2022 Work Plan: Landfarm Sampling and Groundwater Monitoring

For the

Kotzebue Former IHS/BIA Hospital – School Pipeline Release
(ADEC File. No. 410.38.025; Hazard ID 25558)

Kotzebue, Alaska

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADOT&PF	Alaska Department of Transportation and Public Facilities
AK	Alaska
BIA	Bureau of Indian Affairs
BTEX	Aromatic Hydrocarbons (benzene, toluene, ethylbenzene, and xylenes)
COPC	Compounds of Potential Concern
cy	Cubic Yards
DoD	Department of Defense
DRO	Diesel Range Organics
DQO	Data Quality Objectives
GAC	Granulated Activated Carbon
GRO	Gasoline Range Organics
HH	Human Health
IDW	Investigation Derived Waste
IHS	Indian Health Service
KIC	Kikiktagruk Inupiat Corporation
ln ft	Linear Feet
MAC	Maximum Allowable Concentrations
MTG	Migration to Groundwater
mg/l	Milligrams per Liter
mv	Millivolts
NTU	Nephelometric Turbidity Unit
PAH	Polyaromatic hydrocarbon
PCE	Tetrachloroethylene
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	Part Per Million
QC	Quality Control
QEP	Qualified Environmental Professional
QS	Qualified Sampler
RRO	Residual Range Organics
SGS	SGS North America
sq ft	Square Feet
TC-EM JV	Tanana Commercial-Environmental Management Joint Venture
USS	United States Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

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This work plan outlines the proposed landfarm sampling and groundwater monitoring activities at the Former Indian Health Service/Bureau of Indian Affairs (IHS/BIA) Hospital – School Pipeline Release in Kotzebue, Alaska. The site is identified as Alaska Department of Environmental Conservation (ADEC) Contaminated Sites File No. 410.38.025; Hazard ID 25558.

Work is in accordance with the February 5, 2022 Task Order EC-12 under the Professional Services Contract from Maniilaq Association.

1.0 SITE DESCRIPTION AND BACKGROUND

The Subject Property is an active ADEC Contaminated Site and encompasses several lots in Kotzebue, Alaska. The following outlines the purpose of the monitoring, site location, and previous field activities.

1.1 Project Purpose and Objectives

The purpose of the project is to progress toward Cleanup Complete with Institutional Controls for the site. The project objectives include the following:

- Monitoring of product from Monitoring Wells MW1 and MW6 (if present) on Lots 5 and Tract 4A, respectively;
- Groundwater monitoring of the site's ten existing wells (Lots 3 through 5 and Tract 4A);
- Characterize the soil generated during the 2020 excavation and treated at the KIC Base Road landfarm.

1.2 Site Location

The ADEC Contaminated Site covers land in the area of the former IHS Hospital and BIA school. The source area consists of Tracts 1 and 4 of United States Survey 2083. The site is located in the northeast ¼ of the northwest ¼ of Section 3, Township 17 North, Range 18 West, Kateel River Meridian, Alaska (Kotzebue D-2 USGS Quadrangle). The Vicinity Map showing the general location of the Project Area is included as Figure 1.

The former Kotzebue hospital was located between Second Avenue and Third Avenue, southwest of the current elementary school. The tank farm serving the hospital was north along Second Avenue, near the intersection of Ocean Avenue.

The complete extent of contamination has not yet been determined and likely extends beyond the following parcels. As a result, the site is not just the original ten acres of land. The lots included in this assessment and their former uses are the following (WHPacific, 2015):

- Lot 3 – Former BIA school and small structures once part of the hospital; current residential
- Lot 4 – former hospital grounds (1928-1962); current pedestrian/public use, FRF Building (also known as the Ferguson Building)
- Lot 5 – former hospital grounds (1961-1996); current pedestrian/public use, fenced light industrial
- Tract 4A – former BIA fuel pipeline corridor to the 1961 hospital; current Kotzebue school complex

The proposed field activities will primarily focus on groundwater monitoring of the wells near the former IHS hospital (MW-1, MW-2, MW-7, MW-8, and MW-10) to be carried out concurrently with groundwater monitoring of the wells located near the former BIA school (MW-3 through MW-6, MW-9).

