14E-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	High	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
FS1-4H	6/14/2023	6/17/2023	Biennial			SRF14-FS14H-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	Moderate	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
FS1-4I	6/14/2023	6/18/2023	Biennial			SRF14-FS14I-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	Low	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-4CC	Decommissioned in 2021.									
TS1-4DD	6/14/2023	10/7/2015	Gauge only	Gauge only					None	
TS1-4EE	6/14/2023	6/17/2023	Biennial			SRF14-TS14EE-25	SW8015C	Ethylene glycol	None	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-4F	6/14/2023	6/18/2023	Biennial			SRF14-TS14F-25	SW8260D	Petroleum-related VOCs	High	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
TS1-4G	Decommissioned in 2017.									
TS1-4GR	6/14/2023	6/18/2023	Biennial			SRF14-TS14GR-25	SW8015C	Ethylene glycol	High	
							SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene		
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-4J	6/14/2023	6/26/2021	Biennial			SRF14-TS14J-25	SW8260D	Petroleum-related VOCs	**LNAPL**	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
SW	Surface water	6/20/2023	Biennial	X	X	SRF14-SW1-25	SW8260D	Ethylene glycol	NA	
							SW8260E SIM	1,4-dioxane		
Swanson River Tank Setting 1-9										
FS1-9D	6/15/2023	6/19/2023	Every 4 years	Gauge only					Low	
FS1-9F	6/14/2023	12/26/2010	Biennial	Gauge and product recovery.					**LNAPL**	Cut down heaved PVC casing and install a well plug.
FS1-9I	6/15/2023	6/19/2023	Every 4 years	Gauge only					Low	
FS1-9M	6/15/2023	6/19/2023	Every 4 years	Gauge only					Low	
FS1-9N	6/15/2023	6/19/2023	Biennial			SRF19-FS19N-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Low	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-9A	6/15/2023	6/19/2023	Biennial			SRF19-TS19A-25	SW8260D	Petroleum-related VOCs	High	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
TS1-9B	6/15/2023	6/19/2023	Biennial			SRF19-TS19B-25	SW8260D	Petroleum-related VOCs	High	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
TS1-9C	6/15/2023	6/19/2023	Biennial			SRF19-TS19C-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	High	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-9D	6/15/2023	6/19/2023	Biennial			SRF19-TS19D-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-9HH	6/15/2023	6/18/2023	Every 4 years	Gauge only					Low	
TS1-9II	6/15/2023	10/6/2015	Gauge only	Gauge only					None	
TS1-9U	6/15/2023	6/18/2023	Every 4 years	Gauge only					Low	
Swanson River Tank Setting 1-27										
FS1-27C	6/14/2023	6/17/2023	Every 4 years	Gauge only					None	
TS1-27G	6/14/2023	6/17/2023	Biennial		X	SRF127-TS127G-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	Moderate	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-27J	6/14/2023	9/12/2014	Gauge only	Gauge only					None	
TS1-27K	6/14/2023	6/17/2023	Biennial			SRF127-TS127K-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	High	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-27L	6/14/2023	6/17/2023	Biennial			SRF127-TS127L-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	High	Replace monument collar and lid, if possible. Re-develop well due to slow flowrate and possible biological infiltration.
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-27M	6/14/2023	6/17/2023	Biennial			SRF127-TS127M-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, and isopropylbenzene	High	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-27N	6/14/2023	9/12/2014	Gauge only	Gauge only					None	

Hilcorp Beaver Creek Unit Pad 4, Cannery Loop Unit Pad 3, Kenai Gas Field, Swanson River Field, and Beluga River Unit Groundwater Monitoring Program
2025 Work Plan Addendum
Kenai Peninsula, Alaska
Table 1: 2025 Well Status

Well ID	Date Well Gauged	Date Well Sampled	Sampling Frequency	QC		Sample ID	Method(s)	Analyte(s)	Contamination Level (LNAPL, High, Moderate, Low, None)	Maintenance Recommendation(s)
				Dup	MS/MSD					
Swanson River Tank Setting 1-33										
FS1-33F	6/14/2023	6/18/2023	Biennial			SRF133-FS133F-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, isopropylbenzene, and tert-butylbenzene	Moderate	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
FS1-33H	6/14/2023	6/18/2023	Biennial			SRF133-FS133H-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, isopropylbenzene, and tert-butylbenzene	High	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
FS1-33O	6/14/2023	9/11/2014	Gauge only	Gauge only					Moderate	
FS1-33S	6/14/2023	6/17/2023	Biennial		X	SRF133-FS133S-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, isopropylbenzene, and tert-butylbenzene	Low	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
FS1-33T	6/14/2023	9/11/2014	Gauge only	Gauge only					None	
FS1-33W	6/14/2023	6/17/2023	Every 4 years	Gauge only					None	
MW1-33A	Abandoned in 2021.									
TS1-33JJ	6/14/2023	6/17/2023	Every 4 years	Gauge only					Low	
TS1-33KK	6/14/2023	9/12/2014	Gauge only	Gauge only					Low	
TS1-33N	Decommissioned in 2021.									
TS1-33O2	6/14/2023	6/18/2023	Biennial			SRF133-TS133O2-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, isopropylbenzene, and tert-butylbenzene	High	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
TS1-33P	6/14/2023	9/12/2014	Gauge only	Gauge only					None	
TS1-33Q	Assumed destroyed in 2023. Install replacement well TS1-33QR and sample for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, isopropylbenzene, tert-butylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.									
TS1-33U	Decommissioned in 2017.									
TS1-33UR	6/14/2023	6/17/2023	Biennial			SRF133-TS133UR-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, xylenes, isopropylbenzene, and tert-butylbenzene	Moderate	
							SW8270E SIM	1-methylnaphthalene, 2-methylnaphthalene, and napthalene		
Swanson River Tank Setting 2-15										
FS2-15B	6/14/2023	6/17/2023	Every 4 years	Gauge only					None	
TS2-15O	6/14/2023	6/17/2023	Biennial			SRF215-TS215O-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	High	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS2-15P	6/14/2023	6/17/2023	Every 4 years	Gauge only					None	
TS2-15Q	6/14/2023	9/12/2014	Gauge only	Gauge only					None	
TS2-15R	6/14/2023	6/17/2023	Every 4 years	Gauge only					None	
Swanson River Tank Setting 3-4										
FS3-4A	6/15/2023	6/18/2023	Biennial			SRF34-FS34A-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Low	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
FS3-4B	6/15/2023	6/18/2023	Every 4 years	Gauge only					Low	
FS3-4D	6/15/2023	12/26/2010	Biennial	Gauge and product recovery					LNAPL	
FS3-4F	6/15/2023	6/18/2023	Biennial			SRF34-FS34F-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-4CC	6/15/2023	6/19/2023	Biennial			SRF34-TS34CC-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-4D	6/15/2023	6/28/2021	Biennial			SRF34-TS34D-25	SW8260D	Petroleum-related VOCs	LNAPL	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
TS3-4MM	6/15/2023	6/18/2023	Every 4 years	Gauge only					None	
TS3-4NN	6/15/2023	9/9/2014	Gauge only	Gauge only					None	
TS3-4OO	6/15/2023	6/18/2023	Every 4 years	Gauge only					Low	
TS3-4P	6/15/2023	6/18/2023	Biennial			SRF34-TS34P-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	High	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-4PP	6/15/2023	9/9/2014	Gauge only	Gauge only					None	
TS3-4Z	6/15/2023	9/8/2014	Gauge only	Gauge only					None	
Swanson River Tank Setting 3-9										
FS3-9B	6/14/2023	6/19/2023	Every 4 years	Gauge only					None	
FS3-9E	6/14/2023	6/19/2023	Biennial			SRF39-FS3-9E-25	SW8260D	Petroleum-related VOCs	High	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
FS3-9G	6/14/2023	6/19/2023	Every 4 years	Gauge only					Low	
TS3-9A	6/14/2023	12/26/2010	Biennial			SRF39-TS39A-25	SW8260D	Petroleum-related VOCs	LNAPL	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
TS3-9AA	6/14/2023	6/19/2023	Every 4 years	Gauge only					Low	
TS3-9BB	6/14/2023	6/19/2023	Biennial			SRF39-TS39BB-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-9C	Decommissioned in 2017.									
TS3-9CC	6/14/2023	9/9/2014	Gauge only	Gauge only						
TS3-9CR	6/14/2023	6/20/2023	Biennial			SRF39-TS39CR-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	High	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-9DD	6/14/2023	6/18/2023	Every 4 years	Gauge only					Low	
TS3-9F	6/14/2023	6/20/2023	Biennial			SRF39-TS39F-25	SW8260D	Petroleum-related VOCs	High	Gauge and product recovery. Collect sample if no LNAPL present.
							SW8270E SIM	PAHs		
TS3-9S	6/14/2023	9/5/2014	Gauge only	Gauge only					None	
TS3-9T	6/14/2023	6/20/2023	Biennial			SRF39-TS39T-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-9U	6/14/2023	6/19/2023	Biennial			SRF39-TS39U-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
TS3-9V	6/14/2023	6/19/2023	Biennial			SRF39-TS39V-25	SW8260D	1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, and xylenes	Moderate	
							SW8270E SIM	1-methylnaphthalene and naphthalene		
Soldotna Creek Unit 21B-16										
MW-01	Decommissioned in 2021.									
MW-02	Decommissioned in 2021.									
MW-03	Decommissioned in 2021.									
MW-04	Decommissioned in 2021.									
MW-05	9/16/2024	9/16/2024	Annual	X	X	SCU21B16-MW05-25	AK103	RRO	None	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
SW-03	Surface water	9/16/2024	Annual			SCU21B16-SW03-25	SW8260D	BTEX	Low	
							SW8270E SIM	PAHS		
SW-05	Surface water	9/16/2024	Annual			SCU21B16-SW05-25	SW8260D	BTEX	None	
							SW8270E SIM	PAHS		
Soldotna Creek Unit 23B-03										
MW-01	6/18/2023	6/20/2023	Biennial			SCU23B03-MW01-25	AK102/AK103	DRO/RRO	High	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
MW-02	6/18/2023	6/20/2023	Biennial		X	SCU23B03-MW02-25	AK102/AK103	DRO/RRO	Low	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
MW-03	6/18/2023	6/20/2023	Biennial	X		SCU23B03-MW03-25	AK102/AK103	DRO/RRO	High	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
Soldotna Creek Unit 312-09										
MW-01	6/19/2023	6/20/2023	Biennial		X	SCU31209-MW01-25	AK102/AK103	DRO/RRO	Low	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
MW-02	6/19/2023	6/20/2023	Biennial			SCU31209-MW02-25	AK102/AK103	DRO/RRO	None	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
MW-03	6/19/2023	6/20/2023	Biennial	X		SCU31209-MW03-25	AK102/AK103	DRO/RRO	Moderate	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
Swanson River Unit 14-15										
MW-01	9/16/2024	9/16/2024	Biennial	X	X	SRU1415-MW01-25	AK103	RRO	Low	Sample twice (June, Sept). Sample ID in Sept "SRU1415-MW01-25-2"

Hilcorp Beaver Creek Unit Pad 4, Cannery Loop Unit Pad 3, Kenai Gas Field, Swanson River Field, and Beluga River Unit Groundwater Monitoring Program
2025 Work Plan Addendum
Kenai Peninsula, Alaska
Table 1: 2025 Well Status

Well ID	Date Well Gauged	Date Well Sampled	Sampling Frequency	QC		Sample ID	Method(s)	Analyte(s)	Contamination Level (LNAPL, High, Moderate, Low, None)	Maintenance Recommendation(s)
				Dup	MS/ MSD					
Swanson River Unit 43B-15										
MW-01	9/12/2024	9/12/2024	Annual		X	SRU43B15-MW01-25	AK102	DRO	None	Sample in September. Install caps or plugs if additional monitoring is necessary.
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
							SW6020B	RCRA Metals		
MW-02	9/12/2024	9/12/2024	Annual	X		SRU43B15-MW02-25	AK102	DRO	None	Sample in September. Install caps or plugs if additional monitoring is necessary.
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
							SW6020B	RCRA Metals		
MW-03	9/12/2024	9/12/2024	Annual			SRU43B15-MW03-25	AK102	DRO	None	Sample in September. Install caps or plugs if additional monitoring is necessary.
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
							SW6020B	RCRA Metals		
Beluga River Unit 224-13 (M Pad)										
224-13-2	10/3/2024	10/3/2024	Annual		X	BRUM-224132-25	AK102/AK103	DRO/RRO	None	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
224-13-3R	10/3/2024	10/3/2024	Annual	X		BRUM-224133R-25	AK102/AK103	DRO/RRO	None	
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		
224-13-4R	10/3/2024	Not sampled	Annual			BRUM-224134R-25	AK102/AK103	DRO/RRO	**LNAPL**	LNAPL present during well development; Gauge and product recovery. Redevelop and collect sample if no LNAPL present. Deploy petrosock if LNAPL detected.
							SW8260D	Petroleum-related VOCs		
							SW8270E SIM	PAHs		

Notes:

Monitoring wells in **red bold** type denote wells that historically contained LNAPL.

Monitoring wells in **gray bold** type denote wells that have been removed from the monitoring program.

Assume monitoring wells have stick-up monuments with 2-inch diameter PVC casing, unless otherwise noted.

Assume monitoring wells are locked, labeled, and have a well plug or cap, unless otherwise noted.

Contamination levels are determined by most recent analytical concnetrations available. "LNAPL" = product expected to be present, "High" = more than two exceedances, "Moderate" = two or less exceedances, "Low" = detection(s), "None" = non-detect(s).

° = degrees
BTEX = benzene, toluene, ethylbenzene, and total xylenes
btoc = below top of casing
DRO = total petroleum hydrocarbons (TPH) as diesel-range organics
DUP = duplicate
GRO = TPH as gasoline-range organics
HC = hydrocarbon
HVE = high volume evacuation
ID = identification
LNAPL = light nonaqueous-phase liquid
MS/MSD = matrix spike/matrix spike duplicate
NA = not applicable
PAHs = polycyclic aromatic hydrocarbons
PID = photoionization detector
ppm = parts per million
PVC = polyvinyl chloride
QC = quality control
RRO = TPH as residual range organics
SW = surface water
VOCs = volatile organic compounds

Hilcorp Beaver Creek Unit, Cannery Loop Unit, Kenai Gas Field, Swanson River Field, and Beluga River Unit Groundwater Monitoring Program
2025 Work Plan Addendum
Kenai Peninsula, Alaska
Table 2: Anticipated Waste Streams

Waste Stream	Waste Classification	Estimated Quantity	Container	Proper Shipping Name	Disposal	Notes
Liquid IDW – No odor/sheen (purge water, decontamination water)	Non-TSCA/Non-RCRA regulated	555-gal (BCU: 40-gal CLU: 30-gal KGF: 180-gal SRF: 250-gal BRU: 55-gal)	N/A	Non-hazardous liquid	GAC	GAC-treated water free of sheen will be discharged to a vegetated, upland area of the site at least 100 feet from drinking water sources and surface water. Total purge and decontamination water from each monitoring well will be noted on the field forms.
Liquid IDW – SRF TS 1-4 only (purge water, decontamination water)	Non-exempt (SRF TS 1-4, ethylene glycol)	15-gal	55-gal drum	Non-hazardous liquid (impacted with ethylene glycol)	Hilcorp	Purge water from SRF TS 1-4, impacted with ethylene glycol, is non-exempt waste and will be containerized in a 55-gal drum provided and disposed by Hilcorp. SRF Site TS 1-4 is not E&P exempt.
Liquid IDW - Odor/sheen (purge water, decontamination water)	Non-exempt (SRF sites TS 1-27 and TS 2-15)	0-gallons	55-gal drum	Non-hazardous liquid (hydrocarbon odor and/or sheen)	Hilcorp	GAC is anticipated to be sufficient treatment. If three GAC treatment cycles have not removed odor and/or sheen, purge and/or contaminated water will be containerized in a 55-gallon drum provided by Hilcorp, labeled, recorded on the waste-tracking log, and transferred to Hilcorp SRF G&I Facility for storage and subsequent disposal. SRF sites TS 1-27 and TS 2-15 are not E&P exempt.
Liquid IDW - Odor/sheen (purge water, decontamination water)	Exempt (BCU, CLU, KGF, and SRF sites TS 1-9, TS 1-33, TS 3-4, and TS 3-9)	0-gal	55-gal drum	Non-hazardous liquid (hydrocarbon odor and/or sheen)	Hilcorp	GAC is anticipated to be sufficient treatment. If three GAC treatment cycles have not removed odor and/or sheen, purge and/or contaminated water will be containerized in a 55-gallon drum provided by Hilcorp, labeled, recorded on the waste-tracking log, and transferred to Hilcorp at KGF Pad 34-31 (BCU, CLU, and KGF) or SRF G&I Facility (SRF)for storage and subsequent disposal. These sites have sources relating to E&P and are, therefore, exempt.
Drill Cuttings	Exempt	< 1 cubic yard	5-gal bucket with screw-top lid or 55-gal drum	Non-hazardous solid (Hydrocarbon odor and/or staining)	Hilcorp	Soils unearthed during drilling activities will be observed and field screened with a PID. Where there are no indications of contamination by visual, olfactory, or PID observation, soil cuttings will be land spread near the point of generation. Where field observations indicate the potential presence of contaminants, drill cuttings will be containerized in a 5-gallon bucket or a 55-gallon drum, labeled, recorded on the SRF G&I Waste Log, and transferred to Hilcorp SRF G&I Facility for storage and subsequent disposal. A waste characterization sample will be collected to characterize the containerized waste.
Product (BCU, BRU)	N/A	< 5-gal	5-gal bucket with screw-top lid	N/A	Recycle	Volume will be documented and transferred to Hilcorp for recycling in the process stream.
Product (KGF 14-6)	Exempt	< 5-gal	5-gal bucket with screw-top lid	Waste Oil	U.S. Ecology	Volume will be documented and transferred to Hilcorp for subsequent offsite disposal through U.S. Ecology.
Product (SRF)	N/A	< 5-gal	5-gal bucket with screw-top lid	N/A	Recycle	Volume will be documented and transferred to Hilcorp for subsequent disposal or combined with Hilcorp Waste Oil Drums located inside each TS building for recycle.
Sorbent socks	Non-TSCA/Non-RCRA regulated	7 "Oily Waste" bags	Polyethylene "Oily Waste" bags contained in 5-gal bucket with screw-top lid	Oily Waste	Hilcorp	Used sorbent socks to be disposed of from BCU4 South, KGF Pad 14-6, SRF TS 1-4, TS 1-9, TS 1-33, TS 3-4, TS 3-9, and BRU 224-13 (M Pad). Bags will be segregated by site, labeled (TS 1-4 socks will also be identified to contain ethylene glycol), recorded on the waste-tracking log, and transferred to Hilcorp for storage and subsequent disposal.
Solid Waste	Non-TSCA/Non-RCRA regulated	35 bags	Heavy 42-gal garbage bags	Non-hazardous waste – solid (general refuse)	Local landfill	General refuse will include nitrile gloves and other expended PPE, paper towels, disposable tubing, and well decommissioning materials. Volume will be documented and transferred to dumpsters in which general refuse can be placed, local landfill, or transfer station.
Spent GAC	Non-TSCA/Non-RCRA regulated	15-gal	5-gal bucket with screw top lid	Non-hazardous waste – solid (GAC)	Hilcorp	Hilcorp will facilitate disposal when no longer usable. GAC material will be sampled prior to transferring to Hilcorp.

Notes:

BCU = Beaver Creek Unit
BRU = Beluga River Unit
CLU = Cannery Loop Unit
DOT = US Department of Transportation
E&P = exploration and production
GAC = granular activated carbon
gal = gallons
IDW = investigation-derived waste
KGF = Kenai Gas Field
N/A = not applicable
PPE = personal protective equipment
RCRA = Resource Conservation and Recovery Act
SRF = Swanson River Field
TS = Tank Setting
TSCA = Toxic Substances Control Act

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Hilcorp BCU, CLU, KGF, SRF, SCU, SRU, and BRU Groundwater Monitoring Program
2025 Work Plan Addendum
Kenai Peninsula, Alaska
Table 3: Summary of Analyses

Parameter	Method	Container Description	Preservation/Holding Time
Groundwater			
GRO	AK101	(3) 40-mL VOA vials, TLS	HCl to pH<2, 0 to 6°C 14 days
DRO/RRO	AK102/AK103	(2) 250-mL amber glass jar, TLC	HCl to pH<2, 0 to 6°C 14 days to extraction, 40 days to analysis
Petroleum-related VOCs	SW8260D	(3) 40-mL VOA vials, TLS	HCl to pH<2, 0 to 6°C 14 days
PAHs	SW8270E SIM	(2) 250-mL amber glass jar, TLC	0 to 6°C 7 days to extraction, 40 days to analysis
Ethylene glycol	SW8015C	(3) 40-mL VOA vials, TLS	HCl to pH<2, 0 to 6°C 14 days
Surface Water			
TAH/TAqH[1]	EPA 624	(3) 40-mL VOA vials, TLS	HCl to pH<2, 0 to 6°C 14 days
	EPA 625	(2) 250-mL amber glass jar, TLC	0 to 6°C 7 days to extraction, 40 days to analysis
Waste Characterization			
TCLP RCRA Metals	SW1311/ SW6020B	(1) 8-oz clear glass jar w/Teflon-lined lid	0-6°C, 180 days to TCLP extraction, 180 days to analysis
TCLP SVOC	SW1311/ SW8270E	(1) 8-oz clear glass jar w/Teflon-lined lid	0-6°C, 14 days to TCLP extraction, 40 days to analysis
TCLP VOC	SW1311/ SW8260D	(1) 4-oz amber glass jar	0-6°C, 14 days to TCLP extraction, 7 days to analysis
pH	W9045B/ SW9040C	(1) 4-oz amber glass jar	No preservative, ASAP/7days
Ignitability/flashpoint	SW1020A	(1) 4-oz amber glass jar	No preservative, no holding time specified

Notes:

[1] TAH is calculated from the sum of the BTEX compounds; TAqH is calculated from the sum of TAH plus PAH compounds (as listed in Table 1-3 except 1-methylnaphthalene and 2-methylnaphthalene).

°C = degrees Celsius

DRO = diesel range organics

EPA = US Environmental Protection Agency

GRO = gasoline range organics

HCl = hydrochloric acid

mL = milliliters

PAHs = polycyclic aromatic hydrocarbons

RRO = residual range organics

TAH = total aromatic hydrocarbons

TAqH = total aqueous hydrocarbons

TLC = teflon-lined cap

TLS = teflon-lined septa

VOA = volatile organic analysis

VOCs = volatile organic compounds

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Attachment 3 Standard Operating Procedures

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STANDARD OPERATING PROCEDURE
SOP-09
MONITORING WELL INSTALLATION, DEVELOPMENT, AND DECOMMISSIONING

This Standard Operating Procedure (SOP) describes the process for installing, developing, and decommissioning groundwater monitoring wells. This SOP is consistent with Monitoring Well Guidance issued by the Alaska Department of Environmental Conservation (ADEC 2013). Specific monitoring well design and installation procedures depend on project objectives and subsurface conditions and should be discussed in the Work Plan.

Monitoring wells can be installed as long-term monitoring wells, which can be repeatedly sampled over several years, or as temporary well points, which allow for a one-time groundwater sampling event. Following sampling, a temporary well point is usually removed and backfilled in accordance with ADEC regulations.

1. EQUIPMENT AND MATERIALS

The drilling subcontractor will supply all materials and equipment necessary to perform drilling activities and will install monitoring wells in accordance with the Work Plan and as directed.

Temporary well points consist of 1- to 2-inch diameter screened PVC or stainless steel pipe, which can be pre-packed with filter material, or only a slotted screen. Temporary well points can be installed using a drill rig or excavation equipment, or by hand if in unconsolidated material with a shallow water table.

Permanent monitoring wells are installed with either pre-packed or slotted screens, using a drill rig (typically a direct push drill rig or a hollow stem auger).

Equipment and materials that may be needed for monitoring well installation include the following:

- Drill rig or equivalent
- Well casing and screen
- Filter pack materials (silica sand)
- Bentonite
- Surface seal materials (concrete)
- Potable water and/or deionized water
- Weighted tape measure

Equipment and materials that may be needed for monitoring well development includes the following:

- Water level meter or Oil/Water interface probe
- Surge block (with foot valve)
- Submersible pump
- Sprinkler pump (useful for removing large volumes of silt and fine sand laden water)
- Inertial pump and tubing (optional-consider for deep wells greater than 30 feet)
- Disposable polyethylene or Teflon bailers
- 5-gallon buckets
- Graduated cylinder or beaker
- YSI water-quality meter with calibration solutions
- Hach portable turbidity meter
- Potable water and/or deionized water
- Disposable polyethylene tubing

2. WELL INSTALLATION PROCEDURES

This section describes drilling, borehole, casing, well screen, bentonite seal, and monitoring well completion requirements.

2.1 Drilling Requirements

Several drilling methods are available for creating a borehole for well installation. Primary methods include hollow stem auger, direct push, air rotary, mud rotary, and cable tool. The drilling method is selected based on lithology and subsurface characteristics.