In addition, the landfarm property where the contaminated soil that was generated in 2019 and 2020 is located off of Base Road. The location of the Base Road landfarm is shown on Figure 1. The soil that was generated from the 2020 excavation on Lot 4 will be characterized to determine the presence of contaminants, and the soil from the 2019 excavation will be sampled to determine if DRO contaminants are present

1.3 Background

Oil was first discovered in the Kotzebue Elementary School basement and are believed to be a combination of fuel storage tank releases, damaged fuel distribution line, fuel storage tank overfills and other sources (ADEC, 2015). In 1980 the ADEC became aware of the product release when fuel oil was being discharged from an oil-water separator located in the elementary school's basement. The ADEC estimated during the initial investigation that between 100,000 and 200,000 gallons of diesel fuel had been released. Between 1979 and 1980 an estimated 100,000 gallons of fuel was pumped from the basement, and an estimated 40,000 gallons of fuel was recovered by ADEC contractors and citizens from recovery wells during 1980 and 1984. (WHPacific, 2015)

In 1986 the ADEC's contractor evaluated the extent of contamination and decommissioning of the pipeline. ADEC's contractor installed 25 monitoring wells and nine recovery wells. Within a month, all of the wells had evidence of fuel present. The pipeline was also exposed to a depth of less than 3 feet below ground surface and approximately 200 to 300 gallons of diesel was drained from the pipeline. The pipeline was then abandoned in place. (WH Pacific, 2015)

In 1988 an oil sheen was observed on the beach of Kotzebue Sound off of Shore Avenue. Shannon & Wilson installed and operated an oil-recovery system in 1989 which included a 435-foot-long fabric barrier to prevent migration, additional recovery/monitoring wells, and a 74-foot-long oil recovery trench in Second Avenue, north of the former hospital. As much as 2 feet of floating fuel was observed in several wells, but an estimated 5,000 to 7,000 gallons of fuel remained in the ground. The collection efforts ceased after 1990. (S&W, 2010)

In 2008, local residents notified the ADEC that a seasonal sheen was observed in Kotzebue Sound off of Shore Avenue. The ADEC contracted with Shannon & Wilson to collect pore water samples along the beach and install vapor probes near the elementary school. Pore-water samples indicate contamination is entering Kotzebue Sound. With the exception of a probe installed near the former hospital, soil vapor samples were below screening levels. Shannon & Wilson was also tasked with monitoring and recovery well and oil-recovery gallery decommissioning. Of the 64 wells installed in the late 1980s, only 15 were located and of those only three were in good working conditions. The 12 wells were decommissioned. The oil-recovery gallery was unable to be located but the sample collected from the vicinity exceeded diesel range organic (DRO) levels. (S&W, 2010)

In 2010 the ADOT&PF installed of a sheet pile wall along the Shore Avenue. The sheet piles were installed along the tideline to approximately 25 feet below mean sea level and extend approximately 6 feet above the ground surface. The impact of this wall and migration towards Kotzebue Sound is unknown. (S&W, 2010)

In 2014 and 2015 WH Pacific conducted site investigations at the site. This included installation of four test pits, 45 soil borings, and 10 monitoring wells in 2014 in the vicinity of the abandoned in-place pipeline and areas of known or former contamination; groundwater sampling in 2014 and 2015; and a shallow soil gas survey in 2015. The highest concentrations were generally along the former BIA pipeline corridor on Tract 4A, and in the right-of-way area northwest of Building 314 and the FRF Building. The shallow soil gas survey did not indicate detectable levels of contaminants of concern in the school's playground area. (WH Pacific, 2015)