All drilling activities will be supervised by a qualified environmental professional. The drill rig will be decontaminated appropriately before it enters and leaves the site in accordance with the *Equipment Decontamination* SOP-15. All leaks will be repaired prior to coming to the site or as soon as they are discovered at the site. The drill rig will not leak any fluids that may enter the borehole or contaminate equipment placed in the hole. The use of rags or absorbent materials to soak up leaking fluids is unacceptable. Spill response equipment will be on site at all times to ensure constant preparedness in the event of a leak.

Drilling mud, synthetic drilling fluids, petroleum or metal-based pipe joint compounds, and other potential contaminants will not be used. Only high yield sodium bentonite clay free of organic polymer additives will be used if drilling mud is needed to stabilize the boring.

Decontamination water must be potable and obtained from a known water source. A construction diagram will be constructed for each monitoring well and the locations and top of casing and ground elevations will be surveyed.

2.2 Borehole Requirements

Borehole diameters should be at least three inches larger than the nominal outside diameter of the casing and well screen. If using a hollow stem auger, the inside diameter of the auger should be at least four inches larger than the nominal outside diameter of the casing and well screen, unless otherwise specified in the approved Work Plan.

The completed monitoring well must be straight to allow passage of pumps and other sampling devices.

2.3 Casing Requirements

The following lists requirements for monitoring well casings:

- All casing will be new, unused, and pre-cleaned (if necessary).
- Glue or solvents will not be used to join casings; casings will be joined only with water-tight flush-joint threads or thermal welds that will not interfere with the planned well use.
- Pop rivets or screws should not be used on casings or other monitoring well components.
- All monitoring wells must conform to the American Society for Testing Materials (ASTM) F-480-06b. The inside diameter should be at least 1.9 inches, except for well points for piezomenters and transducers, which can be smaller diameter. Polyvinyl chloride (PVC) is a durable monitoring well material with good chemical resistance (EPA 1991).
- All metal casings will be seamless stainless-steel casings.
- The casing will be straight within the tolerance stated for the borehole.
- A notch in the top of the casing will be cut or marked and used as a measuring point for water levels and survey activities.
- The addition of bentonite surrounding the PVC casing will be visually verified during well installation activities to ensure that bridging is not occurring during withdrawal of the drill string/equipment.

2.4 Well Screen Requirements

The following lists requirements for well screens:

- All requirements that apply to casings will also apply to well screen, except for strength requirements.
- Monitoring wells will not be screened across more than one water-bearing unit. Screens will be factory slotted or wrapped.
- Screen slots will be sized to prevent 90 percent of the filter pack from entering the well, and for wells where no filter pack is used, the screen slot size will be selected to retain 60 to 70 percent of the formation materials outside the screen.
- The bottom of the screen will be capped, and the cap will be joined to the screen by threads.

In most hydrogeologic settings, screen lengths should not exceed 10 feet. The use of shorter well screens (5 feet) may allow for contaminant detection by reducing excessive dilution.

2.5 Filter Pack Requirements

Surrounding the monitoring well intake with materials that are coarser, have a uniform grain size, and have a higher permeability than natural formation material allows the groundwater to flow freely into the well from the adjacent formation, while minimizing or eliminating intrusion by fine-grained materials. Silica sand (10/20 or 12/20) is typically used for the filter pack. The filter pack should extend above the well screen to a length of 20% of the well screen length, but no less than 2 feet (ASTM D5092 2005). The thickness of the filter pack should be at least 2 inches between the borehole and the well screen, but no greater than 8 inches (EPA 1991).

2.6 Seal Requirements

An annular seal should be installed to restrict vertical movement of water or contaminants by sealing the well casing to the adjacent soil formation. The annular seal consists of bentonite chips from the filter pack to approximately 2 feet below the ground surface.

The bentonite seal requirements for wells installed deeper than 12 feet below ground surface are:

- The bentonite seal will consist of at least 2 feet of bentonite between the filter pack and the silica sand used to fill the borehole to the ground surface.
- The bentonite will be hydrated after placement.
- Only 100% sodium bentonite will be used.

The bentonite seal will be terminated 2 feet from the ground surface. The remainder of the annulus will be backfilled using silica sand to minimize bentonite intrusion into the well monument and to promote drainage of water from inside the monument. If the monitoring well is advanced in frozen ground, the annular space between the casing and any permafrost should be sealed to minimize effects on the subsurface thermal regime and to prevent water within the well from freezing.

2.7 Monitoring Well Surface Completion Requirements

Surface completion is not required for temporary well points.

If flush-mounted completions are used, cut the casing approximately six inches below the ground surface and provide a water-tight casing cap to prevent surface water from entering the well. A freely draining surface monument with a bolted cover should be placed over the casing. The surface monument should be placed in well-sorted sand to allow water drainage. If the well is located on a gravel pad, the top of the monument must be completed at least 3 inches below pad grade to protect it from snow removal equipment. The top of the casing must be at least one foot above the bottom of the surface monument. The identity of the well should be permanently marked on the monument lid and the casing cap.

For above-ground monitoring well completions, the well casing will extend 2 or 3 feet above ground surface. Provide a casing cap for each well and shield the extended casing with a steel monument that is placed over the casing and cap, seated in a concrete surface pad. The sleeve diameter should be at least 6 inches greater than the casing diameter. Install a lockable cap or lid on the guard pipe. The well identification should be permanently marked on the casing cap and the monument lid.

Well locations must be designed to ensure groundwater samples and water level measurements characterize discrete stratigraphic intervals. This is achieved by positioning the screened interval relative to the water table elevation.

Well locations and designs must prevent surface contaminants from entering the groundwater as well as leakage of groundwater or contaminants between the stratigraphic intervals in the well bore or along the well annulus. Complete wells above grade to decrease the potential of surface contaminants entering the well.

Install monitoring wells where there is no chance of seasonal inundation by floodwaters, unless the wells have special watertight construction.

2.8 Documentation Requirements

If the well is not direct drilled, log the soil boring in accordance with SOP-01 and ASTM D2488 Unified Soil Classification standards. The *Soil Boring Log* (SOP-01 Attachment 2) must be completed during installation before leaving the site to ensure all details are captured and are complete and accurate.

Fill out the attached Well Construction Form (Attachment 1) following installation. All fields on the construction form must be completed, or “NA” will be inserted to indicate a field that is not applicable. The required field form sections are outlined below:

- Well designation
- Date of well installation
- Quantity of drilling fluid lost during drilling
- Well volume
- Depth from top of well casing to bottom of well
- Screen length
- Height of well casing above/below ground surface

Monitoring wells will be surveyed within a horizontal accuracy of 1.0 feet and a vertical accuracy of 0.01 foot. The top of casing and ground surface elevations will be surveyed for use as a reference point to determine water-level elevation, sampling depths, and groundwater flow direction. All survey information will be documented in the field logbook.

3. WELL DEVELOPMENT PROCEDURES

Monitoring wells should not be developed for at least 24 hours after installation. Wells can be developed using a submersible pump, peristaltic pump, Waterra foot valve, or a bailer. Waterra foot valves and bailers are more commonly used in wells with smaller water volumes.

Monitoring wells are developed by first purging the well dry, if possible, then allowing the monitoring well to refill with formation water. If the recovery rate by the formation water is too slow, up to one well casing volume of deionized water can be added to the well. The well should be surged vigorously for approximately 10 minutes using either a surge block or bailer. Add more water as necessary. Purge the well dry again to complete the development process (ADEC 2013).

A minimum of three borehole volumes (calculated from the borehole diameter and the length of screen below the water table, corrected for 30 percent porosity of the filter pack) of water, plus twice the volume of water added during drilling and construction will be removed.

If well screens are submerged, the borehole volume is calculated over the interval of the filter pack (length of screen plus 2 feet of added sand above the screen).

After initial surging and pumping, groundwater parameters will be monitored for stability criteria (Table 1). Groundwater parameter stability is reached when three changes between successive readings at approximately 5-minute intervals at a low-flow pumping rate (drawdown less than 0.3 feet) are less than the criteria provided in Table 1. When stabilization is reached, the well is considered developed. If stability cannot be achieved, the well is considered developed when the total volume of water removed from the well equals five borehole volumes plus the volume of drilling fluid lost or potable water added (if fluids were added during well installation or development).

Table 1 Stability Criteria for Low-Flow Purging

Parameter[1]	Units	Recording Precision	Stability Criterion
pH	—	0.01	±0.1
Temperature	°C	0.01	±0.2
Conductivity	µS/cm	1	±3%
Turbidity	NTU	0.1	± 10% or ± 1 NTU (whichever is greater)
Oxidation Reduction Potential (ORP)	mV	1	±10
Dissolved Oxygen (DO)	mg/L	0.1	±10% or 0.3 mg/L (whichever is greater)

Notes:
°C = degrees Celsius
µS/cm = microSiemens per
centimeter NTU = nephelometric
turbidity units mV = millivolts
mg/L=milligrams per liter
Stability criteria from ADEC *Field Sampling Guidance* (ADEC 2022).
[1] Only three parameters are required to stabilize, four when using temperature.

Low-yielding wells are exceptions to the above criteria. Such wells should be purged dry, then either be allowed to recover or be filled with potable water to the static water level for surging. Add water as needed to maintain the water level during surging. Satisfactory recovery is defined as 80 percent of the well volume. After the initial recovery period, such wells will be surged and purged dry again to complete the development process.

Alternative development procedures may be used if they will not affect the ability of the well to provide representative samples. Wells installed with an annular seal must not be developed until 24 hours after well installation to allow annular seal materials to set and cure. ADEC recognizes that remote site work may make this impractical. The ADEC Project Manager should be contacted for site-specific approval if development is conducted prior to the 24-hour waiting period. Well purge water should be discharged and treated as needed in accordance with the project-specific Work Plan. The following details should be recorded on the Well Development Form (Attachment 2):

- Date of development
- Static water level before and after development
- Depth from top of well casing to top of sediment inside well, before and after development, if present
- Physical characteristics of removed water, including changes during development in clarity, color, particulates, and odor
- Type and size/capacity of pump and/or bailer used
- Pumping rate
- Recharge rate
- Quantity of water removed and time of removal
- Parameter readings, including pH, temperature, conductivity, turbidity, ORP, and DO (if stabilized)

4. WELL DECOMMISSIONING PROCEDURES

The purpose of decommissioning is to protect the aquifer. Monitoring wells and temporary well points should be decommissioned as soon as ADEC has determined the wells are no longer needed. This SOP is consistent with the decommissioning section of the *Monitoring Well Guidance* issued by the Alaska Department of Environmental Conservation (ADEC 2013). Specific monitoring well decommissioning procedures depend on project objectives and subsurface conditions, and must be presented in the Work Plan. ADEC approval of the Work Plan is required prior to decommissioning wells. Common well decommissioning procedures include:

1. Knock the bottom of the screen out with a steel drill rod/ pipe, which allows the well to be used as a tremie pipe.
2. Remove the well casing and screen until the screened interval is above the groundwater interface. This allows the material surrounding the well to collapse into the borehole. Keep a 1:1 ratio when pulling out the screen (i.e., if you have a 10’ screen, pull the well out 10’).

3. After the casing is withdrawn above the groundwater interface, add some bentonite chips to the well. Withdraw the casing further and continue adding bentonite chips. Continue this iterative process (pull the casing, fill the borehole, pull the casing, fill the borehole) to within 2 feet of the ground surface.
4. If the well is shallow, add water to hydrate the bentonite chips. Add additional bentonite chips as necessary to seal the well to within 2 feet of the ground surface.
5. If the well is deep, use a grout pump to place a bentonite slurry in the well. The use of the grout pump will ensure a complete seal of the borehole and minimize the potential for bridging.
6. If the well is in a confined aquifer, bentonite chips should be placed within the confining stratum.
7. Fill the remaining 2 feet of the borehole with sand or gravel and restore the site.
8. Record decommissioning procedures.

If the well casing and screen cannot be removed at the time of decommissioning, and it is known that the well construction included a competent annular seal of bentonite chips surrounding the well casing, the screen should be filled with sand and the casing should be completely sealed in-place with bentonite chips up to the casing cutoff point located near the ground surface.

If the monitoring well is damaged, broken, filled, or plugged with soil or other extraneous material preventing successful decommissioning efforts by the methods described above, decommissioning can be achieved by re-drilling the monitoring well. The PVC casing and well screen may be destroyed by re-drilling the original borehole to the total depth of the well. When the auger is at the bottom of the well, bentonite chips should be added continuously as the auger is carefully removed.

5. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2013. Monitoring Well Guidance. September.

ADEC. 2022. Field Sampling Guidance. January.

American Society of Testing Materials (ASTM). 2009. Standard Practice for Description and Identification of Soils (Visual-Manual Procedure. D2488. West Conshocken, Pennsylvania. July.

Environmental Protection Agency (EPA) .1991. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, Office of Research and Development. March.

EPA Region 4. 2008. Design and Installation of Monitoring Wells, Science and Ecosystem Support Division. February.

ATTACHMENTS

Attachment 1: Well Construction Form

Attachment 2: Well Development Form

Attachment 1: Well Construction Forms

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SHEET 1 OF 1

PROJECT NUMBER

WELL ID

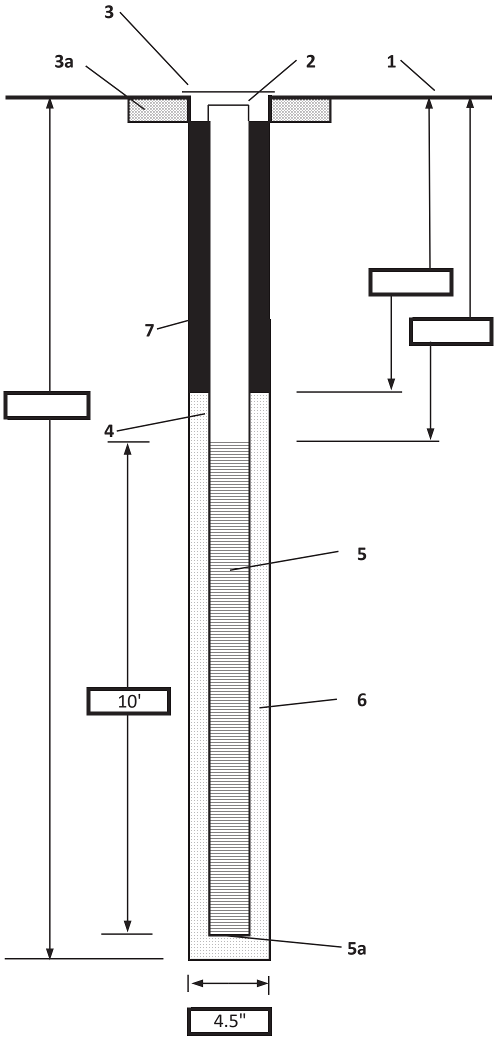
FLUSH MOUNT WELL COMPLETION DIAGRAM

PROJECT/CLIENT: **LOCATION :**

DRILLING CONTRACTOR:

DRILLING METHOD AND EQUIPMENT USED:

WATER LEVEL: **START :** **END :** **LOGGED BY:**



1- Ground elevation at well: TBD

2- Top of casing elevation: TBD

3- Wellhead protection cover type: 8" x 12" steel monument

a) concrete pad dimensions: 20" diameter

4- Dia./type of well casing: 2" Schedule 40 PVC

5- Type/slot/size of screen: 2" Schedule 40 PVC 0.010" screen

a) End cap: 2" D x 4" L threaded end cone

6- Type of screen filter: Premier Colorado Silica Sand 12/20

7- Type of seal: Baroid Casing Seal

Development method: See Development Sheet

Development time: See Development Sheet

Estimated purge volume: See Development Sheet

Comments

PROJECT NUMBER	SHEET 1 OF 1 **WELL ID**

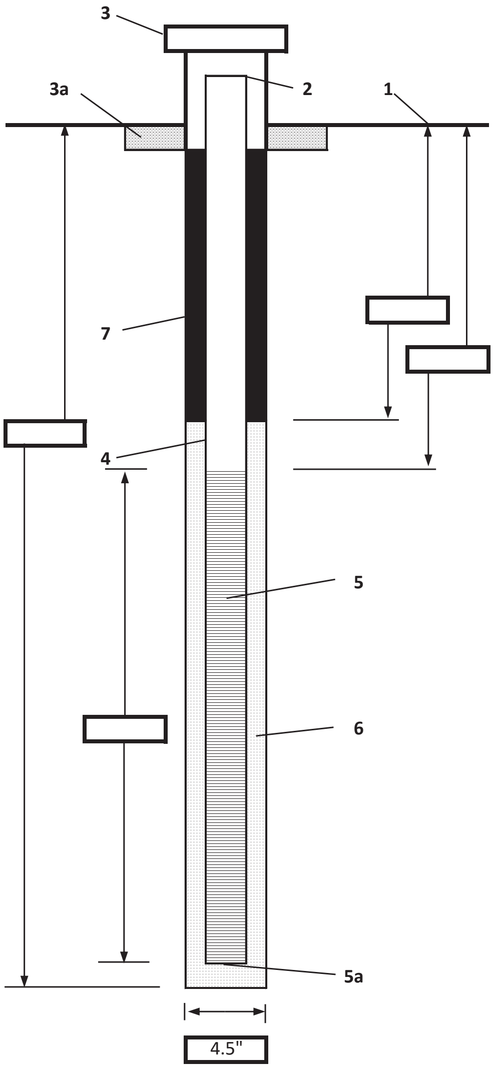
RISER WELL COMPLETION DIAGRAM

PROJECT/CLIENT: **LOCATION :**

DRILLING CONTRACTOR:

DRILLING METHOD AND EQUIPMENT USED:

WATER LEVEL: **START :** **END :** **LOGGED BY:**



1- Ground elevation at well TBD

2- Top of casing elevation TBD

3- Wellhead protection cover type 8" x 48" steel riser
a) concrete pad dimensions 20" diameter

4- Dia./type of well casing 2" Schedule 40 PVC

5- Type/slot/size of screen 2" Schedule 40 PVC 0.010" screen
a) End cap 2" D x 4" L threaded end cone

6- Type of screen filter Premier Colorado Silica Sand 12/20

7- Type of seal Baroid Casing Seal

Development method See Development Sheet

Development time See Development Sheet

Estimated purge volume See Development Sheet

Comments

Attachment 2: Well Development Form

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WELL DEVELOPMENT FORM

PROJECT NO: **SITE ID:** **WELL ID:** **SHEET of**

PROJECT NAME

CLIENT

SITE

EVENT

DEVELOPER(S)

WEATHER/ TEMPERATURE

DATE

START TIME

END TIME

TOTAL PURGE VOLUME

WELL CONSTRUCTION DATA

TIME/DATE WELL COMPLETED

AS-BUILT TOTAL DEPTH OF WELL (ft BTOC)

CASING MATERIAL AND DIMENSIONS

SCREEN LENGTH (ft) /SCREEN TYPE

DEPTH TO TOP FILTER PACK (ft BTOC)/FILTER PACK TYPE

DEPTH TO WATER AT TIME OF DRILLING (ft BTOC)

HEIGHT OF WATER COLUMN AT TIME OF DRILLING (ft)

BOREHOLE DIAMETER (in)

VOLUME OF WATER ADDED DURING DRILLING (gal)

BOREHOLE VOLUME FACTORS [BVF]

CASING MATERIAL	CASING I.D. (in)	BOREHOLE DIAMETER (in)	BVF (gal/lin ft)
1” Sch40 PVC	1.049	4.5	**0.279**
2” Sch40 PVC	2.067	4.5	**0.370**
2” Sch40 PVC	2.067	6	**0.563**
2” Sch40 PVC	2.067	8	**0.905**
2” Sch40 PVC	2.067	10	**1.346**
4” Sch40 PVC	4.026	8	**1.246**
4” Sch40 PVC	4.026	10	**1.687**

All BVF calculations assume a filter pack porosity of 0.3.

PRE-PURGE DEVELOPMENT DATA

PURGING EQUIPMENT:

(PUMP TYPE AND MATERIAL, OTHER APPARATUS)

IF PRODUCT IS PRESENT

DEPTH TO PRODUCT (ft FROM TOC):

THICKNESS OF PRODUCT (ft):

PRODUCT DESCRIPTION:

EQUIPMENT DECON PROCEDURE:

PURGE WATER DISPOSAL METHOD:

EQUIPMENT SERIAL NUMBERS: **TURBIDIMETER** **OTHER**

PRE-PURGE WATER COLUMN OBSERVATIONS AND RECOVERY CALCULATIONS

DEPTH TO WATER (ft BTOC)

TOTAL DEPTH (ft BTOC)

HEIGHT OF WATER COLUMN (ft)

80% HEIGHT OF WATER COLUMN (ft)

80% HEIGHT OF WATER COLUMN (ft BTOC)

DROWNED SCREEN?

PURGE VOLUME CALCULATIONS

For screen across the water table:
Borehole + Casing Volume (BV) =
[Casing Total Depth - Depth to Water] * BVF

For a drowned screen:
Borehole + Casing Volume (BV) =
[Casing Total Depth - Depth to Top Filter Pack]* BVF

For borehole volume factors (BVF), see uppermost section on the right side of this form, above.

BOREHOLE VOLUME (BV, gal)
Calculated using the appropriate formula above.

MINIMUM PURGE VOLUME (gal)
= 2*Volume of Water Added During Drilling + 3*BV

MAXIMUM PURGE VOLUME (gal)
= 2*Volume of Water Added During Drilling + 10*BV

PURGE DATA

ACTIVITY [SURGE, PURGE, RECOVERY]	TIME	WATER LEVEL (ft BTOC)	DRAW DOWN (ft)	TOTAL DEPTH (ft BTOC)	PURGED VOLUME (gallons or liters)		TURBIDITY (Qualitative or NTU)	NOTES [Flow data: pump intake depth, approximate flowrate, purged dry] [Water quality: color, odor, sheen, sediment in purge water or at TD]
					THIS CYCLE	CUMULATIVE		

WELL DEVELOPMENT FORM

PROJECT NO: **SITE ID:** **WELL ID:** **SHEET of**

ADDITIONAL PURGE DATA

ACTIVITY [SURGE, PURGE, RECOVERY]	TIME	WATER LEVEL (ft BTOC)	DRAW DOWN (ft)	TOTAL DEPTH (ft BTOC)	PURGED VOLUME (gallons or liters)		TURBIDITY (Qualitative or NTU)	NOTES [Flow data: pump intake depth, approximate flowrate, purged dry] [Water quality: color, odor, sheen, sediment in purge water or at TD]
					THIS CYCLE	CUMULATIVE	IDEAL <50 NTU	

STABILIZATION DATA

START TIME: **END TIME:** **TOTAL VOLUME PURGE (GAL):** **STABILITY ACHIEVED: Y / N**

STABILIZATION EQUIPMENT:

(PUMP TYPE AND MATERIAL, OTHER APPARATUS)

PURGE WATER DISPOSAL METHOD:

EQUIPMENT DECON PROCEDURE:

PUMP INTAKE DEPTH: (ft BTOC or ft BTOW)

MAX FLOWRATE: (mL/min or gal/min)

STABILIZE DRAWDOWN AT THIS FLOWRATE?

DEDICATED TUBING LEFT?

EQUIPMENT SERIAL NUMBERS: **YSI** **TURBIDIMETER** **OTHER**

CONVERSIONS: 1000 mL/min = 0.264 gal/min 1 gal/min = 1893 mL/min 1 gal = 3.785 L 1 L = 0.264 gal

FIELD WATER QUALITY PARAMETERS

TIME	WATER LEVEL (ft BTOC)	DRAW DOWN (ft)	CUMULATIVE PURGED VOLUME (gallons or Liters)	TEMPERATURE (°C or °F)	pH	CONDUCTIVITY (µS/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	COLOR	ODOR
				± 3% (min ± 0.2°C/0.36°F)	± 0.1	± 3%	± 10 mV	± 10%	± 10% or <10 NTU		

STANDARD OPERATING PROCEDURE
SOP-10
GROUNDWATER GAUGING, MONITORING, AND SAMPLING

This Standard Operating Procedure (SOP) describes field procedures for collecting representative groundwater samples from monitoring wells and temporary well points. This SOP is prepared in accordance with the Alaska Department of Environmental Conservation (ADEC) Field Sampling Guidance (ADEC 2022) and Environmental Protection Agency (EPA) Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (EPA 2017). Prior to any fieldwork event, review the Work Plan to become familiarized with key site/well information to include, but not limited to:

- Specific sampling locations and analytes
- Site-specific conditions
- Well construction (screen length, expected depths, etc.)
- Which program the groundwater monitoring program is operating under (Contaminated Sites Program, Solid Waste Program, Resource Conservation and Recovery Act, etc.).
- Pump intake depth
- Well history
    - Expected water quality parameters (high turbidity, particular odor, etc.);
    - Typical behavior (purges dry, draws down, slow/fast recharge, etc.);
    - Previous flow rates;
    - Air bubbles that could not be removed from glassware;
    - Product presence (how thick, thickness not recorded because too thick, removal method, etc.);
    - Sticky wells;
    - Obstruction (requiring different sampling equipment/procedures, not sampled, etc.);
    - Broken/bent/damaged PVC or steel monument; etc.
- Recognizing/anticipating/adjusting to client-specific needs.