In 2019, TC-EM JV conducted pre-excavation sampling, underground storage tank (UST) removal, and groundwater sampling. The UST removal activities focused on the UST and concrete dispensing island along the north side of the FRF Building. While the presumed storage use of the tank was for vehicle fueling that was discontinued sometime prior to 1969, waste oil was encountered in the UST at the time of the field activities. Approximately 16 cubic yards (cy) of contaminated soil was removed during the UST removal activities and transported to KIC's lined landfarm cell on Base Road in Kotzebue. Concentrations greater than the ADEC cleanup levels remain in the UST excavation and based on field screening and analytical results and the fact that the tank and piping appeared in good condition, the contamination appeared more consistent with the historical fuel oil that has contaminated the project area and not from a release from the UST. Groundwater sampling activities were also conducted during the August 2019 field activities. Measurable product was encountered in Well MW1, which is consistent with the 2014 field activities. Contamination was present in the groundwater in each of the site's wells, with the highest concentrations encountered in the wells along the former pipeline corridor. (TC-EM JV, 2019)

In 2020, TC-EM JV conducted site characterization, soil removal activities, product and groundwater monitoring, and landfarm maintenance at the site. This included drilling 16 borings, monitoring 10 wells, and excavating approximately 170 cy of contaminated soil. Contamination was present in the groundwater in each of the site's wells with product encountered in Wells MW1 and MW6. Additionally, this monitoring event encountered tetrachloroethylene (PCE) in one or more wells though no known or suspected sources of PCE were observed during these field activities. Site characterization of Lot 3 revealed petroleum concentrations greater than ADEC migration to groundwater (MTG) cleanup levels but less than the ADEC human health/maximum allowable concentration (HH/MAC) cleanup levels detected at various locations on the lot. Borings located on the south side of the duplexes (Buildings 307, 312, and 316) were less than ADEC MTG cleanup levels and, based on the groundwater flow direction measured fall of 2020, these borings are located upgradient in reference to other borings advanced in 2020, suggesting the southern extent of contamination is defined. Site characterization of Lot 4, conducted July 2020, revealed contamination greater that the ADEC HH/MAC cleanup levels. Fall of 2020 soil removal activities commenced, focusing on the excavation of contaminated soils on the northwest side of the Ferguson building. During cleanup activities, buried debris was encountered. Concentrations greater than ADEC HH/MAC cleanup levels remains on the edge of the property boundary of Lots 4 and 5. Site characterization of Lot 5 reveals free product, groundwater contamination, and contaminant concentrations greater than ADEC HH/MAC cleanup levels remains in the soil with the highest concentrations located on the northwest portion of the lot. (TC-EM JV, 2020)

In 2021, TC-EM JV conducted soil removal activities, product and groundwater monitoring and landfarm 2019 soil characterization. This included excavating approximately 218 cy of contaminated soil, monitoring 10 wells, and sampling the treated 2019 landfarmed soils. The 2019 treated soils at the landfarm contained DRO concentrations reduced to slightly above ADEC MTG cleanup level. The maximum DRO concentration result was 299 mg/kg compared to the cleanup level of 250 mg/kg, and the location can be seen on Figure 3. Contamination was reported in each of the site wells, except for Well MW3, with product encountered in Wells MW1 and MW6. The soil removal activities concentrated on Lot 4 with results indicating the soil along the edge of the property boundary of Lots 4 and 5, and along the edge of the FRF building, remain above ADEC HH/MAC cleanup levels. During the cleanup activities, buried debris was encountered, including concrete asbestos pipe. Future removal actions in the vicinity will likely encounter additional buried materials. (TC-EM JV, 2021)

2.0 CONTAMINANTS OF POTENTIAL CONCERN AND APPLICABLE REGULATIONS

The ADEC Contaminated Site's database identifies a historical spill of #1 diesel between 1950 and 1980 at the site that resulted in the estimated release of 100,000 to 200,000 gallons of fuel releases in an area of 10 or more acres. The source or sources are suspected to be a result of the following: 1) ruptured tank at the bulk fuel farm in the 1950s; 2) former distribution line between the bulk tank farm and the school and former hospital; and 3) aboveground and underground storage tanks and associated pipeline at the school and former hospital. In 1989, chromatographic profiles from the samples of the contaminated material were consistent with No. 1 Fuel Oil. (S&W, 1990)

The constituents of potential concern (COPC) associated with the Former IHS/BIA Hospital-School Pipeline Release site as identified in previous investigations include the following petroleum-related compounds: gasoline range organics (GRO); diesel range organics (DRO); residual range organics (RRO); volatile organic compounds (VOCs); and polyaromatic hydrocarbons (PAH). The suite of analyses for the soil and groundwater samples collected as part of this work plan effort are outlined in Table 1 in Section 6.0.

Soil and water samples collected during the field activities compared to the cleanup levels outlined in the following regulations:

- Soil: Method Two Under 40 Inch Zone Migration to Groundwater and Human Health and Inhalation levels outlined in Tables B1 and B2 in 18 Alaska Administrative Code (AAC) 75.341, *Oil and Other Hazardous Substances Pollution Control* (November 18, 2021)
- Groundwater: Table C in 18 AAC 75.345, *Oil and Other Hazardous Substances Pollution Control* (November 18, 2021)

3.0 LANDFARM SOIL TREATMENT AND MAINTENANCE

KICC will perform landfarm treatment and maintenance on the 2019 and 2020-generated soil cells throughout the summer of 2022. The soil will be tilled using a rototiller on a bi-weekly basis or when weather allows.

During landfarm tilling events and after large rain events, KICC will attempt to remove excess water from the inside of the landfarm. The water will be pumped using a sump pump into a fabric filter and then into an on-site granulated activated carbon (GAC) system. Treated water will then be discharged to the vegetated area outside of the landfarm (also owned by KICC). The discharge location is approximately 950 feet from Kotzebue Sound and over 3 miles from the closest drinking water source (locations noted on Figure 1). The estimated volume of treated water may be logged for tracking purposes. Nutrients comprising a 50 pound bag of fertilizer (46-0-0) will be added to the soil during the first tilling event. The volume, type, and how much was used on each landfarm cell and explanation on how the fertilizer was selected will be documented in the report.

4.0 SOIL SAMPLING METHODOLOGY

The field screening and analytical soil sampling methods to be used during the 2022 field activities are outlined below.

4.1 Field Screening Methods

Field screening samples will be collected from the KIC landfarm (Figure 4).

4.1.1 Landfarm Treated Field Screening

Both the 2019 and 2020 landfarm cells will be tested near the end of the 2022 field season. Each cell will be treated as individual decision units. The 2019 landfarm cell is approximately 13 feet by 39 feet with soil no greater than 1 foot in thickness (approximately 16 cubic yards). The 2020 landfarm cell is an estimated 80 feet by 60 feet with soil no greater than 1 foot in thickness (approximately 170 cubic yards).

The landfarm will be divided into a grid with a maximum spacing of 10 feet and headspace samples will be collected from the center of each grid. Field headspace samples will be collected using ADEC-approved methods and tested using a photoionization detector (PID). The locations and results of the field headspace samples will be noted by the field personnel in the field notes, so analytical samples from the highest headspace samples can be collected upon completion of headspace readings.

4.1.2 Field Screening Methodology

The field headspace readings from the baseline sampling will be collected by filling re-sealable quart size bags approximately 1/3 to 1/2 full with soil. The bags will then be agitated before being allowed to develop for at least 10 minutes, but no longer than an hour. During this time the soils will be warmed to a minimum temperature of 40°F. After the samples have been warmed and allowed to develop, the probe of the PID will be inserted into the bag about one-half of the headspace depth and the highest displayed reading will be recorded in the field notes along with other pertinent information such as time of collection and the location of the sample.

4.2 Analytical Soil Sampling Methods

Analytical soil samples will be collected from the landfarm as described in the methods outlined below.

4.2.1 Landfarm Treatment Analytical Soil Sampling

Based on the estimated maximum volume treated in the landfarm (170 cy), four samples plus one duplicate will be collected from the 2020 cell, and two samples plus one duplicate will be collected from the 2019 cell. Analytical samples will follow ADEC's January 2022 *Field Sampling Guide,* Table 2A, collected at the highest headspace results and/or other indications of impact (i.e., odor, staining).