1. EQUIPMENT AND MATERIALS

Equipment and supplies utilized during groundwater sampling may include the following:

- Personal protective equipment (PPE) (safety glasses and nitrile gloves, other PPE as required by site conditions)
- RAE Systems MiniRAE photoionization detector (PID), if needed to check vapor emitted from well casing
- Water level meter with audible alarm and a cable marked in 0.01-foot increments
- Oil-water interface probe (if light non-aqueous phase liquid [LNAPL] is suspected)
- Decontamination equipment (deionized water, Alconox, 5-gallon bucket, paper towels)
- YSI 556 Multi-Probe System and cable
- Flow cell/ sensor guard/ calibration cups
- Calibration solutions for YSI (pH 4, 7, and 10, oxidation reduction potential [ORP], and conductivity)
- Discharge lines/silicone tubing and fittings
- Turbidity diverter
- Hach 2100P Portable Turbidity Meter or equivalent
- Graduated cylinder or beaker
- Graduated buckets
- Submersible (stainless steel centrifugal Proactive Monsoon pump with low-flow controller, or equivalent), bladder pump, or peristaltic pump depending on type of contaminants present and well depth
- Disposable Teflon bailers and twine
- Tubing (Teflon-lined and silicone)
- Camera
- Logbook, weatherproof pen, sharpie, etc.
- Groundwater Sampling Forms
- Sample labels
- Sampling containers and packing materials

2. FREE PRODUCT, WATER LEVEL, AND TOTAL DEPTH GAUGING PROCEDURES

The depth to free product (if present) and the depth to groundwater will be measured with an oil/water interface probe. Interface probes provide distinct responses when immersed in nonconductive product or conductive water.

If the well is sealed with an airtight cap, allow time for the pressure to equilibrate after the cap is removed. Before taking measurements, locate the reference point on the well casing. Typically, the reference point is marked with a permanent surveyor’s reference mark, such as a small notch cut into the casing or a permanent ink mark at the top of the casing (TOC). If no reference mark is present, mark the north side of the monitoring well casing and collect water level measurements from this mark. Measure the depth to water (DTW) using the following procedures:

1. Open the monitoring well lid and remove the well plug. If air monitoring is warranted to determine the presence of volatile organic compounds (VOCs), a PID (MiniRAE 2000 or similar) will be used. Some of the conditions that may warrant monitoring include:
    - Ambient conditions prior to removing the well plug and opening the well lid and plug.
    - Ambient conditions in the breathing zone when opening the well or removing the well plug.
    - Headspace immediately after removing the well plug.
    - Breathing zone after the well plug has been removed.
2. With the water level meter or interface probe switched on, slowly lower the probe down the monitoring well until the probe contacts the groundwater or LNAPL surface, as indicated by the audible alarm. Do not let the probe free-fall down the well. Always hold on to the meter's reel handle.
3. Raise the probe out of the water or LNAPL until the audible alarm stops. Continue raising and lowering the probe until a precise level is determined within 0.01 foot.
4. If LNAPL is present in the well, measure and record the depth from the top of casing reference point to the top surface of the LNAPL layer. The oil-water indicator probe alarm will sound a continuous tone when LNAPL is detected. (If thick product is anticipated, review Work Plan for procedure and/or well history, if available, for previous approaches and determining the feasibility of collecting DTW.)

5. Continue to lower the probe until the meter indicates groundwater. The alarm will emit an intermittent beep when water is detected. Record the DTW measurement from the TOC reference point to the static groundwater level.
6. Measure the total well depth (TD) by lowering the probe to the bottom of the well. Turn off the alarm and slowly lower the water level meter until the cable goes slack. Do not let the probe free-fall down the well. Always hold on to the meter's reel handle. Record the TD from the TOC reference point. Gently raise and lower the water level meter probe to tap the bottom of the well until a precise will depth is determined within 0.01 foot.
7. Record the DTW and TD measurements in the field logbook or on the appropriate field form(s) (sampling and/or gauging) (see Attachment 1 for an example).
8. Decontaminate water level meters and interface probes between monitoring wells in accordance with standard operating procedure (SOP)-15 to avoid cross-contamination.
9. For later development of potentiometric maps, measure DTW and TD in all monitoring wells at a site as quickly as practicable.

3. WATER QUALITY MONITORING AND SAMPLING PROCEDURES

Submersible, bladder, or peristaltic pumps are typically used for purging and sampling with pump selection dependent on the target analytes and sample depth. Prior to sampling, monitoring equipment must be calibrated. Monitoring wells are then purged until stabilization is reached for wells with adequate recharge. Water quality parameters will be monitored during purging using a YSI 556 water quality meter and a portable turbidity meter. Turbidity meters, such as the Hach Model 2100P Portable Turbidimeter, measure turbidity from 0.01 to 1000 nephelometric turbidity units (NTUs) in automatic range mode with automatic decimal point placement. Note that different instrument models exist, and the appropriate operation and procedures manual should be referenced prior to use.

For sample collection of VOCs, a peristaltic pump should not be used unless approval from ADEC is obtained prior to sample collection. If a peristaltic pump is used for sample collection, VOC samples should be collected using Hydrasleeve groundwater samplers. Wells that contain free product are not typically sampled.

3.1 Monitoring Equipment Calibration Procedures

Prior to initiating purging, bump checks must be conducted for the water quality meter and turbidity meter. If water quality parameters are being used for water chemistry evaluations, additional calibrations, etc. may be warranted. Bump check readings should be documented on their respective forms (Attachments 2 and 3). Bump check the water quality meter for pH, conductivity, ORP, and dissolved oxygen (DO). Always bump check pH with a 3-point method to account for the full pH range. If any reading is outside the expected standard range, the equipment will be re-calibrated and the calibration will be recorded. If the instrument remains outside the expected calibration standard, the instrument will be removed from project use and replaced as soon as practicable. Flag any data recorded from a meter with suspected calibration issues on the applicable field forms. Store the water quality meter probe according to manufacturer instructions in pH 4.0 solution. Do not store the probe in deionized water.

Calibrate or bump check the turbidity meter daily prior to use and record the results on the calibration form (Attachment 3). Calibration standards are provided with the meter.

3.2 Purging Procedures

Purging is the process by which stagnant water is removed from a well prior to sample collection to allow groundwater from the adjacent formation to enter the well. This allows for collection of a sample representative of actual aquifer conditions.

Purging will be conducted in accordance with EPA and ADEC low-flow sampling guidelines (EPA 2017, ADEC 2022). Purging flow rates and stabilization requirements are different for the ADEC Solid Waste Program per the ADEC Solid Wate Program Groundwater Sampling and Monitoring Wells Guidance (ADEC 2019). See requirements at the end of the section and refer to the Work Plan for further details. Monitoring wells will be purged the equivalent of three times the well casing volume, or until three of the four stabilization parameters (specific conductance, ORP, pH, and DO) have stabilized for three successive readings. If using temperature for stabilization, four of the five stabilization parameters should be stabilized for at least three successive readings. The volume of water purged from each well will be calculated based on the length of the water column and well casing diameter. The formula to calculate a well casing volume is as follows:

Well casing volume = (total depth of casing (ft) – depth to groundwater) * gallons per linear foot.

The gallons per linear foot value is based on the inner diameter of the well casing. Table 1 below provides the gallons per linear foot for standard inner diameter well casing sizes.

Table 1 Volume of Water in Well Casing

Casing Inside Diameter in Inches	Gallons per Foot of Water
½ (0.5)	0.01
1	0.04
2	0.16
4	0.65

Note:

Volumes are referenced from ADEC Field Sampling Guidance (ADEC 2022). Additional well sizes can be found in this document.

It is standard practice to purge at least three well volumes (if the well will not stabilize); therefore, the well casing volume calculated above would be multiplied by three to get total purge volume for wells that are not stabilizing.

If a non-standard well size is encountered, the well casing volume can be calculated by using the equation below:

$$V = \pi r^2(d_2 - d_1)$$

V= Volume in gallons

r = Inside radius of well casing in inches

d_2 = Total depth of well in feet

d_1 = Depth to water surface in feet

The general procedures for collecting water quality parameters during purging using a YSI 556 with a flow cell include the following:

1. Lower the pump (submersible or bladder) or tubing (peristaltic) to the target depth below the static water level. Record the depth of the pump on the Groundwater Sampling Form (Attachment 1). The appropriate pump intake or tubing depth will be determined on a project-specific basis based on contaminants of potential concern, well construction, groundwater depth, and submerged screens (if applicable). The intake or tubing depth will be specified in the Work Plan or will be determined prior to conducting fieldwork.
2. Allow the purge water to visually clear before connecting the flow cell to prevent sediment from building up in the bottom of the flow cell.
3. After the water visually clears, place the YSI 556 probe into the flow cell. Temporarily turn off the pump and connect the water line to the connector at the bottom of the flow cell. Connect a silicone discharge tube to the effluent connector at the top of the flow cell and place the other end of the discharge tube into a graduated 5-gallon bucket.
4. Turn on the pump and allow the flow-thru cell to completely fill with water.
5. Measure and adjust the flow rate. The flow rate should not exceed 500 milliliters (mL) per minute for low flow purging and drawdown should remain stable at less than 0.3 feet, when possible.
6. Measure and record DO, ORP, conductivity, pH, turbidity, temperature, and the depth to groundwater every 3-5 minutes, adjusted as needed based on flow rate to allow adequate water changeover in the flow through cell, until the well is stabilized or until three well volumes have been purged. A minimum of three measurements should be taken and recorded on the Groundwater Sampling Form (Attachment 1). A well is considered stable

when three of the parameters in Table 2 meet the stability criterion (four if using temperature) for three successive readings.

Table 2 Stability Criteria for Low-Flow Purging

Parameter[1]	Units	Recording Precision	Stability Criterion
pH	-	0.01	±0.1
Temperature	°C	0.01	±0.2°C or ±3%
Conductivity	µS/cm	1	±3%
Turbidity	NTU	0.1	± 10% or ± 1 NTU or < 5 NTU (whichever is greater)
ORP	mV	1	± 10
DO	mg/L	0.1	± 10% or 0.2 mg/L (whichever is greater)

Note:
Stability criteria from ADEC Field Sampling Guidance (ADEC 2022).
[1] Only three parameters are required to stabilize, four when using temperature, within three successive readings.
Turbidity readings consistently below 5 nephelometric turbidity units (NTU) are considered stabilized (EPA 2017).

7. To measure turbidity, collect a representative sample in the clean glass vial provided with the turbidity meter. Use a diverter, or similar method, to collect the turbidity sample directly from the water line, bypassing the flow cell. Fill to the line marked on the vial (approximately 15 mL), taking care to handle the vial by the top. Cap the vial. Wipe the vial with a paper towel to remove water spots and fingerprints. Turn the instrument on and place it on a flat sturdy surface. Insert the vial into the instrument compartment so the diamond or orientation mark aligns with the raised orientation mark in front of the vial compartment. Press READ and the result will show in NTU.
8. Once the well has met the stabilization criteria, disconnect the water line from the flow cell and proceed with sample collection directly from the water line.
9. For low yielding wells that cannot be stabilized without substantial draw down, purge the well dry and allow the well to recharge to approximately 80 percent (%) of its pre-purge volume before collecting analytical samples.

For Solid Waste Program sites, the general purging procedures listed above still apply with the following specifications listed below:

1. The pump intake placement is set just above or just within the screened interval, depending on the location of the water table and type of pump used. If the water table is

within the screened interval, then set the pump intake just below the top of the water table. If the screen is submerged, then set the pump intake just below the top of the screened interval. If the type of pump being used has specific placement guidance, then defer to the manufacturer manual. Note that the pump intake should not be placed near the bottom of the well or screened interval to avoid disturbing settled sediments.

2. The flow rate should be no more than 0.2-0.3 liters per minute (L/min); however, a purge rate of up to 0.5 L/min may be used under pre-approved circumstances.
3. If drawdown becomes greater than 0.3 feet, or air bubbles are visible in the tubing, then the flow rate must be reduced.
4. The goal during purging is to reach less than 10 NTUs and three successive stable water quality parameters. If turbidity cannot reach below 10 NTUs, even when all other water quality parameters have stabilized, then the turbidity stabilization criteria of ±10% for three successive readings can be used.

3.3 Groundwater Sample Collection Procedures

Samples should be collected using the following steps:

1. When purging is complete, disconnect the flow through cell from the tubing.
2. Don new nitrile gloves prior to handling sample bottles.
3. Collect samples in the appropriate containers (with preservatives if required by the analytical methods). Begin with volatile sample collection. Slowly fill the 40 mL vials to prevent splashing and entrainment of air bubbles. Reduce the pumping rate, if necessary, to control the flow rate. Care should be taken to avoid touching the mouth of the discharge line, the top of the sample bottle, the inside of the cap, or the Teflon septum. A septum that falls out of the cap onto the ground cannot be used. The vial will be filled completely so that a convex meniscus forms. The cap will then be secured and the bottle inverted, tapped firmly, and checked for the presence of air bubbles. Analytical results will be compromised if air is trapped in the sample container.
4. After volatile sample containers are filled, proceed with filling non-volatile sample containers. Note that these do not need to be filled all the way to the cap like the volatile sample containers and space should be left so the groundwater sample does not touch the cap.
5. Ensure field Quality Control (QC) sample requirements included in the Work Plan are followed. QC samples may include trip blanks, equipment blanks, field duplicates, and the collection of additional sample volumes for the laboratory's quality control (matrix spike and matrix spike duplicates). The frequency of QC sample collection will be outlined in the Work Plan. Refer to SOP-14 QC procedures.

6. Once sample collection is complete, turn off the sample pump and remove the tubing (unless dedicated tubing) and pump from the well. Decontaminate all reusable down well sampling equipment in accordance with SOP-15 and pack up equipment for transport to next well.
7. Handle purge water in accordance with the Work Plan or Waste Management Plan.
8. Chain-of-custody procedures and sample management should be conducted in accordance with SOP-17.

4. POTENTIAL INTERFERENCES

Two potential interferences associated with groundwater sampling are cross-contamination and a lack of sample representation due to improper well purging or stabilization. To prevent cross-contamination between wells, dedicated tubing will be placed in each well and all non-disposable equipment that may directly or indirectly contact samples, will be decontaminated prior to use in another well. Equipment decontamination will be performed in accordance with SOP-15. To ensure that representative conditions within the aquifer are captured during sample collection, purging will be conducted at a rate that produces minimal drawdown until water quality parameters have stabilized or three well volumes have been removed or as described in Section 3.2.

5. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2022. Field Sampling Guidance. January.

ADEC. 2019. Groundwater Sampling and Monitoring Wells Guidance. Division of Environmental Health Solid Waste Program. August.

Environmental Protection Agency (EPA). 2017. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. Quality Assurance Unit, U.S. Environmental Protection Agency – Region 1. EQASOP-GW4. Revision Number 4. As amended through September 19.

Hach Company. 2008. Hach Portable Turbidity Meter Model 2100P Instrument and Procedure Manual. April.

YSI Incorporated. 2009. YSI 556 Multi Probe System Operations Manual. August.

ATTACHMENTS

Attachment 1: Groundwater Sampling Form

Attachment 2: YSI Calibration Form

Attachment 3: Turbidity Meter Calibration Form

Attachment 1: Groundwater Sampling Form

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ALEUT

ALEUT FEDERAL, LLC

Groundwater Sampling

Submitted Date:

Project Information

Project Name	Client	Site

Location Information

<table>
<tr><th>Well ID</th><th>Event Date</th><th colspan="2">Weather</th><th>Ambient Temperature (°F)</th></tr>
<tr><td></td><td></td><td colspan="2">Overcast ☁</td><td>39</td></tr>
<tr><td colspan="2">Well Condition</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="2">Good</td><td colspan="2">Nathaniel Gingery, Kyle Therrien</td><td>Ambient:
Breathing Space:
Down Well:</td></tr>
<tr><td>Well Diameter</td><td>Well Stickup Height</td><td>Current Depth to Water</td><td>Total Well Depth</td><td>Height of Water Column</td></tr>
<tr><td>in</td><td>ft ags</td><td>t btoc</td><td>ft btoc</td><td></td></tr>
<tr><td>Tubing Type</td><td>Pump Depth</td><td>Volume of Water in Well</td><td>Minimum Purge Volume</td><td>Maximum Purge Volume</td></tr>
<tr><td></td><td>ft btoc</td><td>gal</td><td>gal</td><td>gal</td></tr>
<tr><td>Parameter Reading Equipment</td><td>Pump Type</td><td>Pump Start Time</td><td>Pump End Time</td><td>Total Volume Purged</td></tr>
<tr><td>YSI, Turbidimeter</td><td>Bladder Pump
Recharge:
Discharge:
Cycle:</td><td></td><td></td><td>gal</td></tr>
<tr><td colspan="5">Stability was reached by:</td></tr>
</table>

Stability Readings

Reading Time	Depth to Water (ft btoc)	Draw Down (ft)	Volume Purged (mL)	Flow Rate (mL/min)	Temperature (℃) ±3%	pH ±0.1	Conductivity (µS/cm) ±3%	ORP (mV) ±10mV	DO (mg/L) ±10%	Turbidity (NTU) ±10% or ±1 NTU

Sample Information

Sample ID	Sample Time	Sample Date	QC Type	
Method				
Bottle				
Preservative				

Comments

Site Photos

Photo Name

Photo Direction

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WELL SAMPLING FORM

PROJECT NO: **SITE ID:** **WELL ID:** **SHEET: 1 of**

PROJECT NAME	EAS MSWLF Monitoring	**WELL CONDITION**	
CLIENT	USAF	**DAMAGE PRESENT**	
SITE		**DEPTH TO WATER (FROM TOC)**	
SAMPLER(S)		**TOTAL DEPTH (FROM TOC)**	
WEATHER/ TEMPERATURE		**HEIGHT OF WATER COLUMN (WC = TD - DTW)**	WC = - = ft
DATE		**1 WELL VOLUME (WV = WC X Diam. volume)**	
INITIAL GAUGING TIME		**3 WELL VOLUMES (1 well volume x 3)**	
		SUBMERGED SCREEN?	

WELL DIAMETER	O.D.	I.D.	DIAM. VOLUME (GAL/LIN FT)
1" Sch40	1.315"	1.049"	0.05
2" Sch40	2.375"	2.067"	0.17
3" Sch40	3.5"	3.068"	0.38
4" Sch40	4.5"	4.026"	0.66
6" Sch40	6.625"	6.065"	1.5
8" Sch40	8.625"	7.981"	2.6
2" Sch80	2.375"	1.939"	0.15

SAMPLING DATA

COLLECTION METHOD: PUMP TYPE, OTHER SAMPLING APPARATUS

SAMPLE TYPE (GW, PRODUCT, OTHER): GW

TUBING SIZE/TYPE:

IF PRODUCT IS PRESENT

EQUIPMENT DECON PROCEDURE: Alconox/DI

DEPTH TO PRODUCT (ft FROM TOC): **THICKNESS OF PRODUCT (ft):**

PRODUCT DESCRIPTION:

SET DEPTH OF TUBING
(ft below water interface)
***Set pump or tubing intake just above or just within the screened interval. If water table intersects screened interval, pump should be set just below the top of water table.**

DTW - 1 ft = _________ - 1 ft = _________

NOTES: 1000 mL/min = 0.264 gal/min 1 gal/min = 1893 mL/min 1 gal = 3.785 L 1 L = 0.264 gallons

Sediment in Tubing (Y/N)	Bubbles in Tubing (Y/N)

EQUIPMENT SERIAL NUMBERS:
YSI **Turbidimeter** **Other**

FIELD WATER QUALITY PARAMETERS

Time*	Water Level (ft BTOC)	Draw Down (ft)	Cumulative Purged Volume (Gallons)	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Color	Odor
				± 3% (min ±0.2°C/0.36°F)	± 0.1	± 3%	± 10mV	± 10%	< 10 NTU**		

* When purging at required flow rate of 200 - 300 mL/min, take stabilization readings every 3-5 mins.
**If a level of less than 10 NTUs cannot be established during purging, even when all other water quality parameters have stabilized, then a turbidity value of ±10% for three successive readings should be used.

PURGING START TIME: **PURGING END TIME:** **TOTAL PURGED VOLUME (gal):** **MAX FLOWRATE WITH STABLE DRAWDOWN (MUST BE WITHIN 200 - 300 mL/min range):**

ANALYTICAL SAMPLE INFORMATION

SAMPLE DESCRIPTION: (color, free product, odor, turbidity)

Sample ID	Date	Time	Matrix	Containers	QC	Analysis/ Preservative									Remarks

SAMPLING START TIME: **SAMPLING END TIME:**

FIELD WATER QUALITY PARAMETERS

Sheet: 2 of

Time	Water Level (ft BTOC)	Draw Down (ft)	Cumulative Purged Volume (Gallons)	Temperature (°F or °C)	pH	Conductivity (µS/cm)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Color	Odor
				± 3% (min ±0.2°C/0.36°F)	± 0.1	± 3%	± 10mV	± 10%	< 10 NTU*		

Attachment 2: YSI Calibration Form

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YSI Calibration Log

Project Name/Location:____

Project Number:____

Equipment Make and Model(s):____________________ & ____________________

Serial Number(s): ____________________ & ____________________

Serial Num.	Date	Temp.	pH (3 pt.)		Cond. (µs/cm)		ORP (mV)		DO (100%)		Initials
			Standard	Reading	Standard	Reading	Standard	Reading	Atm. Press. (mmHg)	Reading (%)	

Serial Num.	Date	Temp.	pH (3 pt.)		Cond. (us/cm)		ORP (mV)		DO (100%)		Initials
			Standard	Reading	Standard	Reading	Standard	Reading	Atm. Press. (mmHg)	Reading (%)	

Attachment 3: Turbidity Meter Calibration Form

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Turbidity Meter Calibration Verification Check

Project Name/Location: ____

Project Number: ____

Equipment Make and Model(s): ______________________ & ______________________

Date	Time	Serial #:			Serial #:			Initials
		_____NTU	_____NTU	_____NTU	_____NTU	_____NTU	_____NTU	

Date	Time	Serial #:			Serial #:			Initials
		______NTU	______NTU	______NTU	______NTU	______NTU	______NTU	

STANDARD OPERATING PROCEDURE
SOP-11
SURFACE WATER SAMPLING

This Standard Operating Procedure (SOP) describes field procedures for collecting surface water samples from stagnant and flowing water bodies for field screening and analytical analysis. This SOP is prepared in accordance with the Alaska Department of Environmental Conservation (ADEC) Field Sampling Guidance (ADEC 2022). Refer to the Work Plan for specific sampling locations and analytes.

1. EQUIPMENT AND MATERIALS

Equipment and supplies utilized during groundwater sampling may include the following:

- PPE (nitrile gloves, safety glasses, waders, etc.)
- Sampling device (peristaltic pump, submersible pump, bailer, bottle, automatic sampler)
- Extension pole
- Tubing if pump is used
- Battery for pumps
- Nylon rope or steel cable
- Decontamination equipment (deionized water, Alconox, 5-gallon bucket, paper towels)
- YSI 556 Multi-Probe System and cable
- Calibration solutions for YSI (pH 4, 7, and 10, ORP, and conductivity)
- Hach 2100P Portable Turbidity Meter or equivalent
- Camera
- Logbook, weatherproof pen, sharpie, etc.
- Sample labels
- Laboratory-supplied sample containers, preservatives, labels, custody seals, and temperature blanks
- Survey stakes, flags, buoys, or anchors to mark sample locations

- Zip-top plastic bags
- Gel ice
- Trash bags
- Global positioning system (GPS)

2. SURFACE WATER SAMPLING PROCEDURES

Surface water can be collected from just beneath the water surface, mid-water column, or just above the bottom. Target sample depths will be specified in the project Work Plan. Surface water samples can be collected using a variety of methods and sampling devices. The most common collection methods involve either hand collection or collection using sampling equipment. For hand collection, a clean, unpreserved sample bottle or bailer is used to collect water from the water body. Care must be exercised if using this technique to minimize sediment and water disturbance. A method used to collect undisturbed samples involves using a peristaltic or submersible pump to remove water from a target depth within the waterbody. The tubing or pump can be affixed to an extension pole and deployed from shore for nearshore samples to prevent sediment disturbance from impacting the sample. Sample collection procedures for sampling by hand include the following:

1. Don new nitrile gloves and other PPE
2. Decontaminate reusable sample equipment
3. Wade into the water to the target sample location. Take care to avoid disturbing sediment from the bottom. If the water is flowing, stand downstream of the sample collection location and allow any disturbed sediment to the be flushed out before beginning sample collection.
4. Collect sample by lowering a clean, unpreserved 1-liter sample bottle, facing neck down, into the water body to the target depth.
5. Once at the target depth, turn the bottle until the neck is facing slightly upwards with the mouth facing into the current. Remove the bottle cap and allow the bottle to fill with water.
6. Cap the bottle while underwater and remove the bottle from the water body.
7. Decant the sample into the appropriate laboratory sample containers.
8. Repeat the above steps if additional sample volume is needed to fill the laboratory sample containers. Fill volatile sample containers first followed by non-volatile containers.

9. Mark survey location with lathe or other marker for later surveying or survey sample location immediately using GPS.
10. Manage samples in accordance with the procedures in SOP-17.

Sample collection procedures for sampling using a pump or sampler include the following:

1. Don new nitrile gloves and other PPE
2. Decontaminate reusable sample equipment
3. Deploy the tubing or sampler to the target location and depth. If using a sampler, deploy it in the closed position and only open the sampler when it is in place at the target depth.
4. If using a pump, once the tubing is deployed at the target depth, turn on the pump and allow water to flush through the tubing. Once the tubing is flushed and the water is running clear, begin filling laboratory sample containers. Volatile sample containers should be filled first followed by non-volatile containers. Note that use of a peristaltic pump is not permitted for volatile sample collection, unless pre-approved by ADEC.
5. Mark survey location with lathe or other marker for later surveying or survey sample location immediately using GPS.
6. Manage samples in accordance with the procedures in SOP-17.

Water quality parameters may be monitored before or after sampling (as specified in the Work Plan) using a YSI 556 water quality meter and a portable turbidity meter. If sediment disturbance is a concern, these readings should be collected after collecting the analytical surface water sample. Calibration should be performed on the instruments prior to use in accordance with the procedures detailed in SOP-10. The YSI 556 probe should be placed in the probe sensor guard and lowered to the target sample depth in the surface water body. After allowing the instrument to equilibrate, readings should be recorded in the field logbook. Water for turbidity analysis should be collected using the selected sampling device (bottle, tubing, sampler, etc.) and transferred into the vial provided with the turbidimeter for reading.

3. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2022. Field Sampling Guidance. January.

Hach Company. 2008. Hach Portable Turbidity Meter Model 2100P Instrument and Procedure Manual. April.

National Oceanic and Atmospheric Administration and Research Planning, Inc. Guidelines for Collecting High Priority Ephemeral Data for Oil Spill in the Arctic in Support of Natural Resource Damage Assessment. 2014. September.

YSI Incorporated. 2009. YSI 556 Multi Probe System Operations Manual. August.

STANDARD OPERATING PROCEDURE
SOP-14
QUALITY CONTROL SAMPLES

The purpose of this Standard Operating Procedure (SOP) is to direct field personnel in the requirements necessary for collecting field quality control (QC) samples from certain matrixes. Field QC samples are collected to ensure the reliability and validity of field and laboratory data, and include field duplicates, matrix spike and matrix spike duplicates (MS/MSD), temperature blanks, trip blanks, and equipment blanks.

1. SAMPLING PROCEDURES

The following sections describe the procedures for collecting QC samples.

1.1 Field duplicate

Field duplicates are collected to determine whether sample matrix heterogeneity, contaminant distribution, or sample collection methods affect analytical precision. The field sampler ensures that primary and duplicate samples are effectively identical by collecting the samples from the same location, at the same time, with the same techniques, and from the same matrix. Non-volatile samples should be homogenized in a metal bowl or sealable zip-top bag prior to sample collection. Volatile samples should not be homogenized to minimize loss of volatile constituents; however, an effort should be made to collect samples from the same matrix and part of the sample interval.

At a minimum, one blind field duplicate should be collected per day and per 10 samples for each analytical method and matrix for offsite laboratory analysis. In some cases, such as when only one monitoring well per day can be sampled because of low yielding groundwater, it is not feasible to achieve the one field duplicate per day requirement. If anticipated prior to conducting project work, these site-specific deviations should be included in the Work Plan. If multiple sample coolers are shipped together, an effort should be made during sample packaging to include a duplicate in each cooler.

Field duplicates are submitted as blind samples with a unique sample number and collection time to the approved laboratory for analysis (ADEC 2022). A duplicate sample collection time of one hour before the primary sample time is recommended to ensure there are no holding time issues.

1.2 Matrix Spike and Matrix Spike Duplicate

MS/MSD samples are collected to evaluate the precision and accuracy of laboratory procedures in the project sample matrix. The MS/MSD compound is added at the laboratory. This sample is collected at the same time as the primary sample using the same procedure, equipment, and type of container. The MS/MSD sample should be labeled the same as the primary sample with a matching sample identification and time denoted on the chain-of-custody form to ensure that the project MS/MSD pair is used in the laboratory report. The MS/MSD should be noted in the QC column of the chain-of-custody. At a minimum, the frequency of MS/MSD samples collected is one for each analytical batch. Note that the analytical laboratory often batches samples in the same cooler together for shipments containing multiple coolers, so an effort should be made during sample packaging to include an MS/MSD in each cooler. The MS/MSD evaluation process is specified in the Quality Assurance Project Plan (QAPP).

1.3 Temperature Blank

A temperature blank must be included in each sample cooler. A temperature blank is measured by the laboratory to verify and document that the cooler temperature is received between 0 and 6 degrees Celsius (°C). Temperature blanks consist of plastic bottles filled with water, typically prepared by the laboratory. Once shipments are received by the laboratory, the temperature is recorded on the chain-of-custody to document that preservation requirements were met.

1.4 Trip Blanks

Trip blanks must accompany volatile samples, including gasoline range organics and volatile organic compounds. Trip blanks are prepared by the laboratory and are used to establish that the sample has not been contaminated by external sources during transport to and from the field. Trip blanks are samples of reagent-grade water, properly preserved in a controlled environment by the laboratory prior to field mobilization. Trip blanks are kept with the sample containers throughout the sampling process and returned to the laboratory with the analytical samples. One trip blank must accompany each cooler containing volatile samples. All trip blanks must be labeled and included on the chain-of-custody. Trip blank sample times will be recorded as 0800. The trip blank evaluation process is specified in the QAPP.

1.5 Equipment Blanks

Equipment blanks may be used to evaluate the effectiveness of decontamination procedures. The equipment rinsate blank is collected by pouring or pumping deionized water onto or into the sampling equipment after the equipment has been decontaminated, and then collecting the rinsate water for analysis of an analytical suite identical to that performed for the associated sample(s). The required equipment rinsate blank collection frequency and evaluation process are specified in the QAPP. Decontamination procedures must be performed in accordance with SOP-15 Equipment Decontamination.

2. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2022. Field Sampling Guidance. January.

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STANDARD OPERATING PROCEDURE
SOP-15
EQUIPMENT DECONTAMINATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures for decontamination of reusable equipment.

1. EQUIPMENT AND MATERIALS

Equipment and materials utilized for decontamination may include:

- Level D Personal Protective Equipment (nitrile or rubber gloves, safety glasses, safety toed boots, hard hat and safety vest if decontaminating drilling or heavy equipment)
- Hand tools for bulk contamination removal (shovels, brooms, etc.)
- Liquinox or Alconox
- Spray bottles, or pump sprayer
- Pressure washer/steam cleaner (for larger equipment such as augers)
- Potable water
- Distilled or deionized water
- Bristle brushes
- Plastic tubs
- Plastic sheeting
- Department of Transportation (DOT)-approved, 5-gallon buckets with screw top lids
- DOT-approved, 55-gallon open-top drums
- Contractor-grade plastic bags
- Paper towels

2. DECONTAMINATION PROCEDURES

Reusable sampling equipment must be decontaminated between samples and at the end of each day. Drilling and excavation equipment should be decontaminated prior to beginning site activities, before collecting each sample when non-dedicated sampling equipment is used, and after completing site activities. Decontamination procedures are detailed in the following subsections.

2.1 Decontamination Area

A localized decontamination area should be identified for larger drilling and excavation equipment. The area should have easy access and level ground to minimize slip, trip, and fall hazards. The decontamination area should be large enough to temporarily store clean equipment and materials and stage drums of investigation-derived waste (IDW). When decontaminating larger drilling tooling, such as hollow-stem augers, line each area with a heavy-gauge plastic sheeting and include a collection system designed to capture potential decontamination wastes (water and residual soil). Containerize decontamination water and residual soil in approved containers, such as DOT-approved 55-gallon drums. Decontamination areas should be organized in a manner to minimize overspray and risk to the surrounding environment.

Smaller equipment (spoons, trowels, groundwater sampling pumps, etc.) may be decontaminated near the sampling locations. In this case, all required decontamination supplies must be mobilized to the sampling location. A 5-gallon bucket with a screw top lid or a plastic tub should be used to capture decontamination water, which should be transferred to larger containers, as necessary.

2.2 Sampling Equipment Decontamination

Improper decontamination can cause cross-contamination. To avoid cross-contamination, sampling equipment must be either disposed of after one use or decontaminated after each use. Disposable or dedicated sampling equipment should be used whenever possible. When non-dedicated, reusable equipment is used, it should be decontaminated in stages in a way that minimizes contaminant release to the environment. The following procedures should be used:

1) Remove as much bulk contamination as possible from equipment at the point of origin.
2) Wash equipment thoroughly with potable water containing a laboratory-grade detergent, such as Liquinox or Alconox. Use a bristle brush to remove any remaining residual contamination.
3) Rinse equipment thoroughly with potable water.
4) Rinse equipment thoroughly with distilled or deionized water. Note that some instruments can be damaged by deionized water, such as YSI 556 probes.
5) Air dry equipment in clean area free of dust or other fugitive contaminants. Alternatively, wet equipment may be dried with a clean, disposable paper towel to assist the drying process. All equipment should be dry before reuse.
6) Store clean and dry sampling equipment within a protective medium (plastic bag or carrying case).

2.3 Heavy Equipment Decontamination

Heavy equipment decontamination must be performed prior to transporting or walking equipment between contaminated areas. Decontamination will focus on minimizing the spread of contaminated media resulting from equipment movement or transport. This decontamination process will use dry methods (brooms, brushes, shovels, etc.) to remove large, easily dislodged deposits of soil and other contaminated media from equipment (tracks, buckets, etc.) prior to exiting the exclusion zone. The Field Lead may alter decontamination procedures based on dry decontamination effectiveness.

Final decontamination should be conducted when equipment is no longer needed onsite. A decontamination area should be established to collect decontamination materials, sludge, and water. Bulk contamination should be removed using shovels and brushes, and the equipment should be further cleaned using a pressure washer with a detergent wash, followed by a potable water rinse, where necessary.

2.4 Personnel and Personal Protective Equipment Decontamination

During environmental investigations and removal actions, boots and gloves are commonly the most contaminated types of personal protective equipment (PPE). Contaminated solids, such as mud, should be scraped and wiped from boots. Personnel decontamination involves removal of bulk contamination first. Any remaining contamination should be removed using soapy water and brushes. Once all debris is removed, rinse the boots with clean water. If boots are not laden with solid materials, a brush can be used to knock off or remove any residual solid materials. If the boots have contacted liquid-phase contaminants, it is important that the contaminants be removed using soapy water and a brush, followed by a clean water rinse. If the contaminants have adsorbed into the boots, the boots must be replaced. Gloves should be removed rolling the glove off from the top down to avoid contact with contaminated soil.

Following removal and cleaning of reusable PPE, field personnel should wash their hands or any exposed body parts that may have contacted the associated contamination.

3. INVESTIGATION DERIVED WASTE MANAGEMENT

Typical investigation derived wastes consist of soil cuttings, decontamination water, and solid wastes. These wastes should be handled in accordance with the following steps:

1) Soil cuttings should be containerized in open-top, DOT-approved, 55-gallon drums. Decontamination water should be collected in plastic troughs or tubs, DOT-approved 55-gallon drums, or DOT-approved 5-gallon buckets with screw top lids.
2) Solid wastes generated during decontamination activities should be containerized in contractor grade plastic bags.

3) All wastes must be treated or disposed of in accordance with applicable state and federal regulations, as specified in the Work Plan or Waste Management Plan.

4) Prior to transporting soil cuttings or decontamination water off-site, an ADEC Contaminated Media Transport and Treatment or Disposal Approval Form must be submitted to the ADEC Project Manager for approval (Attachment 1).

4. QUALITY CONTROL

Quality Control (QC) samples may be collected to verify that the decontamination procedures are effective. QC samples include equipment rinsate blanks and equipment wipe samples, which are described in SOP-14 Quality Control Samples.

ATTACHMENTS

Attachment 1: ADEC Contaminated Media Transport and Treatment or Disposal Approval Form

Attachment 1: ADEC Contaminated Media Transport and Treatment or Disposal Approval Form

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ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites and Prevention and Emergency Response Programs

Transport, Treatment, & Disposal Approval Form for Contaminated Media

DEC HAZARD/SPILL ID #	NAME OF SPILL OR CONTAMINATED SITE

SITE OR SPILL LOCATION

CURRENT LOCATION AND TYPE OF CONTAMINATED MEDIA	SOURCE OF THE CONTAMINATION

COMPOUNDS OF CONCERN	ESTIMATED VOLUME	DATE(S) GENERATED

POST TREATMENT ANALYSIS REQUIRED *(such as GRO, DRO, RRO, BTEX, and/or Chlorinated Solvents)*

COMMENTS

Facility Accepting the Contaminated Media

NAME OF THE FACILITY	PHYSICAL ADDRESS/PHONE NUMBER

Responsible Party and Contractor Information

BUSINESS/NAME	ADDRESS/PHONE NUMBER

Name of the Person Requesting Approval (printed)

Title/Association

Signature

Date

Phone Number

--DEC USE ONLY--

Based on the information provided, ADEC approves transport of the above-described media for treatment in accordance with the approved facility operations plan. The Responsible Party or their consultant must submit to the DEC Project Manager a copy of weight/volume receipts of the loads transported to the facility and a post treatment analytical report. If the media is contaminated soil, it shall be transported as a covered load in compliance with 18 AAC 60.015.

DEC Project Manager Name (printed)

Project Manager Title

Signature

Date

Phone Number

Rev. 12/2014

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STANDARD OPERATING PROCEDURE
SOP-17
SAMPLE MANAGEMENT

This Standard Operating Procedure (SOP) will be used to direct field personnel in the techniques and requirements for sample management, including maintaining a chain-of-custody (COC); and labeling, packing, shipping environmental samples to the laboratory for analysis.

1. MATERIALS

Equipment required includes:

- Sample labels
- Laboratory receipt forms
- Field custody forms (COC form)
- Custody seals
- Inter-laboratory transfer documentation, if applicable
- Weatherproof labels for sample containers
- Coolers
- Gel ice packs
- Sorbent pads
- Contractor-grade plastic bags
- Bubble wrap and/or foam inserts
- Plastic zip-top bags, quart and gallon
- Clear tape
- Strapping tape
- Cooler labels: keep cool/refrigerate/do not freeze, this end up, fragile, dangerous goods in excepted quantities, shipping address, etc.

2. PROCEDURES

An environmental sample is any sample that has less than reportable quantities of any hazardous constituents according to Department of Transportation (DOT) 49 CFR - Section 172. This section describes the procedures for maintaining COC; and labeling, packing, and shipping collected samples.

2.1 Sample Chain-of-Custody Procedures

The COC record accompanies all sample shipments. Two COC records are prepared for each shipment. One COC record is placed in a re-sealable plastic bag with the bag sealed shut to prevent water intrusion from moisture in the cooler, and the bag is taped inside the cooler lid. The duplicate or electronic copy of the COC record is retained by the sampler and provided to the Project Chemist and other sample coordinators. Airway bills are retained with the COC record and provided to the Project Chemist, so sample pickup can be coordinated with the laboratory. Airway bills must be scanned and stored in electronic format.

2.1.1 Sample Documentation

Sample identification documents are carefully prepared so that sample identification and COC are maintained. Sample identification documents include the field logbook, sample labels, custody seals, and COC records.

A sample is in custody if it meets one of the following conditions:

- Is in an authorized person’s physical possession.
- Is in an authorized person’s view after being in possession.
- Is in an authorized person’s possession and then secured (locked up).
- Is kept in a secured area that is restricted to authorized personnel.

2.1.2 Field Custody

The following procedures should adhered to in the field to ensure that custody is maintained:

- The sample collector is personally responsible for the care and custody of samples collected until they are properly transferred to another company representative or relinquished to the laboratory.
- The sample collector records sample data (time of collection, sample number, analytical requirements, and matrix) in the field logbook and/or on the appropriate field form.
- Sample labels are completed for each sample, using weatherproof ink.

2.1.3 Chain-of-Custody Record

The COC record is fully completed prior to sample shipment. When possible, an electronic COC record should be used. Required information on the COC includes the following:

- Client (contractor name)

- Reporting Information (Chemist name and contact information)
- Project Name
- Invoice information
- PO Number
- COC number
- Cooler ID
- Page number
- NPDL number (for USACE projects only)
- Field Sample ID
- Location ID
- Collection date
- Collection time (in 24-hour format)
- Sampler initials
- Quantity (number of containers)
- Container types (VOA, amber, 40 mL, etc.)
- Container volumes
- Preservative
- Sample matrix (soil, water, other)
- Requested laboratory analysis methods required for each jar
- Quality control (trip blanks and MS/MSD)
- Turn-around-time (TAT)
- Notes
- Special instructions

2.1.4 Custody Seals

Custody seals are preprinted, adhesive-backed seals with security slots designed to break if the seals are disturbed. Seals are signed and dated when applied to the cooler. Sample shipping containers (coolers) are sealed in as many places as necessary to ensure that the container cannot be opened without tearing the custody seals. Typically, one custody seal is placed along the front corner of the cooler, and a second is placed along the opposite back corner of the cooler. Clear tape is placed over the seals to ensure that seals are not accidentally broken during shipment. If the custody seal was broken at some point during transport, the reason for breaking the seal, condition of the container contents, the cooler temperature, and anything added to or removed from the container must be documented on the COC form. The container must then be sealed with a new custody seal.

If a sample handler transports the samples directly to the laboratory without shipment, custody seals are not required.

2.1.5 Transfer of Custody

When transferring the possession of samples from the field sampler to a transporter or the laboratory, the sampler must sign, date, and note the time as "relinquished by" on the COC record. The receiver also signs, dates, and notes the time as "received by" on the COC record; however, when samples are transported by a common commercial carrier, such as Alaska Airlines or Federal Express, the carrier does not sign the COC record. Instead, the COC record is signed by the sampler as "relinquished by" prior to closing the sample coolers for shipment and relinquishing them to the commercial carrier.

2.1.6 Laboratory Custody

A designated sample custodian accepts custody of the shipped samples and verifies that the sample identifications match the COC record. The laboratory completes a cooler receipt form when samples are received. The cooler receipt form documents any discrepancies identified between the sample labels and COC, cooler temperature(s), sample preservation, and sample integrity. Cooler receipt information, including a signed COC, custody seals, and a completed cooler receipt form, are provided to the Project Chemist. If the project is for the USACE, these items must be emailed to receipt.cooler@usace.army.mil within 24 hours of cooler receipt.

2.2 Sample Labeling, Packing, and Shipping Procedures

Samples must be labeled using nomenclature defined in the project Work Plan. All sample labels must be weatherproof and contain the following information:

- Project or project number
- Sampler name or initials
- Sample identification
- Sample date and time (in 24-hour format)
- Laboratory analysis methods required for sample jar
- Preservatives added to sample jar

Adhesive sample labels are placed directly on the sample containers. If the labels do not adequately adhere due to moisture, secure the label by placing clear packing tape over the label. Sample containers that are weighed by the laboratory prior to use, such as those used for volatile soil sample collection, should not have any additional labels or tape placed on the container as it affects the weight. For those containers, use the label that is already provided on the jar. Only one label should be placed on each sample container.

2.2.1 Packing

When packing sample containers for shipment, the steps below must be followed.

1. Choose a cooler with structural integrity to withstand shipment. Secure and tape the drain plug with duct tape.
2. Be sure that container lids are tight and will not leak.
3. Ensure that the sample labels are intact, fully completed with the correct information, and that the sample identification exactly matches the COC record.
4. Place sample containers in bubble wrap, bubble bags, in their original boxes, or in re-sealable bags with sorbent pads, depending on the type of container. Wrap and package containers sufficiently to prevent cross contamination and ensure that containers remain intact during shipment (bubble wrap and plastic zip-top bags).
5. Place a layer of frozen gel ice packs, along the bottom of the cooler. Cover the ice packs with a layer of bubble wrap and then place a sorbent pad over the bubble wrap.
6. Line the cooler with a contractor-grade plastic bag.
7. Place the containers inside the contractor-grade plastic bag with caps up.
8. Ensure that a temperature blank is included in each cooler. The temperature blank should be placed at the same level and next to the samples, preferably in the center of the cooler.
9. If the cooler contains volatile samples, ensure that a trip blank is included.
10. Fill excess space between sample containers with additional bubble wrap or gel ice.
11. Tape the top of the contractor-grade plastic bag shut once all sample containers, trip blanks, and the temp blank are inside.
12. Place another layer of bubble wrap along the top of the cooler, and if possible, place a layer of gel ice packs along the top of the cooler. Use sufficient ice in packaging to ensure that samples are received by the laboratory at the proper temperature (0 to 6°C). Note that partially melted or soft gel ice packs should not be used to pack coolers for transport. A minimum of 8 frozen gel ice packs should be used to maintain sample temperature during transit for 24 hours.

13. Fill remaining headspace with additional packing material.
14. Place the completed COC record for the laboratory into a plastic zip-top bag, tape the bag to the inner side of the cooler lid, and then close the cooler.
15. Conduct a shake test by gently shaking the cooler to determine if the containers are shifting in the cooler. If so, add additional packing material until there are no sounds of shifting when shaken.
16. Wrap strapping tape around each end of the cooler two times to secure the lid. Place completed custody seals on the front and back of the cooler so that the cooler cannot be opened without breaking the seals. Place clear tape over custody seals.
17. Attach an address label containing the name and address of the shipper to the top of the cooler. Attach other markings such as "Refrigerate" or "Keep Cool," "Do Not Freeze," and "Fragile." For samples with liquid (including preserved soil samples), place "up arrow" stickers on opposite sides of the cooler pointing in the same direction as the containers containing liquids. For samples containing dangerous goods in excepted quantities, place a "dangerous goods in excepted quantities" label with the hazard class number on the top of the cooler (see Section 2.2.2 for additional details).

2.2.2 Sample Shipping

Environmental samples are shipped as non-hazardous materials unless the samples meet the established DOT criteria for a "hazardous material" or the International Air Transport Association (IATA)/International Civil Aviation Organization (ICAO) air definition of "dangerous goods." If the samples meet criteria for hazardous materials or dangerous goods, then DOT and IATA/ICAO regulations must be followed, which includes having qualified personnel make the shipments.

Samples shipped as "Dangerous Goods in Excepted Quantities" must have the appropriate labelling and be declared as dangerous goods to the shipping carrier; however, a dangerous goods "candy-striped" form and Notification to Caption (NOTOC) are not required (IATA 2020).

2.2.2.1 Soil Sample Shipments

Soil samples preserved with methanol, and any excess methanol vials, must be shipped as "Dangerous Goods in Excepted Quantities" per the IATA regulations. The volume for excepted quantities of methanol is 30 mL per container and 500 mL per cooler. The hazard class number is 3, flammable liquid. Sample jars with methanol in excess of 30 mL and coolers with methanol in excess of 500 mL require shipment as "Dangerous Goods in Limited Quantities" and require the completion of a "candy-striped" form.

2.2.2.2 Water Sample Shipments

Water samples preserved with hydrochloric acid or other insignificant amounts of preservative are not shipped as dangerous goods once filled; however, pre-preserved sample containers with preservative and no water added must be shipped as “Dangerous Goods in Excepted Quantities” per IATA regulations. The volume for excepted quantities of hydrochloric acid or nitric acid is 30 mL per container and 500 mL per cooler, respectively. The hazard class number is 8, corrosive. Sample jars with hydrochloric acid or nitric acid in excess of 30 mL and coolers with hydrochloric acid or nitric acid in excess of 500 mL require shipment as “Dangerous Goods” and require the completion of a “candy-striped” form.

Upon shipping samples, notify the laboratory contact that samples have been shipped and provide the airway bill number.

3. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2022. Field Sampling Guidance. January.

International Air Transport Association (IATA). 2020. Dangerous Goods Regulations Limited/Excepted Quantities Labels.

ATTACHMENTS

Attachment 1: Chain-of-Custody Form

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Attachment 1: Chain-of-Custody Form

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Chain-of-Custody Report

Collection Organization:
Chain-of-Custody:
Cooler ID:
NPDL Number:
Project Number:
Laboratory:
Bill To:
Report To:

COC Sample ID	Loc ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Volume	Preservative	Matrix	Analyses Requested Group	QC	TAT	Notes:

Special Instructions:

Relinquish By: Relinquish By: Temperature Blank:
Signature/Printed Name Date/Time Signature/Printed Name Date/Time

Received By: Received By: Cooler Temperature:
Signature/Printed Name Date/Time Signature/Printed Name Date/Time

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STANDARD OPERATING PROCEDURE
SOP-18
LOGBOOK DOCUMENTATION AND FIELD FORMS

This Standard Operating Procedure (SOP) describes the content and format of field logbooks and field forms. It was generated in accordance with the Alaska Department of Environmental Conservation (ADEC) Field Sampling Guidance (ADEC 2022) requirements. This SOP will be used to direct personnel in field documentation and record keeping requirements to ensure that field activities are properly documented.

Adequate documentation is necessary to describe the work performed. Attention to detail is vital as field logbooks are used in the reporting process as well as in administrative and judicial proceedings. As a result, it is important that documentation be factual, complete, accurate, consistent, and clear. All site personnel who make logbook entries and complete field forms are responsible for maintaining the required documentation. The Project Manager and designated Field Lead will assign field notebook and form entry responsibilities.

1. FIELD LOGBOOK PROCEDURE

Field logbooks are bound, sequentially paginated, weatherproof notebooks used to record daily field activities and are permanently assigned to a specific project. All notes must be printed legibly in permanent ink.

1.1 Front Cover

The front cover of each logbook must include the following information:

- Owner of the book (Example: Aleut Remediation)
- Book number
- Job name, Contract number, and/or Client
- Start date
- End date

1.2 Project Contact Information

Include project contact information on the inside front cover or first page of the logbook. Contact information may include names and phone numbers of subcontractors, project assistants, field team members, and emergency numbers from the Accident Prevention Plan and/or Site-Specific Health and Safety Plan.

1.3 Daily Entries

Logbook entries must abide by the following guidelines:

- Pages can never be removed from the logbook.
- All information is printed legibly in waterproof ink.
- Entries are written in chronological order using objective and factual language.
- Entries are written on subsequent lines such that no blank lines exist on any page.
- If any space remains on the bottom of the last page at the conclusion of the day's field entries, a diagonal line is drawn and signed to obscure any additional entries on that page.
- If corrections are necessary, a single line is drawn through the original entry. The corrected information is then added, initialed, and dated.

The minimum daily standard logbook entries include the following:

- Project name/Site ID/Client/Date/Page Number
- Full names, affiliations and project titles, and roles of personnel on site, including visitors. Initials can be put in brackets for each person and those initials can be used for reference to that person throughout the remainder of that day's logbook entry.
- Weather, site conditions, and other salient conditions
- Daily objectives
- Safety meetings/tailgates (note time and reference tailgate safety form for details)
- Level of personal protective equipment
- All daily equipment calibrations performed and maintenance (note time and reference applicable equipment calibration form for details); record any recalibration activities conducted throughout the day; note the equipment and serial numbers assigned to each project team member
- Note the trip blank being used for the day (Trip Blank ID and generation date/time)
- For each activity, record start time, location of activity, description of activity, and activity completion time (i.e. every time a new soil boring is started and completed, when sampling starts at a well location and when sampling is completed at that location). Add reference to a specific field for details (ex. indicate soil lithology information, field screening, analytical sample, and QC information is provided on soil boring log)

- For each sample collected, at a minimum, record the time of sample collection, the sample ID, and any associated QC samples along with their times and IDs as applicable (duplicates, MS/MSD, equipment blanks, etc.). Additional sample details, including the analytical methods, number and type of containers, preservative, MeOH lot number, and tare weights may be required for certain projects (i.e. USACE projects). Sample details can be recorded as a table at the end of the day’s notes.
- Decontamination procedures and equipment (record time, decontamination procedures, and equipment used each time decontamination is performed)
- Other pertinent observations
- Waste staging information (document the waste staging location, type of waste, container type, quantity of waste, labeling procedures)
- Sample shipping information (date, time, destination, location)
- Any deviations from the site-specific approved work plan. If no deviations were performed, include note at end of day that there were no work plan deviations.
- Sketch of site location with north arrow, soil boring locations, monitoring well locations, other sample and field screening locations, duplicate sample locations, and other key features
- Survey activities

2. FIELD DATA SHEETS

All other supportive unbound data documentation that is a part of the field records are maintained as part of the field forms. The Project Manager will decide if field forms will be hard copy or electronic based on project needs. Hard copy form entries will be recorded in weatherproof ink on weatherproof paper and kept in a field file folder. Electronic field form entries will be made using a tablet. Electronic field forms will be created in Survey123 and will be comparable to hard copy forms (i.e., contain the same information fields).

Common field forms and the required information for each form are listed below:

- **PID Calibration**
    - The type of field instrumentation including model and serial numbers
    - Record all daily equipment calibrations and any recalibrations performed during fieldwork
    - Date/time of each calibration
    - Fresh air calibration standard and reading
    - Span calibration standard and reading

  - Personnel that performed the calibration

- **YSI Bump Check/Calibration**
  - The type of field instrumentation including model and serial numbers
  - Record all daily equipment calibrations and any recalibrations performed during fieldwork
  - Date/time of each calibration
  - Personnel that performed the calibration
  - Temperature of calibration solutions at time of calibration
  - Calibration standards and readings for each parameter
    - pH 3-point
    - ORP
    - Conductivity
    - Dissolved oxygen and barometric pressure

- **Turbidity Meter Bump Check**
  - The type of field instrumentation including model and serial numbers
  - Record all daily equipment bump checks performed during fieldwork
  - Date/time of each check
  - Personnel that performed the check
  - Standard and reading in NTU for each turbidity standard checked (typically 3 are provided with meter)

- **Soil Boring Logs**
  - Project name/Number/ Client/Location/Site
  - Soil boring No./ID
  - Logged by
  - Drilling contractor/method (DPT, HAS, etc.)/equipment used (ex. 6620)/drill crew
  - Borehole drilling start/stop times
  - Groundwater depth
  - Total boring depth
  - Inches driven/recovered
  - PID screening interval, PID reading in ppm, and time of sampler retrieval
  - Soil descriptions by depth
    - Soil name, USCS Group Symbol, color, density/consistency, plasticity, moisture, secondary grain size, odor, additional descriptors
  - Associated photograph numbers

  - Backfill date/time/method (i.e. bentonite, grout, placing soil back down borehole, etc.)
  - Sample IDs/times/methods/containers/preservatives/QC (duplicate, MS/MSD); preservative lot numbers and tare weights should also be noted here if required for project

- **Well Gauging/Product Recovery Form**
  - Well ID
  - Gauging equipment/product removal equipment
  - Equipment decontamination procedure
  - Date/Time of each gauging measurement
  - Depth to water
  - Total well depth
  - Height of water column
  - Product presence
  - Depth to product
  - Product thickness
  - Volume of product removed, if applicable
  - Product type, odor, color
  - Well construction notes
  - Photographs (photos should be taken of each well to document well condition inside and outside of the well)

- **Groundwater Sampling Form**
  - Well ID
  - Project Name
  - Client
  - Site
  - Samplers
  - Weather/temperature
  - Date
  - Start time
  - End Time
  - Well condition
  - Damage present
  - Depth to water
  - Total well depth
  - Height of water column
  - Drowned screen

  - Pump type/sampling apparatus
  - Tubing type
  - Set pump/tubing depth
  - Decon procedures
  - Equipment serial numbers (YSI and Turbidity Meter) if not recorded in field logbook
  - Product presence/notes
  - Field water quality parameters
    - Time
    - Water Level
    - Draw down
    - Cumulative purged volume
    - Temperature
    - pH
    - conductivity
    - ORP
    - DO
    - Turbidity
    - Color/odor
  - Stabilization or minimum purge volume achieved
  - Max flow rate with stable drawdown
  - Sample IDs/times/methods/containers/preservatives/QC (duplicate, MS/MSD/ equipment blank)
  - Photograph ID/ direction facing/ description/ date/ time (photos should be taken of each well to document well condition inside and outside of the well)

- **Waste Tracking Form**
  - Generator
  - Generation date and time
  - Media/type of waste
  - Container type and condition
  - Volume of waste
  - Transport date/mechanism
  - Disposal facility
  - Photographs of all waste containers and staging areas

3. QUALITY CONTROL

Logbook entries and field forms completed by the field team must be reviewed at the end of each field day by the Field Lead, Project Manager, or designee. The Field Manager's logbook entries and forms will be QC'd by a member of the field team familiar with the work conducted that day. The reviewer will enter "reviewed by: Name, Signature, Date" as the last field logbook entry for the day, just above the diagonal line that is drawn and signed by the logbook author. The "reviewed by" line of field forms will also be signed and dated by the reviewer at the end of each field day. Logbooks and field forms should be reviewed again after fieldwork is completed to ensure documentation is thoroughly completed.

4. DOCUMENT CONTROL

If possible, logbook notes and field forms should be scanned at the end of each field day and placed in the SharePoint "Field" folder for the respective project. Any photographs taken during the project should also be copied to the SharePoint "Field" Folder. Field forms should be organized into subfolders based on the type of form (i.e., Tailgate safety, soil boring logs, groundwater monitoring, etc.). At a minimum, project logbooks and hard copy field forms must be scanned and loaded to SharePoint or provided to administrative support staff for scanning within five business days of returning from fieldwork.

5. ELECTRONIC DATA

Electronic data documents include photographs, electronic field forms, GPS and survey data, etc. All electronic data that are part of the field records should be backed up daily while in the field and exported to the "Field" folder of the respective project within five business days of returning from fieldwork. Forms should be organized into subfolders by form type as described in Section 4.

6. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2022. Field Sampling Guidance. January.

ATTACHMENTS

Attachment 1: Example Logbook Entry

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Attachment 1: Example Logbook Entry

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Location XXX, AK Date XX/XX/2024

Project / Client XXX Remedial Investigation (RI)

Onsite: John Smith (JS - Aleut Field Manager)
Mark Jameson (MJ - Aleut Geologist)
Chris Robertson (CR) - Client representative)
Dan Thomas (DT - GeoTek Driller Lead)
Cameron Charles (CC - GeoTek Driller helper)

Weather: partly Sunny ~55°F

Objective: Complete soil borings at site SA219 & WT4950. Conduct field screening & soil sampling. Install one monitoring well at WT4950.

0700 - Begin day with tailgate safety meeting. See tailgate safety form for details. PPE Level D.

0715 - MJ calibrates PID MiniRae 3000 serial number PK201465. See PID Calibration form for details.

0720 - CR/DT mobilize 6620 DPT drill rig to SA219 site. Aleut sets up logging/sampling & decontamination stations at Northeast corner of Building XX. Trip Blank 24xx-TB01 accompanying samples.

0800 - Begin drilling soil boring at SA219-SB01.

0810 - Collect soil sampe 4-6 ft bgs, ID: 24SA219-SB01-4-6

Location XXX, AK Date xx/xx/2024

Project / Client XXX RI

See SA219-SB01 Soil boring log for lithology, field screening, & sample details.

0820 - Complete drilling at soil boring SA219-SB01. Decon drilling rods with Alconox & potable water.

0835 - Begin drilling soil boring SA219-SB02.

0840 - collect soil sample 0-2 ft bgs, Sample ID: 24SA219-SB02-0-2 See SA219-SB02 soil boring log for litholog, field screening, & sample details

0850 - Collect soil sample 10-12 ft bgs, Sample ID: 24SA219-SB02-10-12. See soil boring log for details

0900 - complete soil boring SA219-SB02. Decon drilling rods with Alconox & potable water.

0915 - Begin drilling soil boring SA219-SB03.

0922 - collect soil sample 8-10 ft bgs, ID: 24SA219-SB03-8-10

Duplicate (0822) 24SA219-SB039-8-10

0930 - collect sample 15-17 ft bgs,

Location XXX, AK Date xx/xx/2024

Project / Client XXX RI

ID: 24SA219-SB03-15-17

0935 - Complete soil boring SA219-SB03. See Soil boring log for details. Decon. drilling rods with alconox & potable water.

0945 - Begin drilling soil boring SA219-SB04.

0952 - collect Soil Sample 2-4ft bgs, ID: 24SA219-SB04-2-4, Extra volume collected for MS/MSD. See Soil boring log for details.

1001 - Complete Soil boring SA219-SB04. Decon. drilling rods w/Alconox & Potable water.

1016 - Begin drilling at WT4950 with Soil boring WT4950-SB01.

1024 - Collect Soil Sample 6-8 ft bgs, ID: 24WT4950-SB01-6-8. See Soil boring log for details.

1035 - Complete Soil boring WT4950-SB01. Decon. drilling rods w/Alconox & potable water.

1045 - Begin drilling Soil boring WT4950-SB02.

1055 - Collect Soil Sample 5-7 ft bgs,

Location xxx, AK Date xx/xx/2024

Project / Client xxx RI

ID: 24WT4950-SB02-5-7

Duplicate (0955) 24WT4950-SB029-5-7

See soil boring log for details.

1105 - Complete Soil Boring WT4950-SB02. Decon drilling rods w/ Alconox & potable water.

1115 - Begin drilling soil boring WT4950-SB03.

1123 - Collect soil sample 10-12 ft bgs, ID: 24WT4950-SB03-10-12

1130 - Collect soil sample 20-22 ft bgs, ID: 24WT4950-SB03-20-22

See soil boring log for details.

1135 - Complete soil boring WT4950-SB03. Decon. drilling rods w/Alconox & potable water.

1145 - Shut down drill rig. Break for lunch.

1215 - Resume drilling operations.

1220 - Begin drilling soil boring WT4950-SB04.

1230 - collect soil sample from 10-12 ft bgs. ID: 24WT4950-SB04-10-12

1240 - collect soil sample from

Rite in the Rain

Location XXX, AK
Date xx/xx/2024

Project / Client XXX, RI

TW xx/xx/2024

16-18 ft bgs, ID: ~~WT~~ 24WT4950-SB04-16-18

1250 - Complete soil boring WT4950-SB04 See soil boring log for details. Decon drilling rods w/Alconox & potable water.

1305 - Begin drilling soil boring WT4950-SB05.

1319 - collect soil sample from 10-12 ft bgs, ID: 24WT4950-SB05-10-12 See soil boring log for details.

1325 - complete soil boring WT4950-SB05. Decon. drilling rods w/Alconox & potable water.

1332 - Begin drilling soil boring WT4950-SB06.

1345 - Collect soil sample 8-10 ft bgs, ID; 24WT4950-SB06-8-10, extra volume collected for MS/MSD. see soil boring log for details.

1352 - Complete soil boring WT4950-SB06. Decon drilling rods w/Alconox & potable water.

1400 - Begin drilling soil boring WT4950-SB07. Issue with hydraulics on drill rig, DT/CC work to troubleshoot.

1445 - Drill rig issue fixed. Resume

Location XXX, AK
Date xx/xx/2024
Project / Client XXX RI

drilling operations at WT4950-SB07
1458- Macrocore stuck in sample
barrel. Redrill 5-10 ft interval ~2ft
west of initial borehole location.
1508- Collect soil sample from 8-10ft
bgs; ID: 24WT4950-SB07-8-10
Duplicate (1408) 24WT4950-SB079-8-10
See soil boring log for details.
1515- Complete soil boring WT4950-
SB07. Decon. drilling rods w/Alconox
& potable water. Drillers refuel rig.
1530- Site visitor arrives on site.
xx pilot arrives to pick up sample
coolers from previous week. Drilling
paused while coolers transported
to xxx aircraft for shipment to SGS
laboratory in Anchorage, AK.
1630- xx pilot offsite. Resume drilling
(Aleut/Geotek). with monitoring well
installation at WT4950-SB07 location
(WT4950-MW07).
1745- Well WT4950-MW07 installation
complete. See well construction log
for details. Decon drilling rods with

Location XXX, AK Date xx/xx/2024

Project / Client XXX, RI

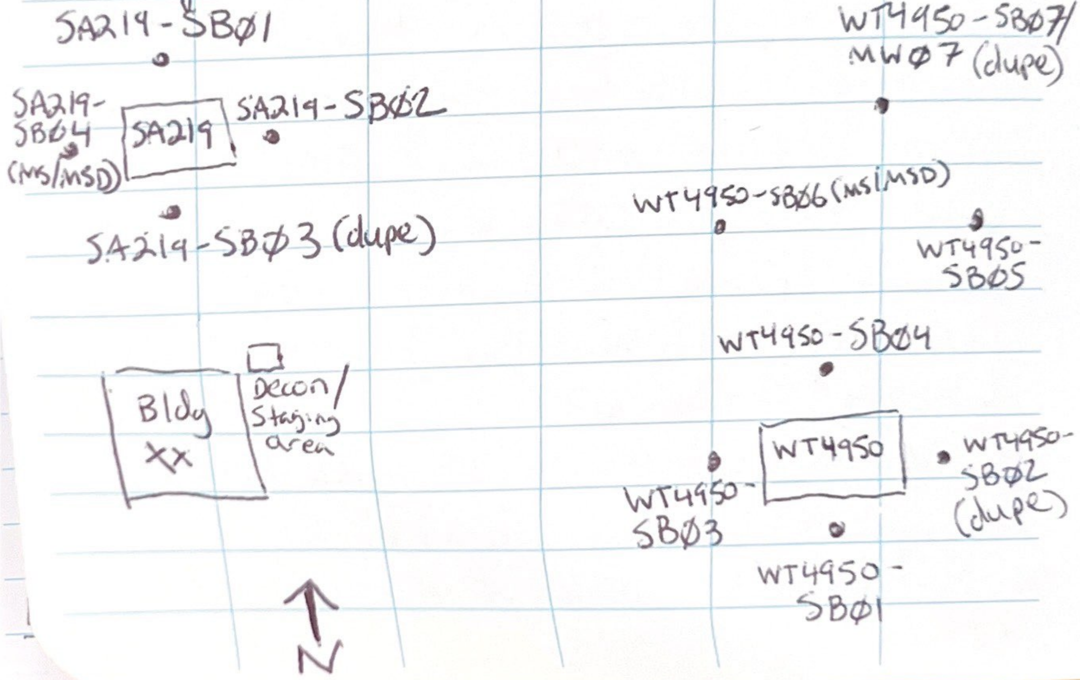
Alconox & potable water.

1800 – DT/CC Stage drill rig for evening. JS/MJ transfer soil cuttings to 55-gal metal drum staged at Northeast corner of Bldg xx. Drum labeled with generator information.

1830 – JS/MJ conduct GPS survey of all horizontal locations of both soil borings and the monitoring well.

1845 – Survey activities complete.

1900 – JS/MJ conduct sample management & update sample summary. All samples stored in refridgerator with 24xx-TB01, temp 0–6°C. No work plan deviations.



Location XXY, AK Date XX/XX/2024

Project / Client XXX, RI

Sample Summary:

		MeoH		None		
Time	ID	VOC 8260D	GRO AK101	DRO/RRO AK102/103	PAH 8270D SIM	QC
0810	24SA219-SB01-4-6	X	X	X	X	
0840	24SA219-SB02-0-2	X	X	X	X	
0850	24SA219-SB02-10-12	X	X	X	X	
0922	24SA219-SB03-8-10	X	X	X	X	
0822	24SA219-SB039-8-10	X	X	X	X	dupe
0930	24SA219-SB03-15-17	X	X	X	X	
0952	24SA219-SB04-2-4	X	X	X	X	MS/MSD (x3)
1024	24WT4950-SB01-6-8	X	X	X	X	
1055	24WT4950-SB02-5-7	X	X	X	X	
0955	24WT4950-SB029-5-7	X	X	X	X	dupe
1123	24WT4950-SB03-10-12	X	X	X	X	
1130	24WT4950-SB03-20-22	X	X	X	X	
1230	24WT4950-SB04-10-12	X	X	X	X	
1240	24WT4950-SB04-16-18	X	X	X	X	
1319	24WT4950-SB05-10-12	X	X	X	X	
1345	24WT4950-SB06-8-10	X	X	X	X	MS/MSD (x3)
1508	-24WT4950-SB07-8-10	X	X	X	X	
1408	24WT4950-SB079-8-10	X	X	X	X	

VOC/GRO (1) 4oz septa w/25mL MeoH

DRO/RRO/PAH (1) 4oz amb No preservative

LogBook QC'd by: (JS)

EOP:

@1930

Attachment 4 Laboratory Certifications

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SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

SGS NORTH AMERICA INC. – ALASKA DIVISION
200 W Potter Dr.
Anchorage, AK 99518
Mary McDonald Phone: (907)-550-3203
mary.mcdonald@sgs.com

ENVIRONMENTAL

Valid To: December 31, 2025 Certificate Number: 2944.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO/IEC 17025:2017, the 2009 TNI Environmental Testing Laboratory Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.4 of the DoD/DOE Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Inductively Coupled Plasma Mass Spectroscopy, Gas Chromatography, Gas Chromatography/Mass Spectrometry, Ion Chromatography, Hazardous Waste Characteristics Tests, Total Organic Carbon

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
Metals		
Aluminum	EPA 6020B	EPA 6020B
Antimony	EPA 6020B	EPA 6020B
Arsenic	EPA 6020B	EPA 6020B
Barium	EPA 6020B	EPA 6020B
Beryllium	EPA 6020B	EPA 6020B
Boron	EPA 6020B	EPA 6020B
Cadmium	EPA 6020B	EPA 6020B
Calcium	EPA 6020B	EPA 6020B
Chromium	EPA 6020B	EPA 6020B
Cobalt	EPA 6020B	EPA 6020B
Copper	EPA 6020B	EPA 6020B
Iron	EPA 6020B	EPA 6020B
Lead	EPA 6020B	EPA 6020B
Magnesium	EPA 6020B	EPA 6020B
Manganese	EPA 6020B	EPA 6020B
Mercury	EPA 6020B EPA 7470A	EPA 6020B EPA 7471A
Molybdenum	EPA 6020B	EPA 6020B

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
Nickel	EPA 6020B	EPA 6020B
Potassium	EPA 6020B	EPA 6020B
Selenium	EPA 6020B	EPA 6020B
Silver	EPA 6020B	EPA 6020B
Sodium	EPA 6020B	EPA 6020B
Strontium	EPA 6020B	EPA 6020B
Thallium	EPA 6020B	EPA 6020B
Vanadium	EPA 6020B	EPA 6020B
Zinc	EPA 6020B	EPA 6020B
Metals Digestion Methods	EPA 3010A	EPA 3050B
Toxicity Characteristic Leaching Procedure	EPA 1311	EPA 1311
Nutrients		
Nitrate (as N)	EPA 9056A	EPA 9056A
Nitrate + Nitrite (as N)	EPA 9056A	EPA 9056A
Nitrite (as N)	EPA 9056A	EPA 9056A
Demands		
Total Organic Carbon	EPA 9060A	EPA 9060A
Wet Chemistry		
Bromide	EPA 9056A	EPA 9056A
Chloride	EPA 9056A	EPA 9056A
Fluoride	EPA 9056A	EPA 9056A
Sulfate	EPA 9056A	EPA 9056A
Purgeable Organics (Volatiles)		
Acetone	EPA 8260D	EPA 8260D
Benzene	EPA 8260D EPA 8021B	EPA 8260D EPA 8021B
Bromobenzene	EPA 8260D	EPA 8260D
Bromochloromethane	EPA 8260D	EPA 8260D
Bromodichloromethane	EPA 8260D	EPA 8260D
Bromoform	EPA 8260D	EPA 8260D
Bromomethane	EPA 8260D	EPA 8260D
2-Butanone	EPA 8260D	EPA 8260D
n-Butylbenzene	EPA 8260D	EPA 8260D
sec-Butylbenzene	EPA 8260D	EPA 8260D
tert-Butylbenzene	EPA 8260D	EPA 8260D
Carbon Disulfide	EPA 8260D	EPA 8260D
Carbon Tetrachloride	EPA 8260D	EPA 8260D
Chlorobenzene	EPA 8260D	EPA 8260D
Chloroethane	EPA 8260D	EPA 8260D
Chloroform	EPA 8260D	EPA 8260D
Chloromethane	EPA 8260D	EPA 8260D

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
2-Chlorotoluene	EPA 8260D	EPA 8260D
4-Chlorotoluene	EPA 8260D	EPA 8260D
Dibromochloromethane	EPA 8260D	EPA 8260D
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260D EPA 8260D SIM	EPA 8260D EPA 8260D SIM
Dibromoethane	EPA 8260D	EPA 8260D
1,2-Dibromoethane (EDB)	EPA 8260D EPA 8260D SIM	EPA 8260D EPA 8260D SIM
1,2-Dichlorobenzene	EPA 8260D	EPA 8260D
1,3-Dichlorobenzene	EPA 8260D	EPA 8260D
1,4-Dichlorobenzene	EPA 8260D	EPA 8260D
Dichlorodifluoromethane	EPA 8260D	EPA 8260D
1,1-Dichloroethane	EPA 8260D	EPA 8260D
1,2-Dichloroethane	EPA 8260D	EPA 8260D
1,1-Dichloroethene	EPA 8260D	EPA 8260D
cis-1,2-Dichloroethene	EPA 8260D	EPA 8260D
trans-1,2-Dichloroethene	EPA 8260D	EPA 8260D
1,2-Dichloropropane	EPA 8260D	EPA 8260D
1,3-Dichloropropane	EPA 8260D	EPA 8260D
2,2-Dichloropropane	EPA 8260D	EPA 8260D
1,1-Dichloropropene	EPA 8260D	EPA 8260D
cis-1,3-Dichloropropene	EPA 8260D	EPA 8260D
trans-1,3-Dichloropropene	EPA 8260D	EPA 8260D
1,4-Dioxane	EPA 8260D SIM	EPA 8260D SIM
Ethyl Benzene	EPA 8260D EPA 8021B	EPA 8260D EPA 8021B
Freon 113	EPA 8260D	EPA 8260D
2-Hexanone	EPA 8260D	EPA 8260D
Hexachlorobutadiene	EPA 8260D	EPA 8260D
Isopropylbenzene	EPA 8260D	EPA 8260D
4-Isopropyltoluene	EPA 8260D	EPA 8260D
Methylene chloride	EPA 8260D	EPA 8260D
4-Methyl-2-pentanone	EPA 8260D	EPA 8260D
Methyl tert-butyl ether	EPA 8260D	EPA 8260D
Naphthalene	EPA 8260D	EPA 8260D
n-Propylbenzene	EPA 8260D	EPA 8260D
Styrene	EPA 8260D	EPA 8260D
1,1,1,2-Tetrachloroethane	EPA 8260D	EPA 8260D
1,1,2,2-Tetrachloroethane	EPA 8260D	EPA 8260D
Tetrachloroethene	EPA 8260D	EPA 8260D
Toluene	EPA 8260D EPA 8021B	EPA 8260D EPA 8021B
1,2,3-Trichlorobenzene	EPA 8260D	EPA 8260D
1,2,4-Trichlorobenzene	EPA 8260D	EPA 8260D
1,1,1-Trichloroethane	EPA 8260D	EPA 8260D
1,1,2-Trichloroethane	EPA 8260D	EPA 8260D

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
Trichloroethene	EPA 8260D	EPA 8260D
Trichlorofluoromethane	EPA 8260D	EPA 8260D
1,2,3-Trichloropropane	EPA 8260D EPA 8260D SIM	EPA 8260D EPA 8260D SIM
1,2,4-Trimethylbenzene	EPA 8260D	EPA 8260D
1,3,5-Trimethylbenzene	EPA 8260D	EPA 8260D
Vinyl Acetate	EPA 8260D	EPA 8260D
Vinyl Chloride	EPA 8260D	EPA 8260D
Xylenes, Total	EPA 8260D EPA 8021B	EPA 8260D EPA 8021B
1,2-Xylene (O-Xylene)	EPA 8260D EPA 8021B	EPA 8260D EPA 8021B
1,3-Xylene & 1,4-Xylene (M+P-Xylene)	EPA 8260D EPA 8021B	EPA 8260D EPA 8021B
Toxicity Characteristic Leaching Procedure (ZHE)	EPA 1311	EPA 1311
Volatiles Preparation Methods	EPA 5030B	EPA 5035A
Total Petroleum Hydrocarbons (TPH)		
Gasoline Range Organics	EPA 8015C AK 101 (AK State Method)	EPA 8015C AK 101 (AK State Method)
GRO Preparation Methods	EPA 5030B	EPA 5035A
Diesel Range Organics	EPA 8015C AK 102 (AK State Method)	EPA 8015C AK 102 (AK State Method)
Residual Range Organics	EPA 8015C AK 103 (AK State Method)	EPA 8015C AK 103 (AK State Method)
DRO/RRO Preparation Methods	EPA 3520C Modified EPA 3630C	EPA 3550C EPA 3630C
Extractable Organics (Semi-volatiles)		
Acenaphthene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Acenaphthylene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Aniline	EPA 8270E	EPA 8270E
Anthracene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Azobenzene	EPA 8270E	EPA 8270E
Benzoic Acid	EPA 8270E	EPA 8270E
Benzo(a)anthracene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Benzo(b)fluoranthene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Benzo(k)fluoranthene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Benzo(ghi)perylene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
Benzo(a)pyrene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Benzyl Alcohol	EPA 8270E	EPA 8270E
Bis (2-chloroethoxy) Methane	EPA 8270E	EPA 8270E
Bis (2-chloroethyl) Ether	EPA 8270E	EPA 8270E
Bis (2-chloroisopropyl) Ether	EPA 8270E	EPA 8270E
Bis (2-ethylhexyl) Phthalate	EPA 8270E	EPA 8270E
4-bromophenylphenyl Ether	EPA 8270E	EPA 8270E
Butyl Benzyl Phthalate	EPA 8270E	EPA 8270E
Carbazole	EPA 8270E	EPA 8270E
4-Chloroaniline	EPA 8270E	EPA 8270E
4-Chloro-3-methylphenol	EPA 8270E	EPA 8270E
1-Chloronaphthalene	EPA 8270E	EPA 8270E
2-Chloronaphthalene	EPA 8270E	EPA 8270E
2-Chlorophenol	EPA 8270E	EPA 8270E
4-Chlorophenyl Phenyl Ether	EPA 8270E	EPA 8270E
Chrysene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Dibenzo(a,h)anthracene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Dibenzofuran	EPA 8270E	EPA 8270E
1,2-Dichlorobenzene	EPA 8270E	EPA 8270E
1,3-Dichlorobenzene	EPA 8270E	EPA 8270E
1,4-Dichlorobenzene	EPA 8270E	EPA 8270E
3,3’-Dichlorobenzidine	EPA 8270E	EPA 8270E
2,4-Dichlorophenol	EPA 8270E	EPA 8270E
2,6-Dichlorophenol	EPA 8270E	EPA 8270E
Diethyl Phthalate	EPA 8270E	EPA 8270E
2,4-Dimethylphenol	EPA 8270E	EPA 8270E
Dimethyl Phthalate	EPA 8270E	EPA 8270E
di-n-Butyl Phthalate	EPA 8270E	EPA 8270E
di-n-Octyl Phthalate	----------------------------	EPA 8270E
2,4-Dinitrophenol	EPA 8270E	EPA 8270E
2,4-Dinitrotoluene	EPA 8270E	EPA 8270E
2,6-Dinitrotoluene	EPA 8270E	EPA 8270E
Fluoranthene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Fluorene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Hexachlorobenzene	EPA 8270E	EPA 8270E
Hexachlorobutadiene	EPA 8270E	EPA 8270E
Hexachlorocyclopentadiene	EPA 8270E	EPA 8270E
Hexachloroethane	EPA 8270E	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Isophorone	EPA 8270E	EPA 8270E

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
1-Methylnaphthalene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
2-Methylnaphthalene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
2-Methyl-4,6-dinitrophenol	EPA 8270E	EPA 8270E
2-Methylphenol (As o cresol)	EPA 8270E	EPA 8270E
3 & 4-Methylphenol (As p & m cresol)	EPA 8270E	EPA 8270E
Naphthalene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
2-Nitroaniline	EPA 8270E	EPA 8270E
3-Nitroaniline	EPA 8270E	EPA 8270E
4-Nitroaniline	EPA 8270E	EPA 8270E
Nitrobenzene	EPA 8270E	EPA 8270E
2-Nitrophenol	EPA 8270E	EPA 8270E
4-Nitrophenol	EPA 8270E	EPA 8270E
n-Nitrosodimethylamine	EPA 8270E	EPA 8270E
n-Nitrosodi-n-propylamine	EPA 8270E	EPA 8270E
n-Nitrosodiphenylamine	EPA 8270E	EPA 8270E
Pentachlorophenol	EPA 8270E	EPA 8270E
Phenanthrene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Phenol	EPA 8270E	EPA 8270E
Pyrene	EPA 8270E EPA 8270E SIM	EPA 8270E EPA 8270E SIM
Pyridine	EPA 8270E	EPA 8270E
1,2,4-Trichlorobenzene	EPA 8270E	EPA 8270E
2,4,5-Trichlorophenol	EPA 8270E	EPA 8270E
2,4,6-Trichlorophenol	EPA 8270E	EPA 8270E
Pesticides/ /PCBs		
Aldrin	EPA 8270E SIM	EPA 8270E SIM
alpha-BHC	EPA 8270E SIM	EPA 8270E SIM
alpha-Chlordane	EPA 8270E SIM	EPA 8270E SIM
beta-BHC	EPA 8270E SIM	EPA 8270E SIM
delta-BHC	EPA 8270E SIM	EPA 8270E SIM
gamma-BHC	EPA 8270E SIM	EPA 8270E SIM
gamma-Chlordane	EPA 8270E SIM	EPA 8270E SIM
Chlordane (technical)	EPA 8270E SIM	EPA 8270E SIM
4,4’-DDD	EPA 8270E SIM	EPA 8270E SIM
4,4’-DDE	EPA 8270E SIM	EPA 8270E SIM
4,4’-DDT	EPA 8270E SIM	EPA 8270E SIM
Dieldrin	EPA 8270E SIM	EPA 8270E SIM
Endosulfan I	EPA 8270E SIM	EPA 8270E SIM
Endosulfan II	EPA 8270E SIM	EPA 8270E SIM
Endosulfan Sulfate	EPA 8270E SIM	EPA 8270E SIM
Endrin	EPA 8270E SIM	EPA 8270E SIM

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
Endrin Aldehyde	EPA 8270E SIM	EPA 8270E SIM
Endrin Ketone	EPA 8270E SIM	EPA 8270E SIM
Heptachlor	EPA 8270E SIM	EPA 8270E SIM
Heptachlor Epoxide	EPA 8270E SIM	EPA 8270E SIM
Methoxychlor	EPA 8270E SIM	EPA 8270E SIM
PCB-1016 (Aroclor)	EPA 8082A	EPA 8082A
PCB-1221 (Aroclor)	EPA 8082A	EPA 8082A
PCB-1232 (Aroclor)	EPA 8082A	EPA 8082A
PCB-1242 (Aroclor)	EPA 8082A	EPA 8082A
PCB-1248 (Aroclor)	EPA 8082A	EPA 8082A
PCB-1254 (Aroclor)	EPA 8082A	EPA 8082A
PCB-1260 (Aroclor)	EPA 8082A	EPA 8082A
Semivolatile Extraction Methods	EPA 3520C Modified EPA 3535A	EPA 3550C EPA 3665A
Toxaphene	EPA 8270E SIM	EPA 8270E SIM
Toxicity Characteristic Leaching Procedure	EPA 1311	EPA 1311
Hazardous Waste Characteristics		
Corrosivity	EPA 9040C	EPA 9045D
Ignitability	EPA 1020B	----------------------------
TCLP		
1,1-Dichloroethene	EPA 1311/8260D	----------------------------
1,2-Dichloroethane	EPA 1311/8260D	----------------------------
1,4-Dichlorobenzene	EPA 1311/8270E	----------------------------
2,4,5-Trichlorophenol	EPA 1311/8270E	----------------------------
2,4,6-Trichlorophenol	EPA 1311/8270E	----------------------------
2,4-Dinitrotoluene	EPA 1311/8270E	----------------------------
2-Butanone (MEK)	EPA 1311/8260D	----------------------------
2-Methylphenol (o-Cresol)	EPA 1311/8270E	----------------------------
3&4-Methylphenol (p & m-Cresol)	EPA 1311/8270E	----------------------------
Arsenic	EPA 1311/6020B	----------------------------
Barium	EPA 1311/6020B	----------------------------
Benzene	EPA 1311/8260D	----------------------------
Cadmium	EPA 1311/6020B	----------------------------
Carbon tetrachloride	EPA 1311/8260D	----------------------------
Carbon tetrachloride	EPA 1311/8260D	----------------------------
Chlordane (Technical)	EPA 1311/8270E SIM Pest	----------------------------
Chlorobenzene	EPA 1311/8260D	----------------------------
Chloroform	EPA 1311/8260D	----------------------------
Chromium	EPA 1311/6020B	----------------------------
Endrin	EPA 1311/8270E SIM Pest	----------------------------
gamma-BHC (Lindane)	EPA 1311/8270E SIM Pest	----------------------------
Heptachlor	EPA 1311/8270E SIM Pest	----------------------------
Heptachlor epoxide	EPA 1311/8270E SIM Pest	----------------------------
Hexachlorobenzene	EPA 1311/8270E	----------------------------

Parameter/Analyte	**Solid & Chemical Materials**	
	Aqueous	**Solid**
Hexachlorobutadiene	EPA 1311/8260D	----------------------------
Hexachlorobutadiene	EPA 1311/8270E	----------------------------
Hexachloroethane	EPA 1311/8270E	----------------------------
Lead	EPA 1311/6020B	----------------------------
Mercury	EPA 1311/6020B	----------------------------
Methoxychlor	EPA 1311/8270E SIM Pest	----------------------------
Nitrobenzene	EPA 1311/8270E	----------------------------
Pyridine	EPA 1311/8270E	----------------------------
Selenium	EPA 1311/6020B	----------------------------
Silver	EPA 1311/6020B	----------------------------
Tetrachloroethene	EPA 1311/8260D	----------------------------
Toxaphene	EPA 1311/8270E SIM Pest	----------------------------
Trichloroethene	EPA 1311/8260D	----------------------------
Vinyl chloride	EPA 1311/8260D	----------------------------
Toxicity Characteristic Leaching Procedure	EPA 1311	EPA 1311

Accredited Laboratory

A2LA has accredited

SGS NORTH AMERICA INC. - ALASKA DIVISION

Anchorage, AK

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2017, the 2009 TNI Environmental Testing Laboratory Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.4 of the DoD/DOE Quality System Manual for Environmental Laboratories (QSM), accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated *April 2017*).

1978
A2LA

Presented this 27th day of November 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2944.01
Valid to December 31, 2025

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

THE STATE
of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Environmental
Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program
Laboratory Approval Program

PO Box 111800
Juneau, Alaska 99811-1800
CS Chemist: 907.465.5346
cs.lab.cert@alaska.gov

January 5, 2024

William Wesley
SGS North America Inc. - Anchorage
200 W Potter Dr
Anchorage, AK 99518

RE: Contaminated Sites Laboratory Approval **17-021**

Thank you for submitting a completed application to the Alaska Department of Environmental Conservation's Contaminated Sites Laboratory Approval Program (CS-LAP), on December 22, 2023. Based on your lab's Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP) approval through the American Association for Laboratory Accreditation (A2LA), SGS North America Inc. - Anchorage, located at the above address, is granted ***Approved*** status to perform the analyses listed in the attached *Scope of Approval*, for Alaska contaminated sites projects, including underground storage tanks and leaking underground storage tank sites (UST/LUST), under the July 1, 2017 amendments to 18 AAC 78. This approval is effective January 5, 2024 and expires on January 31, 2026.

Be aware that in accordance with 18 AAC 78.815(b) and 18 AAC 78.815(e), **any** changes in your lab's NELAP and/or DoD-ELAP approval status for **any** analytes in **any** methods or **any** matrices must be reported to the CS-LAP within 3 business days. This includes any suspension of any analyte(s) due to failed Performance Testing (PT) or Performance Evaluation (PE) samples. **FAILURE TO REPORT A CHANGE IN STATUS WILL RESULT IN REVOCATION OF ALL CS-LAP APPROVALS FOR ALL ANALYTES AND ALL METHODS IN ALL MATRICES FOR A PERIOD OF ONE YEAR.** Notification should be in writing sent to cs.lab.cert@alaska.gov. We recommend also contacting the CS-LAP by telephone to verify that the message was received.

If you have any questions, please contact the CS-LAP at (907) 465-5346, or by email at cs.lab.cert@alaska.gov. Labs are also highly encouraged to join the CS-LAP listserv by going to http://list.state.ak.us/mailman/listinfo/cs.lab.approval.

Respectfully,

Zuzana Culakova

Zuzana Culakova

Attachment: Scope of Approval

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
83-32-9	Soil	Acenaphthene	8270E	A2LA
83-32-9	Water	Acenaphthene	8270E	A2LA
83-32-9	Soil	Acenaphthene	8270E-SIM	A2LA
83-32-9	Water	Acenaphthene	8270E-SIM	A2LA
208-96-8	Soil	Acenaphthylene	8270E	A2LA
208-96-8	Water	Acenaphthylene	8270E	A2LA
208-96-8	Soil	Acenaphthylene	8270E-SIM	A2LA
208-96-8	Water	Acenaphthylene	8270E-SIM	A2LA
67-64-1	Soil	Acetone	8260D	A2LA
67-64-1	Water	Acetone	8260D	A2LA
309-00-2	Soil	Aldrin	8270E SIM	A2LA
309-00-2	Water	Aldrin	8270E SIM	A2LA
120-12-7	Soil	Anthracene	8270E	A2LA
120-12-7	Water	Anthracene	8270E	A2LA
120-12-7	Soil	Anthracene	8270E-SIM	A2LA
120-12-7	Water	Anthracene	8270E-SIM	A2LA
7440-36-0	Soil	Antimony (metallic)	6020B	A2LA
7440-36-0	Water	Antimony (metallic)	6020B	A2LA
7440-38-2	Soil	Arsenic, Inorganic	6020B	A2LA
7440-38-2	Water	Arsenic, Inorganic	6020B	A2LA
7440-39-3	Soil	Barium	6020B	A2LA
7440-39-3	Water	Barium	6020B	A2LA
56-55-3	Soil	Benz[a]anthracene	8270E	A2LA
56-55-3	Water	Benz[a]anthracene	8270E	A2LA
56-55-3	Soil	Benz[a]anthracene	8270E-SIM	A2LA
56-55-3	Water	Benz[a]anthracene	8270E-SIM	A2LA
71-43-2	Soil	Benzene	8021B	A2LA
71-43-2	Water	Benzene	8021B	A2LA
71-43-2	Soil	Benzene	8260D	A2LA
71-43-2	Water	Benzene	8260D	A2LA
50-32-8	Soil	Benzo[a]pyrene	8270E	A2LA
50-32-8	Water	Benzo[a]pyrene	8270E	A2LA
50-32-8	Soil	Benzo[a]pyrene	8270E-SIM	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
50-32-8	Water	Benzo[a]pyrene	8270E-SIM	A2LA
205-99-2	Soil	Benzo[b]fluoranthene	8270E	A2LA
205-99-2	Water	Benzo[b]fluoranthene	8270E	A2LA
205-99-2	Soil	Benzo[b]fluoranthene	8270E-SIM	A2LA
205-99-2	Water	Benzo[b]fluoranthene	8270E-SIM	A2LA
191-24-2	Soil	Benzo[g,h,i]perylene	8270E	A2LA
191-24-2	Water	Benzo[g,h,i]perylene	8270E	A2LA
191-24-2	Soil	Benzo[g,h,i]perylene	8270E-SIM	A2LA
191-24-2	Water	Benzo[g,h,i]perylene	8270E-SIM	A2LA
207-08-9	Soil	Benzo[k]fluoranthene	8270E	A2LA
207-08-9	Water	Benzo[k]fluoranthene	8270E	A2LA
207-08-9	Soil	Benzo[k]fluoranthene	8270E-SIM	A2LA
207-08-9	Water	Benzo[k]fluoranthene	8270E-SIM	A2LA
65-85-0	Soil	Benzoic Acid	8270E	A2LA
65-85-0	Water	Benzoic Acid	8270E	A2LA
100-51-6	Soil	Benzyl Alcohol	8270E	A2LA
100-51-6	Water	Benzyl Alcohol	8270E	A2LA
7440-41-7	Soil	Beryllium and compounds	6020B	A2LA
7440-41-7	Water	Beryllium and compounds	6020B	A2LA
111-44-4	Soil	Bis(2-chloroethyl)ether	8270E	A2LA
111-44-4	Water	Bis(2-chloroethyl)ether	8270E	A2LA
117-81-7	Soil	Bis(2-ethylhexyl)phthalate (DEHP)	8270E	A2LA
117-81-7	Water	Bis(2-ethylhexyl)phthalate (DEHP)	8270E	A2LA
108-86-1	Soil	Bromobenzene	8260D	A2LA
108-86-1	Water	Bromobenzene	8260D	A2LA
75-27-4	Soil	Bromodichloromethane	8260D	A2LA
75-27-4	Water	Bromodichloromethane	8260D	A2LA
75-25-2	Soil	Bromoform	8260D	A2LA
75-25-2	Water	Bromoform	8260D	A2LA
74-83-9	Soil	Bromomethane	8260D	A2LA
74-83-9	Water	Bromomethane	8260D	A2LA
85-68-7	Soil	Butyl Benzyl Phthalate	8270E	A2LA
85-68-7	Water	Butyl Benzyl Phthalate	8270E	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
104-51-8	Water	Butylbenzene, n-	8260D	A2LA
135-98-8	Soil	Butylbenzene, sec-	8260D	A2LA
135-98-8	Water	Butylbenzene, sec-	8260D	A2LA
98-06-6	Soil	Butylbenzene, tert-	8260D	A2LA
98-06-6	Water	Butylbenzene, tert-	8260D	A2LA
7440-43-9	Soil	Cadmium	6020B	A2LA
7440-43-9	Water	Cadmium	6020B	A2LA
75-15-0	Soil	Carbon Disulfide	8260D	A2LA
75-15-0	Water	Carbon Disulfide	8260D	A2LA
56-23-5	Soil	Carbon Tetrachloride	8260D	A2LA
56-23-5	Water	Carbon Tetrachloride	8260D	A2LA
5103-71-9	Soil	Chlordane, α-	8270E SIM	A2LA
5103-71-9	Water	Chlordane, α-	8270E SIM	A2LA
5103-74-2	Soil	Chlordane, γ-	8270E SIM	A2LA
5103-74-2	Water	Chlordane, γ-	8270E SIM	A2LA
12789-03-6	Soil	Chlordane, Total	8270E SIM	A2LA
12789-03-6	Water	Chlordane, Total	8270E SIM	A2LA
108-90-7	Soil	Chlorobenzene	8260D	A2LA
108-90-7	Water	Chlorobenzene	8260D	A2LA
67-66-3	Soil	Chloroform	8260D	A2LA
67-66-3	Water	Chloroform	8260D	A2LA
74-87-3	Soil	Chloromethane	8260D	A2LA
74-87-3	Water	Chloromethane	8260D	A2LA
7440-47-3	Soil	Chromium (Total)	6020B	A2LA
7440-47-3	Water	Chromium (Total)	6020B	A2LA
218-01-9	Soil	Chrysene	8270E	A2LA
218-01-9	Water	Chrysene	8270E	A2LA
218-01-9	Soil	Chrysene	8270E-SIM	A2LA
218-01-9	Water	Chrysene	8270E-SIM	A2LA
7440-50-8	Soil	Copper	6020B	A2LA
7440-50-8	Water	Copper	6020B	A2LA
N/A	Soil	Cresol, m- (3-Methylphenol) + Cresol, p- (4-Methylphenol)	8270E	A2LA
N/A	Water	Cresol, m- (3-Methylphenol) + Cresol, p- (4-Methylphenol)	8270E	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
98-82-8	Soil	Cumene (Isopropylbenzene)	8260D	A2LA
98-82-8	Water	Cumene (Isopropylbenzene)	8260D	A2LA
72-54-8	Soil	DDD, 4,4’-	8270E SIM	A2LA
72-54-8	Water	DDD, 4,4’-	8270E SIM	A2LA
72-55-9	Soil	DDE, 4,4’-	8270E SIM	A2LA
72-55-9	Water	DDE, 4,4’-	8270E SIM	A2LA
50-29-3	Soil	DDT, 4,4’-	8270E SIM	A2LA
50-29-3	Water	DDT, 4,4’-	8270E SIM	A2LA
53-70-3	Soil	Dibenz[a,h]anthracene	8270E	A2LA
53-70-3	Water	Dibenz[a,h]anthracene	8270E	A2LA
53-70-3	Soil	Dibenz[a,h]anthracene	8270E-SIM	A2LA
53-70-3	Water	Dibenz[a,h]anthracene	8270E-SIM	A2LA
132-64-9	Soil	Dibenzofuran	8270E	A2LA
132-64-9	Water	Dibenzofuran	8270E	A2LA
124-48-1	Soil	Dibromochloromethane	8260D	A2LA
124-48-1	Water	Dibromochloromethane	8260D	A2LA
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8260D	A2LA
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8260D	A2LA
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8260D-SIM	A2LA
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8260D-SIM	A2LA
84-74-2	Soil	Dibutyl Phthalate	8270E	A2LA
84-74-2	Water	Dibutyl Phthalate	8270E	A2LA
95-50-1	Soil	Dichlorobenzene, 1,2-	8260D	A2LA
95-50-1	Water	Dichlorobenzene, 1,2-	8260D	A2LA
95-50-1	Soil	Dichlorobenzene, 1,2-	8270E	A2LA
95-50-1	Water	Dichlorobenzene, 1,2-	8270E	A2LA
541-73-1	Soil	Dichlorobenzene, 1,3-	8260D	A2LA
541-73-1	Water	Dichlorobenzene, 1,3-	8260D	A2LA
541-73-1	Soil	Dichlorobenzene, 1,3-	8270E	A2LA
541-73-1	Water	Dichlorobenzene, 1,3-	8270E	A2LA
106-46-7	Soil	Dichlorobenzene, 1,4-	8260D	A2LA
106-46-7	Water	Dichlorobenzene, 1,4-	8260D	A2LA
106-46-7	Soil	Dichlorobenzene, 1,4-	8270E	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
106-46-7	Water	Dichlorobenzene, 1,4-	8270E	A2LA
91-94-1	Soil	Dichlorobenzidine, 3,3'-	8270E	A2LA
91-94-1	Water	Dichlorobenzidine, 3,3'-	8270E	A2LA
75-71-8	Soil	Dichlorodifluoromethane (Freon-12)	8260D	A2LA
75-71-8	Water	Dichlorodifluoromethane (Freon-12)	8260D	A2LA
75-34-3	Soil	Dichloroethane, 1,1-	8260D	A2LA
75-34-3	Water	Dichloroethane, 1,1-	8260D	A2LA
107-06-2	Soil	Dichloroethane, 1,2-	8260D	A2LA
107-06-2	Water	Dichloroethane, 1,2-	8260D	A2LA
75-35-4	Soil	Dichloroethylene, 1,1-	8260D	A2LA
75-35-4	Water	Dichloroethylene, 1,1-	8260D	A2LA
156-59-2	Soil	Dichloroethylene, 1,2-cis-	8260D	A2LA
156-59-2	Water	Dichloroethylene, 1,2-cis-	8260D	A2LA
156-60-5	Soil	Dichloroethylene, 1,2-trans-	8260D	A2LA
156-60-5	Water	Dichloroethylene, 1,2-trans-	8260D	A2LA
120-83-2	Soil	Dichlorophenol, 2,4-	8270E	A2LA
120-83-2	Water	Dichlorophenol, 2,4-	8270E	A2LA
78-87-5	Soil	Dichloropropane, 1,2-	8260D	A2LA
78-87-5	Water	Dichloropropane, 1,2-	8260D	A2LA
542-75-6	Soil	Dichloropropene, 1,3- (cis + trans)	8260D	A2LA
542-75-6	Water	Dichloropropene, 1,3- (cis + trans)	8260D	A2LA
10061-01-5	Soil	Dichloropropene, cis-1,3-	8260D	A2LA
10061-01-5	Water	Dichloropropene, cis-1,3-	8260D	A2LA
10061-02-6	Soil	Dichloropropene, trans-1,3-	8260D	A2LA
10061-02-6	Water	Dichloropropene, trans-1,3-	8260D	A2LA
60-57-1	Soil	Dieldrin	8270E SIM	A2LA
60-57-1	Water	Dieldrin	8270E SIM	A2LA
N/A	Soil	Diesel Range Organics (C10 – C25)	AK 102	A2LA
N/A	Water	Diesel Range Organics (C10 – C25)	AK 102	A2LA
84-66-2	Soil	Diethyl Phthalate	8270E	A2LA
84-66-2	Water	Diethyl Phthalate	8270E	A2LA
105-67-9	Soil	Dimethylphenol, 2,4-	8270E	A2LA
105-67-9	Water	Dimethylphenol, 2,4-	8270E	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
131-11-3	Soil	Dimethylphthalate	8270E	A2LA
131-11-3	Water	Dimethylphthalate	8270E	A2LA
51-28-5	Soil	Dinitrophenol, 2,4-	8270E	A2LA
51-28-5	Water	Dinitrophenol, 2,4-	8270E	A2LA
606-20-2	Soil	Dinitrotoluene, 2,6- (2,6-DNT)	8270E	A2LA
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	8270E	A2LA
123-91-1	Soil	Dioxane, 1,4-	8260D-SIM	A2LA
123-91-1	Water	Dioxane, 1,4-	8260D-SIM	A2LA
959-98-8	Soil	Endosulfan I	8270E SIM	A2LA
959-98-8	Water	Endosulfan I	8270E SIM	A2LA
33213-65-9	Soil	Endosulfan II	8270E SIM	A2LA
33213-65-9	Water	Endosulfan II	8270E SIM	A2LA
72-20-8	Soil	Endrin	8270E SIM	A2LA
72-20-8	Water	Endrin	8270E SIM	A2LA
100-41-4	Soil	Ethylbenzene	8021B	A2LA
100-41-4	Water	Ethylbenzene	8021B	A2LA
100-41-4	Soil	Ethylbenzene	8260D	A2LA
100-41-4	Water	Ethylbenzene	8260D	A2LA
206-44-0	Soil	Fluoranthene	8270E	A2LA
206-44-0	Water	Fluoranthene	8270E	A2LA
206-44-0	Soil	Fluoranthene	8270E-SIM	A2LA
206-44-0	Water	Fluoranthene	8270E-SIM	A2LA
86-73-7	Soil	Fluorene	8270E	A2LA
86-73-7	Water	Fluorene	8270E	A2LA
86-73-7	Soil	Fluorene	8270E-SIM	A2LA
86-73-7	Water	Fluorene	8270E-SIM	A2LA
N/A	Soil	Gasoline Range Organics (C6 – C10)	AK 101	A2LA
N/A	Water	Gasoline Range Organics (C6 – C10)	AK 101	A2LA
76-44-8	Soil	Heptachlor	8270E SIM	A2LA
76-44-8	Water	Heptachlor	8270E SIM	A2LA
1024-57-3	Soil	Heptachlor Epoxide	8270E SIM	A2LA
1024-57-3	Water	Heptachlor Epoxide	8270E SIM	A2LA
118-74-1	Soil	Hexachlorobenzene	8270E	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
118-74-1	Water	Hexachlorobenzene	8270E	A2LA
87-68-3	Soil	Hexachlorobutadiene	8260D	A2LA
87-68-3	Water	Hexachlorobutadiene	8260D	A2LA
87-68-3	Soil	Hexachlorobutadiene	8270E	A2LA
87-68-3	Water	Hexachlorobutadiene	8270E	A2LA
319-84-6	Soil	Hexachlorocyclohexane, Alpha- (α-BHC)	8270E SIM	A2LA
319-84-6	Water	Hexachlorocyclohexane, Alpha- (α-BHC)	8270E SIM	A2LA
319-85-7	Soil	Hexachlorocyclohexane, Beta- (β-BHC)	8270E SIM	A2LA
319-85-7	Water	Hexachlorocyclohexane, Beta- (β-BHC)	8270E SIM	A2LA
58-89-9	Soil	Hexachlorocyclohexane, Gamma- (Lindane)	8270E SIM	A2LA
58-89-9	Water	Hexachlorocyclohexane, Gamma- (Lindane)	8270E SIM	A2LA
77-47-4	Soil	Hexachlorocyclopentadiene	8270E	A2LA
77-47-4	Water	Hexachlorocyclopentadiene	8270E	A2LA
67-72-1	Soil	Hexachloroethane	8270E	A2LA
67-72-1	Water	Hexachloroethane	8270E	A2LA
591-78-6	Soil	Hexanone, 2-	8260D	A2LA
591-78-6	Water	Hexanone, 2-	8260D	A2LA
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270E	A2LA
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270E	A2LA
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270E-SIM	A2LA
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270E-SIM	A2LA
78-59-1	Soil	Isophorone	8270E	A2LA
78-59-1	Water	Isophorone	8270E	A2LA
7439-92-1	Soil	Lead, Total	6020B	A2LA
7439-92-1	Water	Lead, Total	6020B	A2LA
7439-96-5	Soil	Manganese	6020B	A2LA
7439-96-5	Water	Manganese	6020B	A2LA
7439-97-6	Soil	Mercury (elemental)	6020B	A2LA
7439-97-6	Water	Mercury (elemental)	6020B	A2LA
72-43-5	Soil	Methoxychlor	8270E SIM	A2LA
72-43-5	Water	Methoxychlor	8270E SIM	A2LA
78-93-3	Soil	Methyl Ethyl Ketone (2-Butanone)	8260D	A2LA
78-93-3	Water	Methyl Ethyl Ketone (2-Butanone)	8260D	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
108-10-1	Soil	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260D	A2LA
108-10-1	Water	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260D	A2LA
1634-04-4	Soil	Methyl tert-Butyl Ether (MTBE)	8260D	A2LA
1634-04-4	Water	Methyl tert-Butyl Ether (MTBE)	8260D	A2LA
75-09-2	Soil	Methylene Chloride	8260D	A2LA
75-09-2	Water	Methylene Chloride	8260D	A2LA
90-12-0	Soil	Methylnaphthalene, 1-	8270E	A2LA
90-12-0	Water	Methylnaphthalene, 1-	8270E	A2LA
90-12-0	Soil	Methylnaphthalene, 1-	8270E-SIM	A2LA
90-12-0	Water	Methylnaphthalene, 1-	8270E-SIM	A2LA
91-57-6	Soil	Methylnaphthalene, 2-	8270E	A2LA
91-57-6	Water	Methylnaphthalene, 2-	8270E	A2LA
91-57-6	Soil	Methylnaphthalene, 2-	8270E-SIM	A2LA
91-57-6	Water	Methylnaphthalene, 2-	8270E-SIM	A2LA
91-20-3	Soil	Naphthalene	8260D	A2LA
91-20-3	Water	Naphthalene	8260D	A2LA
91-20-3	Soil	Naphthalene	8270E	A2LA
91-20-3	Water	Naphthalene	8270E	A2LA
91-20-3	Soil	Naphthalene	8270E-SIM	A2LA
91-20-3	Water	Naphthalene	8270E-SIM	A2LA
7440-02-0	Soil	Nickel, Total	6020B	A2LA
7440-02-0	Water	Nickel, Total	6020B	A2LA
98-95-3	Soil	Nitrobenzene	8270E	A2LA
98-95-3	Water	Nitrobenzene	8270E	A2LA
62-75-9	Soil	Nitrosodimethylamine, N-	8270E	A2LA
62-75-9	Water	Nitrosodimethylamine, N-	8270E	A2LA
621-64-7	Soil	Nitroso-di-N-propylamine, N-	8270E	A2LA
621-64-7	Water	Nitroso-di-N-propylamine, N-	8270E	A2LA
86-30-6	Soil	Nitrosodiphenylamine, N-	8270E	A2LA
86-30-6	Water	Nitrosodiphenylamine, N-	8270E	A2LA
117-84-0	Soil	Octyl Phthalate, di-N-	8270E	A2LA
12674-11-2	Soil	PCB - Aroclor-1016	8082A	A2LA
12674-11-2	Water	PCB - Aroclor-1016	8082A	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
11104-28-2	Soil	PCB - Aroclor-1221	8082A	A2LA
11104-28-2	Water	PCB - Aroclor-1221	8082A	A2LA
11141-16-5	Soil	PCB - Aroclor-1232	8082A	A2LA
11141-16-5	Water	PCB - Aroclor-1232	8082A	A2LA
53469-21-9	Soil	PCB - Aroclor-1242	8082A	A2LA
53469-21-9	Water	PCB - Aroclor-1242	8082A	A2LA
12672-29-6	Soil	PCB - Aroclor-1248	8082A	A2LA
12672-29-6	Water	PCB - Aroclor-1248	8082A	A2LA
11097-69-1	Soil	PCB - Aroclor-1254	8082A	A2LA
11097-69-1	Water	PCB - Aroclor-1254	8082A	A2LA
11096-82-5	Soil	PCB - Aroclor-1260	8082A	A2LA
11096-82-5	Water	PCB - Aroclor-1260	8082A	A2LA
87-86-5	Soil	Pentachlorophenol	8270E	A2LA
87-86-5	Water	Pentachlorophenol	8270E	A2LA
85-01-8	Soil	Phenanthrene	8270E	A2LA
85-01-8	Water	Phenanthrene	8270E	A2LA
85-01-8	Soil	Phenanthrene	8270E-SIM	A2LA
85-01-8	Water	Phenanthrene	8270E-SIM	A2LA
108-95-2	Soil	Phenol	8270E	A2LA
108-95-2	Water	Phenol	8270E	A2LA
103-65-1	Soil	Propyl benzene	8260D	A2LA
103-65-1	Water	Propyl benzene	8260D	A2LA
129-00-0	Soil	Pyrene	8270E	A2LA
129-00-0	Water	Pyrene	8270E	A2LA
129-00-0	Soil	Pyrene	8270E-SIM	A2LA
129-00-0	Water	Pyrene	8270E-SIM	A2LA
N/A	Soil	Residual Range Organics (C25 – C36)	AK 103	A2LA
N/A	Water	Residual Range Organics (C25 – C36)	AK 103	A2LA
7782-49-2	Soil	Selenium	6020B	A2LA
7782-49-2	Water	Selenium	6020B	A2LA
7440-22-4	Soil	Silver	6020B	A2LA
7440-22-4	Water	Silver	6020B	A2LA
7440-24-6	Soil	Strontium	6020B	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
7440-24-6	Water	Strontium	6020B	A2LA
100-42-5	Soil	Styrene	8260D	A2LA
100-42-5	Water	Styrene	8260D	A2LA
630-20-6	Soil	Tetrachloroethane, 1,1,1,2-	8260D	A2LA
630-20-6	Water	Tetrachloroethane, 1,1,1,2-	8260D	A2LA
79-34-5	Soil	Tetrachloroethane, 1,1,2,2-	8260D	A2LA
79-34-5	Water	Tetrachloroethane, 1,1,2,2-	8260D	A2LA
127-18-4	Soil	Tetrachloroethylene	8260D	A2LA
127-18-4	Water	Tetrachloroethylene	8260D	A2LA
7440-28-0	Soil	Thallium, Total	6020B	A2LA
7440-28-0	Water	Thallium, Total	6020B	A2LA
108-88-3	Soil	Toluene	8021B	A2LA
108-88-3	Water	Toluene	8021B	A2LA
108-88-3	Soil	Toluene	8260D	A2LA
108-88-3	Water	Toluene	8260D	A2LA
N/A	Soil	Total Organic Carbon	9060A	A2LA
N/A	Water	Total Organic Carbon	9060A	A2LA
8001-35-2	Soil	Toxaphene	8270E SIM	A2LA
8001-35-2	Water	Toxaphene	8270E SIM	A2LA
76-13-1	Soil	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260D	A2LA
76-13-1	Water	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260D	A2LA
87-61-6	Soil	Trichlorobenzene, 1,2,3-	8260D	A2LA
87-61-6	Water	Trichlorobenzene, 1,2,3-	8260D	A2LA
120-82-1	Soil	Trichlorobenzene, 1,2,4-	8260D	A2LA
120-82-1	Water	Trichlorobenzene, 1,2,4-	8260D	A2LA
120-82-1	Soil	Trichlorobenzene, 1,2,4-	8270E	A2LA
120-82-1	Water	Trichlorobenzene, 1,2,4-	8270E	A2LA
71-55-6	Soil	Trichloroethane, 1,1,1-	8260D	A2LA
71-55-6	Water	Trichloroethane, 1,1,1-	8260D	A2LA
79-00-5	Soil	Trichloroethane, 1,1,2-	8260D	A2LA
79-00-5	Water	Trichloroethane, 1,1,2-	8260D	A2LA
79-01-6	Soil	Trichloroethylene	8260D	A2LA
79-01-6	Water	Trichloroethylene	8260D	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
75-69-4	Soil	Trichlorofluoromethane	8260D	A2LA
75-69-4	Water	Trichlorofluoromethane	8260D	A2LA
95-95-4	Soil	Trichlorophenol, 2,4,5-	8270E	A2LA
95-95-4	Water	Trichlorophenol, 2,4,5-	8270E	A2LA
88-06-2	Soil	Trichlorophenol, 2,4,6-	8270E	A2LA
88-06-2	Water	Trichlorophenol, 2,4,6-	8270E	A2LA
96-18-4	Soil	Trichloropropane, 1,2,3-	8260D	A2LA
96-18-4	Water	Trichloropropane, 1,2,3-	8260D	A2LA
95-63-6	Soil	Trimethylbenzene, 1,2,4-	8260D	A2LA
95-63-6	Water	Trimethylbenzene, 1,2,4-	8260D	A2LA
108-67-8	Soil	Trimethylbenzene, 1,3,5-	8260D	A2LA
108-67-8	Water	Trimethylbenzene, 1,3,5-	8260D	A2LA
7440-62-2	Soil	Vanadium, Total	6020B	A2LA
7440-62-2	Water	Vanadium, Total	6020B	A2LA
108-05-4	Soil	Vinyl Acetate	8260D	A2LA
108-05-4	Water	Vinyl Acetate	8260D	A2LA
75-01-4	Soil	Vinyl Chloride	8260D	A2LA
75-01-4	Water	Vinyl Chloride	8260D	A2LA
179601-23-1	Soil	Xylene, m+p-	8021B	A2LA
179601-23-1	Water	Xylene, m+p-	8021B	A2LA
179601-23-1	Soil	Xylene, m+p-	8260D	A2LA
179601-23-1	Water	Xylene, m+p-	8260D	A2LA
95-47-6	Water	Xylene, o-	8021B	A2LA
95-47-6	Water	Xylene, o-	8021B	A2LA
95-47-6	Soil	Xylene, o-	8260D	A2LA
95-47-6	Water	Xylene, o-	8260D	A2LA
1330-20-7	Soil	Xylene, Total	8021B	A2LA
1330-20-7	Water	Xylene, Total	8021B	A2LA
1330-20-7	Soil	Xylene, Total	8260D	A2LA
1330-20-7	Water	Xylene, Total	8260D	A2LA
7440-66-6	Soil	Zinc, Total	6020B	A2LA
7440-66-6	Water	Zinc, Total	6020B	A2LA

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Attachment 5 Resumes

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QUINN MEEHAN, PG PROGRAM MANAGER

Mr. Meehan has 20 years of experience as an environmental professional (Geologist and Project/Program Manager) throughout Alaska, the Pacific Northwest, and Hawaii. Quinn's experience spans the range of the remedial process from site characterization to Decision Documents/Records of Decision, remedial action, and long-term monitoring and NAPL recovery programs. He has performed and managed this work in Alaska for a variety of federal and private sector markets, including oil and gas Kenai Peninsula and Cook Inlet projects. He has executed and managed environmental projects in remote and austere Alaska locations with inclement conditions and complex logistics. He successfully communicates and coordinates with a variety of clients, regulatory agencies, stakeholders, and contractors. As a manager he works directly with the client to meet project objectives; assembles and unites the project team; supervises and mentors field and office personnel; provides overall oversight of subcontractors; directs, tracks, and delivers the project scope; coordinates project-specific and schedule requirements; ensures overall health/safety/environmental and policy/regulatory compliance; prepares proposals and cost estimates; and handles the financial and administrative aspects of a project.

EDUCATION/QUALIFICATIONS

Total Cumulative Years: 20
Employer: Aleut Environmental Remediation, LLC
Present Position/Title: Program/Project Manager
US Citizen: Yes
Education: B.S., Geology, University of Washington, 2004

Certifications: State of Alaska Professional Geologist (PG, No. 112679); American Institute of Professional Geologists Certified Professional Geologist (CPG, No. 11836)
Relevant Training: NSTC North Slope Unescorted + Hydrogen Sulfide Safety Training, Alyeska Pipeline Safety Training, PFAS Field Sampling Training, OSHA HAZWOPER 8-hr Site Supervisor Training; OSHA HAZWOPER 8-hr refresher Training; OSHA HAZWOPER 40-hr Training; ATV Safety Institute course per EM-385-1-1; Dakota Technologies LIF Data Interpretation

RELEVANT EXPERIENCE

Program Manager, Hilcorp Alaska, Swanson River Field Tank Settings, Soldotna Creek Units, Kenai Gas Field, Beaver Creek Unit Pad 4, and Cannery Loop Unit Pad 3 Contaminated Sites Long-Term Groundwater Monitoring, Kenai Peninsula, AK. Supported a long-term groundwater monitoring program at seven tank setting units, two well pads, one former tank area, and six oilfield pads across four sites on the Kenai Peninsula that involved groundwater monitoring at over 200 monitoring wells. Assisted with project management and technical reviews. Collaborated with project team for consistency with Hilcorp program and ADEC requirements.

Program/Project Manager, Hilcorp Alaska and Hilcorp North Slope, Program Management and Chemistry Support, Variety of Kenai Peninsula, Cook Inlet, and Prudhoe Bay Sites, AK. Currently manages program and chemistry support provided to Hilcorp Alaska and Hilcorp North Slope environmental programs. Support includes accrual tracking, file structure development and management, technical document reviews, regulator correspondence, environmental GIS database and web-map development, QAPP generation, chemical data quality reviews, database queries, and reporting support. Includes support of BCU4, CLU3, KGF, and SRF. Provides technical consultation, coordinates the team, and performs all administrative aspects of the projects.

Project Manager, Hilcorp Kenai Peninsula Waste Sites Groundwater Monitoring Program, SRF Grind and Inject Facility, Kenai Peninsula, AK. Project Manager for a long-term groundwater monitoring project at a waste storage facility. Monitoring included visual inspections, well maintenance, gauging, and groundwater sampling. Collaborated with the client, established the team, oversaw all aspects of the work, and provided document reviews. All work was completed on time and under budget.

Project Manager, Hilcorp, Farm Yard Spill, Kenai, AK. Project Manager for spill response activities associated with a 200-gallon hydraulic oil spill. Collaborated with the client and team, oversaw all aspects of the work, and provided data and document reviews. All work was completed on time and under budget.

Project Manager, Harvest, Groundwater Monitoring, Site Characterization, and Landfarm Optimization, Drift River Terminal, AK. Project. Managed long-term groundwater monitoring, site characterization, and landfarm optimization project at the former Drift River Terminal. Groundwater monitoring involved well gauging, evaluating the feasibility of transmissivity testing, groundwater sampling and trend analysis, in situ parameter testing for future evaluation of remedial technologies, and a land survey to determine accurate well elevations. Site characterization is ongoing and included completion of a site characterization work plan. Landfarm optimization included soil sampling, nutrient analysis, and development of a landfarm operations plan. Reviewed planning and reporting documents and ensured overall project quality; managed project costs and schedule; mentored junior staff; and handled correspondence with client and regulatory agencies.

Project Manager, GE Oil and Gas, Phase I and Phase II ESA, Kenai, AK. Managed and performed Phase I and Phase II ESAs across two Kenai properties. Worked closely with client on facility operation details, environmental goals of existing facility, and acquisition of neighboring property. Performed detailed records reviews, interviewed and coordinated with facility operators, performed visual inspections, oversaw soil boring and monitoring well installation, developed monitoring wells, low-flow groundwater sampling, collected soil and groundwater samples, and characterized septic tank conditions. All work was completed on time and under budget.

Project Manager, USACE, RI, Cold Bay, AK. Project Manager of a multi-year RI performed at a former military facility comprising over 1000 acres. Field work was performed over two seasons, with each event spanning over 100 consecutive days. A total of 350 sites were investigated. Field work included completion of over 2,000 UVOST, 550 soil borings, 100 passive soil gas samplers, 50 Incremental Sampling Methodology samples, EM-61 and ground penetrating radar (GPR) geophysical surveys, land surveys, and the collection of more than 500 analytical soil samples.

Project Manager, USACE, RI, Kodiak, AK. Project Manager for a follow-on RI at a former aviation gasoline (AVGAS) underground tank farm. Delineating the nature and extent of AVGAS and chlorinated solvent contamination in soil, groundwater, surface water, and sediment. Integral in planning drill rig access across steep terrain in order to fill data gaps from previous RI. The Contractor Performance Assessment Report indicated exceptional ratings for quality, schedule, and management: *"work quality during execution of this task order has been exceptional."* The project was completed on time and under budget.

Project Manager, USACE, RI, Yakukat, AK. Project Manager for RI at seven areas of concern, including a landfill, former aboveground storage tanks (ASTs), and former power plants. Quinn's management and proactive approach was reflected through client feedback on the project: *"Contractor has been actively communicating with the USACE PDT and ADEC. Frequent back and forth communication about technical details…allowed for a scientific based rationale to be developed and proposal of no further action for three sites. This is expected to save the Government millions of dollars in unnecessary cleanup costs."*

Project Manager, USACE, RI/FS/PP, Kruzof Island, AK. Project Manager, Field Manager, and Technical Lead for RI/FS/PP at a former military site on a remote island outside of Sitka. The RI was conducted in two phases and included site inspections; soil, sediment, groundwater, and surface water sampling; and geophysical survey to evaluate drums, AST, power plant, septic tanks, and a landfill. Involved in all aspects of planning and management of project tasks, which required evaluating many challenging logistical considerations including site access, sample shipment, and communications from a remote uninhabited location.

SARA HADDEN PROJECT CHEMIST

Ms. Hadden brings over 20 years of diverse work experience in the environmental field, where she has technical expertise with numerous aspects of the planning and execution of environmental compliance and remediation projects. She has performed environmental investigations and remediation on various projects. Project scopes have included Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, Decision Documents, removal actions, remediation, and long-term monitoring projects. She has a working knowledge of federal, state, and local laws, regulations, and guidance, including CERCLA, RCRA, TSCA, CAA, CWA, 18 AAC 60, 18 AAC 75, and 18 AAC 78.

Sara brings the background and breadth of experience necessary to successfully plan for the execution of environmental investigations across the state of Alaska. She will use her knowledge of relevant state and federal guidelines; sampling methods; and contaminant fate and transport to ensure regulatory compliance and support client objectives and decision-making.

EDUCATION/QUALIFICATIONS

Total Cumulative Years: 20
Employer: Aleut Environmental Remediation, LLC
Present Position/Title: Senior Environmental Scientist/Project Manager/Project Chemist
US Citizen: Yes
Education: M.S., Environmental Quality Science, 2004, University of Alaska Anchorage; B.S., Biology, Southern Oregon University, 2001; A.S. Science, Cottey College, 1998.

Certifications: ADEC-Qualified Environmental Professional
Relevant Training: OSHA 40-hr-Hazardous Site Training (with annual 8-hour refresher); OSHA 8-hr Site Manager and Supervisor Training for Hazardous Site Operations and Emergency Response; 30-hr OSHA Construction Outreach Training; OSHA Excavation Competent Person; USACE Construction Quality Management for Contractors; DOT Hazardous Materials Transportation; IATA Dangerous Goods Transportation; Lead Risk Assessor Certification; AHERA Building Inspector Certification; Bear Awareness Training; First Aid/CPR/AED; Niton XRF Analyzer Operator training; Managing Uncertainty with Systematic Planning for Environmental Decision Making

RELEVANT EXPERIENCE

Project Manager, Hilcorp Alaska Contaminated Sites Groundwater Monitoring Project, Kenai Peninsula Sites, AK. Provided project management for this ongoing ADEC Contaminated Sites monitoring program involving nearly 200 wells at 18 sites within the Beaver Creek Unit, Cannery Loop Unit, Kenai Gas Field, and Swanson River Field. Ms. Hadden managed the overall project including budget and schedule, as well provided senior review of work plans addendums and reports. She provided guidance and support for the field team during procurements and field execution, as well as during document generation, to ensure that project data quality objectives were met.

Environmental Scientist, Hilcorp Alaska Environmental Program Support. Provides environmental chemistry support for Hilcorp's Kenai and Cook Inlet oil and gas assets. Ms. Hadden provided technical support for chemistry reviews and data analysis. She provided reviews of data quality reports for various reports in support of Hilcorp's Kenai and Cook Inlet oil and gas assets.

Environmental Scientist, Hilcorp North Slope Environmental Program Support. Provides technical chemistry support for Hilcorp's upstream and midstream oil and gas assets. Conducted reviews of analytical chemistry data validation reports in accordance with the QA/QC programs for the ADEC Contaminated Sites monitoring and RCRA Order compliance programs. This project supported the collection and analysis of samples, including groundwater and surface water monitoring, and site investigations at over 300 sites in the Prudhoe Bay Unit. Ms. Hadden also assisted with the revisions of the Quality Assurance Project Plan for the Prudhoe Bay RCRA and ADEC programs. Revisions were made in collaboration with Hilcorp to ensure their environmental goals were met and to streamline the plans for ease of use and program consistency. Ms. Hadden also led the effort to generate a comprehensive Atlas which documented the history and existing contamination located at Prudhoe Bay sites. This document well be used by facilities staff to guide and inform ground intrusive work at the sites to help with the management and mitigation of existing contamination at the sites.

Project Manager, Delta Western, Rocky Point Management Area (RPMA) Groundwater Monitoring and Operations and Maintenance (O&M) Support; Dutch Harbor, AK. Sara works with, manages, and supports the current local environmental subcontractor for this project on behalf of Delta Western. This project includes the execution of long-term monitoring and O&M activities for the RPMA in Dutch Harbor, Alaska, which involves groundwater sampling, product recovery, surface water sampling, and sediment sampling, as well as the O&M of oil-water separators at the site. Sara coordinates with the local subcontractor to expedite accurate and efficient sampling and O&M activities, and coordinates with the analytical laboratory for glassware orders as well as sample receipts. In 2022, Sara spent time in the field with the local subcontractor to mentor the field staff in proper sample collection and handling. Sara also manages reporting and data management including the completion of ADEC checklists and generating the annual reports to document each season's sampling and O&M activities.

Environmental Scientist/Chemist, Hilcorp Waste Sites and Site Closure Support, Kenai, AK. This $200K project included the well installation, development, and sampling of waste site wells in addition to ensuring that the facility permits were maintained in compliance with ADEC solid waste requirements. This project grew into the development of closure documentation to assist Hilcorp in retiring their waste facilities. Closure efforts included conducting statistical analyses based on the evaluation of historical data trends to obtain closure of sites for Hilcorp. Sara managed tasks toward the successful closure of the Beaver Creek Unit Drilling Waste Disposal site as well as a second closure by ADEC at the Swanson River Central Drilling Waste Facility. Sara also supported the annual waste sampling program for three waste sites across two of Hilcorp's development units.

Project Manager/Technical Lead, FAA/USACE/USCG, Annette Island, AK. This project included site investigation and remediation activities, as well as long-term groundwater monitoring activities. As the Project Manager, Sara was responsible for coordinating Closure and After Action reporting activities, ensuring the generation of quality documents, and managing the budget and schedule. Sara managed the annual groundwater monitoring program which involved the planning for, execution of, and reporting on sample collection of over 50 groundwater monitoring wells. She developed a decision tree to systematically remove wells from the sampling program to benefit the client's objectives. Sara led excavation, sample collection, and sample management activities, managed subcontractors on site, and authored After Action and Closure Reports.

Technical Lead/Environmental Scientist, USACE, Amaknak Pre-WWII Tank Farm FUDS, Unalaska, Alaska. This project included optimization of the groundwater monitoring program at the Pre-WWII Tank Farm FUDS in Amaknak, as well as the completion of a five-year review. Work included an upgrade of onsite remedies, groundwater network optimization, and groundwater gauging and sampling. Sara managed the generation of multiple deliverables including a Groundwater Monitoring Optimization and Sampling Plan, an Annual Groundwater Report, a Periodic Review, a Groundwater Use Determination Memorandum, and a GIS database for public use. Sara also served as the Project Manager for this project during the field effort.

Environmental Scientist, USACE, FUDS Groundwater Sampling at Nome, Tok, Big Delta, and Northway, AK. Sara supported this multi-year project during the planning and reporting phases. Tasks included updating existing planning documents and authoring long-term monitoring reports and periodic reviews (27 report versions in total); providing support to multiple project teams in performing fieldwork, which included monitoring well development at six wells, groundwater sampling at 52 wells, drinking water sample collection, and data downloads from pressure transducers.

BRADLEY RAMSAY SURVEY/GIS/ENVIRONMENTAL SCIENTIST

Mr. Ramsay has over 8 years of experience as an environmental scientist in Alaska and 4 field seasons of collecting microbial samples around the Pacific Northwest. He is an 18 AAC 75 Qualified Environmental Professional and an OSHA 30-hour and USACE EM385-competent site safety and health officer (SSHO). Mr. Ramsay has experience working for a diverse array of private, federal, and state clients including Hilcorp, Harvest Midstream, Alaska Peninsula Corporation, Ounalashka Corporation, Qawalangin Tribe of Unalaska, Delta Western, Exxon, GOJO Industries USAF/AFCEC, USACE (Alaska District), FAA, NAVFAC Mid-Atlantic, USCG, EPA, DoE, AKDOT&PF, AKDMVA, and AKARNG. He is experienced in performing groundwater monitoring within the Kenai Peninsula and Cook Inlet regions, including the Swanson River Oil Field (SRF) (including the Soldotna Creek Unit (SCU)), Kenai Gas Field (KGF), Cannery Loop Unit Pad 3 (CLU3), and Beaver Creek Unit Pad 4 (BCU4) on the Kenai Peninsula and the Drift River Terminal across the Cook Inlet. He has extensive field experience in remote Alaska and has worked from Adak to the Atlantic coast including the following Alaska locations: Port Heiden, Tok, JBER-Elmendorf, JBER-Richardson, Anchorage, Eielson AFB, Fort Wainwright, Harding Lake, Nome, Umiat, Akiak, Kwethluk, Nunapitchuk, Tununak, Unalakleet (North River RRS), Adak, Unalaska, Drift River Terminal, and several Kenai Peninsula Production Facilities. He has also supported projects outside of Alaska, including Camp Lejeune, NC; St. Francis County, MO; Red Bluff Air Route Surveillance Radar Facility, CA; Hanford Nuclear Reservation 100-H Site, WA; Yellowstone National Park, WY; and Powder River Basin, MT/WY. Mr. Ramsay has executed removal actions, remedial investigations, preliminary assessments, long-term monitoring, treatability studies, waste characterization and management, in-situ chemical oxidation, emergency spill response, demolition, mold abatement, in-situ biostimulation studies, and microbial community sampling and analyses. He is also experienced in RTK- and mapping grade-GPS surveys and high-precision vertical leveling measurements. Mr. Ramsay has 10 years of experience with ESRI ArcGIS managing geospatial and chemistry data. He is skilled in using Python programming to automate GIS processes and manage very large datasets. Mr. Ramsay's background in chemistry (BS Chemistry/MS Biochemistry) additionally qualifies him for handling, processing, and understanding analytical data and laboratory challenges involved with analytical data production.

EDUCATION/QUALIFICATIONS

Years In Proposed Position: 9
Total Cumulative Years: 14
Employer: Aleut Environmental Remediation, LLC
Present Position/Title: Environmental Scientist
US Citizen: Yes
Education: M.S., Biochemistry, Montana State University, 2007; B.S., Chemistry, Montana State University, 2003.

Certifications: ADEC-Qualified Environmental Professional
Relevant Training: OSHA HAZWOPER 40-hr; OSHA HAZWOPER 8-hr refresher; OSHA HAZWOPER Supervisor 8-hr; OSHA Construction 30-hr; Contractor Construction Quality Management; DOT Hazardous Materials Transportation; IATA Dangerous Goods Transportation; First Aid/CPR

RELEVANT EXPERIENCE

Environmental Scientist/Land Surveyor, Hilcorp Alaska, Swanson River Field Tank Settings, Soldotna Creek Units, Kenai Gas Field, Beaver Creek Unit Pad 4, and Cannery Loop Unit Pad 3 Contaminated Sites Long-Term Groundwater Monitoring, Kenai Peninsula, AK. Supported a long-term groundwater monitoring project that involved groundwater sampling at over 200 monitoring wells at SRF, SCU, KGF, CLU3, and BCU4. Mr. Ramsay served as the SSHO for a five-person crew over a three-week continuous field period. He performed gauging, groundwater sampling, and land surveying (monitoring well level loops) across four facilities and fourteen sites. He generated land survey reports and assisted with the long-term monitoring report.

Environmental Scientist, Hilcorp Alaska, LLC, Environmental Support Services, Prudhoe Bay and Kenai, AK. Supported the Hilcorp environmental program by preparing a contaminated soil and water management plan for excavation work near contaminated sites at Swanson River Field.

Environmental Scientist/Land Surveyor, Harvest, Groundwater Monitoring and Landfarm Optimization, Drift River Terminal, AK. Project. Supported long-term groundwater monitoring, site and landfarm optimization at the former Drift River Terminal. Performed groundwater monitoring field work including: well gauging, LNAPL removal, and monitoring well land survey activities. Performed landfarm soil sampling and nutrient analysis.

Environmental Scientist, AKARNG, Long-Term Monitoring, Four Sites (Akiak, Kwethluk, Nunapitchuk, Tununak), AK. Served as the technical/field lead and SSHO for a long-term groundwater monitoring project. Field activities included groundwater, surface water, and soil sampling; well decommissioning; well installation; and land surveying at four remote Alaska locations. Mr. Ramsay prepared for and coordinated all remote site logistics. He authored work plans and reports with minimal AKARNG and ADEC comments and performed all chemistry and GIS functions. The project received regulatory approval of two site closure documents for Akiak and Kwethluk.

Environmental Scientist, Qawalangin Tribe, PCB Transformer Site Investigations, Unalaska, AK. Served as the SSHO for a transformer vault investigation and removal project. Mr. Ramsay conducted sampling and surveyed vault locations using RTK GPS, supported the reporting effort by authoring the survey report, and provided a quality assurance review of all reporting documents.

Environmental Scientist, USAF, PBR RI/Removal Action, Eielson AFB, AK. Supported a performance-based remediation project with both RI and removal action tasks at Eielson AFB. Mr. Ramsay served as the SSHO, oversaw soil boring and temporary well advancement, and collected soil and groundwater samples at 24 sites. He authored reporting documents and prepared all project figures using GIS.

Environmental Scientist, FAA Umiat Range and Knifeblade Ridge Demolitions and Site Investigation, Umiat, AK. Served as the SSHO for a demolition and stie investigation project. Mr. Ramsay conducted soil and surface water sampling at two sites (Umiat Range and Knifeblade Ridge), completed a land survey using RTK GPS, and conducted post-demolition activities at former buildings and other site infrastructure, including debris removal (drums, transformers, etc.). He coordinated remote site logistics, authored reporting documents, prepared all project figures using GIS, and completed the chemistry data quality review.

Environmental Scientist, FAA, Red Bluff Air Route Surveillance Radar Removal Action, Red Bluff, CA. Served as the field lead and SSHO for a contaminated soil removal action project. Mr. Ramsay authored planning documents; coordinated field logistics; oversaw subcontractors, including a heavy civil construction subcontractor; ensured excavation activities were conducted safely at the sensitive radar facility; and collected excavation confirmation samples to confirm that PCB, metal, and pesticide contaminated soils were removed. He conducted background sampling activities, completed a land survey of all excavation and sampling locations, authored reporting deliverables, prepared all project figures using GIS, and completed the chemistry data quality review.

NATHANIEL GINGERY CHEMIST

Mr. Gingery has over 13 years of experience working on environmental projects in Alaska and abroad. He has extensive experience developing and implementing QA/QC programs, providing field support, and processing and managing analytical data. His experience includes work plan and technical report authoring, environmental sample collection, on-site mobile laboratory operations, bench chemistry, and data management. As a Project Chemist at ARS Aleut Remediation, LLC (Aleut), Nathaniel's primary focus is chemistry support for various efforts conducted throughout Alaska and the Pacific Northwest. He also provides field support, conducting environmental sampling for a variety of media including groundwater. In addition to being an accomplished field team member for remote field efforts across Alaska, Nathaniel has developed, implemented, and supported digital data collection using ArcGIS Pro and Survey123. He has provided chemistry support for a variety of groundwater monitoring and other projects in accordance with State and Federal regulatory programs including ADEC Contaminated Sites Program, ADEC Solid Waste, RCRA, CERCLA, and CWA. Mr. Gingery is experienced in performing groundwater monitoring within the Kenai Peninsula, including the Swanson River Oil Field (SRF) (including the Soldotna Creek Unit (SCU)), Kenai Gas Field (KGF), Cannery Loop Unit Pad 3 (CLU3), and Beaver Creek Unit Pad 4 (BCU4) on the Kenai Peninsula. He also has experience with Cook Inlet sites, such as the Drift River Terminal.

EDUCATION/QUALIFICATIONS

Total Cumulative Years: 13
Employer: Aleut Environmental Remediation, LLC
Present Position/Title: Chemist
US Citizen: Yes
Education: B.S., Natural Science with a Minor in Chemistry, University of Alaska, Anchorage, 2017.

Certifications: ADEC-Qualified Environmental Professional
Relevant Training: OSHA 40-hr Hazardous Site Training (with annual 8-hour refresher); OSHA 30-hr Construction Safety and Health Training; OSHA Confined Spaces Training; DOT Hazardous Materials Transportation; IATA Dangerous Goods Transportation; First Aid/CPR/AED; UFP-QAPP training

RELEVANT EXPERIENCE

Project Chemist/Field Sampler, Hilcorp Alaska, Swanson River Field Tank Settings, Soldotna Creek Units, Kenai Gas Field, Beaver Creek Unit Pad 4, and Cannery Loop Unit Pad 3 Contaminated Sites Long-Term Groundwater Monitoring, Kenai Peninsula, AK. Supported a long-term groundwater monitoring project that involved groundwater sampling at over 200 monitoring wells. Mr. Gingery performed groundwater gauging, groundwater and surface water sampling, product recovery, and monitoring well maintenance at seven tank setting units, one former tank area, and six pads across four sites on the Kenai Peninsula. Over a three-week period, assisted with the gauging of 244 wells, groundwater sample collection at 136 wells, surface water sample collection at 20 locations, and product recovery at 9 wells.

Project Chemist/Field Sampler, Hilcorp Kenai Peninsula Waste Sites Groundwater Monitoring Program, SRF Grind and Inject Facility, Kenai Peninsula, AK. Conducted monitoring well inspections, groundwater gauging, and sampling activities. Supported chemistry elements for a long-term groundwater monitoring project at the Swanson River Grind & Inject Facility. Evaluated chemical data and prepared reporting documents for ADEC Solid Waste program review and approval. Designed and maintained digital data collection forms and an end use system for automated data flow from fieldwork to reporting.

Project Chemist, Hilcorp Alaska Environmental Program Support, Kenai and Cook Inlet, AK. Provides environmental chemistry and data management support for Hilcorp's Kenai and Cook Inlet oil and gas assets. Supports the management and validation of environmental data collected in support of environmental programs including ADEC Contaminated Sites monitoring, compliance, and remediation projects.

Project Chemist, Hilcorp North Slope Environmental Program Support, Prudhoe Bay, AK. Provides environmental chemistry support for Hilcorp's upstream and midstream oil and gas assets. Supports the management and validation of environmental data collected in support of environmental programs including ADEC Contaminated Sites monitoring, compliance, and remediation projects.

Project Chemist/Field Sampler, Inert Waste Monofill Groundwater Monitoring, Adak, AK. Coordinated with the analytical laboratory to procure glassware. Conducted monitoring well inspections, groundwater gauging, and sampling activities. Designed and maintained digital data collection forms and an end use system for automated data flow from fieldwork to reporting. Evaluated chemical data and prepared reporting documents, including a data quality report, for ADEC Solid Waste program review and approval. Assisted in the collection of geospatial data and drone survey imagery.

Project Chemist/Field Sampler, Eareckson Air Station Landfill Groundwater Sampling Support, Eareckson, AK. Reviewed glassware orders and equipment inventory to ensure proper sampling supplies/equipment were available. Led and trained Eareckson-based field technicians in proper gauging, purging, and sampling methods. Conducted monitoring well inspections, groundwater gauging, and sampling activities. Performed sample management activities, including labeling, packing, shipping, and maintaining the chain-of-custody. Evaluated chemical data and prepared reporting documents, including a data quality report, for ADEC Solid Waste program review and approval.

Project Chemist, Joint Base Elmendorf-Richardson (JBER) ORC Remedial Investigation, JBER, AK. Reviewed and validated analytical chemistry data and generated report crosstabs. Managed databases of current and historical chemistry data and worked with GIS team to produce report figures. Developed digital data collection and storage and worked with GIS team to integrate data into an online dashboard. Worked with authoring teams to write environmental project work plans and reports. Coordinated with analytical laboratories to ensure the accurate and timely delivery of sample kits to meet project requirements. Served as site safety officer and sample team member for field efforts.

Project Chemist, JBER Fence-to-Fence Monitoring, JBER, AK. Served as field staff on F2F quarterly groundwater and soil gas monitoring efforts. Managed and shipped samples to lab. Performed data qualification and wrote data quality review for several quarters.

Project Chemist, King Salmon AFS Remedial Investigation, King Salmon, AK. Developed and supported digital data collection, storage, and export to report format. Worked with GIS team to ensure offsite project managers had a real-time picture of field progress. Planned, purchased, and mobilized field supplies and equipment. Worked as member of field team collecting soil, sediment, groundwater, and surface water samples. Installed and sampled sub-slab soil gas ports. Filled in as field team lead on multiple occasions, including overseeing subcontractors to ensure the final soil borings were completed at the end of the project.

Project Chemist, Eklutna Remedial Investigation/Risk Assessment, Eklutna, AK. Assisted in the installation of a sitewide electronic water level monitoring system and performed monthly readings for 13 consecutive months. Managed and shipped environmental samples to the lab. Collected passive soil gas and ambient air samples. Performed data quality assessment and wrote validation reports for both field mobilizations.

Project Chemist, Eielson AFB PBR, Eielson, AK. Designed a data structure to handle decades of sample data and set up queries to generate report figures displaying targeted data.

Analytical Chemist, Multiple Project at SGS North America, Inc, Anchorage, AK. Responsible for conducting chemical analyses, maintaining instruments, and reporting accurate data for analytical methods including residential and industrial water quality suites, contaminated sites remediation testing, and compliance testing. Responsibilities included water quality sample analysis for drinking water methods, environmental sample extraction and analysis, and mobile laboratory operation.

ETHAN GADDY, PGIT — GEOLOGIST

Mr. Gaddy has several years of geologic and environmental expertise with a focus on surface and groundwater hydrology. He has extensive experience working as a field-operative, data-analyst, lab-assistant, and researcher for academia and industry projects across the United States. Clients have included Bunker Hill Mining Corporation, NCDEQ, Mainspring Conservation Landtrust, Tennessee Valley Authority, NCWRC, and Oregon State University. He has a thorough working knowledge of federal mine closure procedures, Geographic Information System software, hydrogeologic modeling, and data processing software. Ethan is also a Certified PGIT recognized by Washington State.

EDUCATION/QUALIFICATIONS

Years In Proposed Position: 0-1 **Total Cumulative Years:** 0-1 **Employer:** Aleut Environmental Remediation, LLC **Present Position/Title:** Geologist **US Citizen:** Yes **Education:** M.S., Geology, University of Idaho, 2023. B.A., Geology, Western Carolina University, 2021.	**Certifications:** Fundamentals of Geology (FG) **Relevant Training:** OSHA HAZWOPER 40-hr; MSHA part 46 and 48; First Aid/CPR

RELEVANT EXPERIENCE

Geologist, Hilcorp Alaska, LLC, Land Farm Sampling, Drift River, AK, 2024. Provided technical support for Remedial Investigation soil sampling at Drift River, AK land farm.

Physical Scientist, USFS, Idaho Panhandle National Forests, Coeur D'Alene, ID, 2023. Planned and conducted investigations concerning hazard identification as related to legacy mining activities, modern disturbance, and mineral-deposit location on public lands in the northern Rocky Mountain backcountry. Provided assistance with Abandoned Mine Land feature closure.

Research Technician, University of Idaho, Stratigraphic Characterization of Quaternary Glacial Deposits, McCarthy, AK, 2023. Assisted with collection of analytical soil samples (primarily for radiocarbon and surface exposure dating) and stratigraphic column creation from river bluffs in backcountry surrounding McCarthy. Conducted GPR analysis of the paleo-floodplain surrounding McCarthy.

Research Assistant, University of Idaho, Source-water Discrimination and Inverse Mixing of Minewater, Kellogg, ID, 2021-2023. Provided technical support to Bunker Hill Mining Corporation for Bi-weekly sampling of snow, surface waters, and minewaters at the Bunker Hill Superfund Complex from 2021 to 2023. During this time Mr. Gaddy directly oversaw sample preparation, collection, quality assurance, and delivery to Lab, while working on mine site as a university representative. Mr. Gaddy was also responsible for the organization, analysis, and interpretation of the lab analytical data. Primary analytes of the study included stable and radiogenic water isotopes, heavy metals, and traditional geochemical lab and field analytes. Mr. Gaddy was also responsible for the construction of a report and manuscript detailing action and results of the study as well as recommendations for remedial action.

Research Assistant, Oregon State University, Effects of Disturbance on Sediment Storage Capacity of Headwater Streams, H.J. Andrews Experimental Forest, Blue River, OR, 2022.

Assisted with development of field procedures for assessment of sediment storage. Assisted with performance of field duties, largely consisting of the collection of channel dimensions and channel-obstruction dimensions in headwater streams of the Cascade Mountains.

Aquatic Research Technician, Western Carolina University, Ecological Assessment of Upper Tennessee River Drainage, Cullowhee, NC, 2021. Assisted with aquatic habitat assessment, macro-invertebrate survey, and electro-fishing surveys across multiple sub-drainages in the Upper Tennessee River watershed. Mr. Gaddy collected and prepared eDNA and Ion Chromatograph (IC) samples, all IC analysis was performed on-site by Mr. Gaddy and peers. Mr. Gaddy installed several climate monitoring stations (complete with atmospheric and soil sensors) in backcountry Appalachian environments. Mr. Gaddy oversaw the calibration and deployment of sub-aqueous temperature loggers as well as data collection events. Mr. Gaddy assisted with an ecological assessment report that sought to identify potential results of dam removal. Deliverables included reports and video documentaries to Tennessee Valley Authority, Mainspring Conservation Landtrust, and NCWRC.

Research Assistant, Western Carolina University, Microplastics Removal from Alluvial Sediments, Cullowhee, NC, 2021. Assisted with characterization of the behavior and recovery methods for various common plastic polymer species in solution and sediment. Recorded effects of morphology and species on particle behavior and recovery. Attempted to write procedure for microplastic removal for standardization.

Research Assistant, Western Carolina University, Road-Culvert-Gully Investigation, Cullowhee, NC, 2020-2021. Conducted field-verification and cataloging of potential gully features pinpointed by a newly developed ArcMap algorithm, across the entirety of Jackson and Haywood counties (Western NC). Mr. Gaddy also worked to organize field expeditions and schedule personnel.

Research Assistant, Western Carolina University, Gribble Gap Hydrologic Monitoring, Cullowhee, NC, 2019-2020. Supported a long-term groundwater monitoring project, which included well gauging, conductivity readings, and trend analysis. Primary responsibilities of Mr. Gaddy included flume and equipment maintenance, calibration of level loggers, recruit and schedule volunteers to assist/conduct (in) monitoring events, work plan development for monitoring events, download rain gauge and level logger data, verification and organization of data for submission to NCDEQ. Mr. Gaddy also completed the construction and installation of a flume with the assistance of peers.

JOSEPHINE CHONG FOO YUEN CHEMIST

Ms. Chong Foo Yuen is an entry-level chemist who has over 2 years of chemistry expertise in an industry setting with a focus on environmental remedial investigations. She has analyzed samples for numerous projects throughout the state of Alaska and has provided chemistry support in accordance with State and Federal regulatory programs, including ADEC Contaminated Sites Program, USACE, RCRA, and others.

EDUCATION/QUALIFICATIONS

Years In Proposed Position: 0-1 **Total Cumulative Years:** 2.5 **Employer:** Aleut Environmental Remediation, LLC **Present Position/Title:** Chemist **US Citizen:** No **Education:** B.A., Chemistry, French, and Francophone Studies, Hamilton College, 2022	**Certifications:** NA **Relevant Training:** OSHA HAZWOPER 40-hr; First Aid/CPR/AED

ANNA WEN GIS/ ENVIRONMENTAL SCIENTIST

Ms. Wen is an entry-level environmental scientist who has experience working as a research assistant for academia projects within Alaska. She has a thorough working knowledge of Geographic Information System software and data analysis.

EDUCATION/QUALIFICATIONS

Years In Proposed Position: 0-1
Total Cumulative Years: 0-1
Employer: Aleut Environmental Remediation, LLC
Present Position/Title: Environmental Scientist
US Citizen: Yes
Education: B.S., Environment and Society, Concentration in Biology, Minor in GIS, University of Alaska Anchorage, 2023.

Certifications: NA
Relevant Training: NA