4.2.2 Analytical Soil Sampling Methodology

Soil samples will be collected using clean spoons or disposable equipment and placed directly into clean laboratory-provided containers. Volatile samples will be collected first and preserved with 25-mL of methanol, per Alaska (AK) Methods. Samples will be collected from the most likely contaminated areas based on field screening data.

5.0 SAMPLING PLAN

Field activities will occur in Fall 2022 and will include landfarm sampling and groundwater monitoring.

The location of the landfarm and groundwater monitoring wells are shown on Figures 1 and 2.

Resumes of the Qualified Environmental Professionals (QEP) that will conduct the sampling outlined in this work plan are included in Appendix A. In the event that different staff conducts the field work, the resumes of those staff will be included in the report.

5.1 Landfarm Sampling Methods

The soil generated and placed in the Base Road landfarm in 2019 and 2020 will be sampled to assess the effectiveness of the treatment in reducing concentrations. The landfarm cells will be divided into a grid with a maximum spacing of 10 feet and headspace samples will be collected from the center of each grid.

5.2 Product Monitoring Activities

During the 2014, 2019, 2020 and 2021 field activities, product was encountered in Monitoring Well MW1. In 2020 and 2021, product was also encountered in Well MW6. Depth to product and product thickness will be measured from the well using a product interface probe and/or steel tape with paste. Measurements will be collected to the nearest 0.01 foot and documented in the field notes.

If measurable product is encountered, devices will be used in attempt to recover free product to the maximum extent practicable. Since limited product has been historically encountered in Wells MW1 and MW6, recovery socks will be deployed and replaced in subsequent field efforts.

5.3 Groundwater Monitoring Activities

Groundwater level, collection of field parameters, photographs, and analytical samples will be collected from the site's ten wells. The locations of the monitoring wells to be sampled during this effort are shown on Figure 2.

5.3.1 Groundwater Level Measurements and Flow Direction

Prior to purging activities, depth to water and total well depths of each monitoring well will be measured from the top of the casing. This location should be marked and at the highest point of the casing. An electronic water level meter will be used to measure the depth to water, depth to product (if applicable), and total well depth to the nearest 0.01 foot. The measurements will be recorded in the field notebook or log. The depths to water measurements will be used to determine the groundwater flow direction and gradient.

Improvements to the monitoring wells may be warranted during the sampling activities. If there is indication of well jacking due to frost heaving or damage to the well that may warrant improvements and changes to the well casing, the improvements will be noted in the field notes. If monitoring wells are damaged and no longer functional, the wells may be decommissioned on future field efforts per the ADEC's September 2013 *Monitoring Well Guidance*. A separate work plan outlining the decommissioning activities will be provided to the ADEC.

5.3.2 Sample Equipment and Water Quality Parameter Collection

The monitoring wells will be purged using low-flow sampling methods per the Environmental Protection Agency's 2010 *Low Stress (low flow) Purging and Sampling Procedure for the*

Collection of Groundwater Samples from Monitoring Wells. A decontaminated positive displacement submersible pump and disposable Teflon-lined tubing will be utilized to purge and collect the groundwater monitoring well samples.

The purging will be conducted to sustain a minimum drawdown (< 0.1 m) during purging—typically achievable with a flow rate of approximately 0.1 gallon per minute. The pump will be placed in the top one foot of the water column. Field parameters will be measured at 3 to 5-minute intervals to evaluate the effectiveness of removing stagnant casing water. Water quality parameters will be considered stable when three successive readings for a minimum of three (or four if using temperature) parameters collected 3 to 5 minutes apart are within the following stabilization criteria:

- ± 3% for temperature (minimum of ± 0.2° C)
- ± 0.1 for pH
- ± 3% for conductivity
- ± 10 mv for ORP
- ± 10% (or < 0.5 mg/l) for DO
- ± 10% (or < 5 NTU) for turbidity

The water will be collected directly into the laboratory-supplied sample containers. The sample containers will be filled in order of volatility: VOCs/1,2-dichloroethane/aromatic hydrocarbons (BTEX), GRO, DRO, RRO, and PAHs (as applicable).

5.4 Decontamination Procedures

Decontamination procedures will be implemented to minimize the potential for cross-contamination at the site. The re-usable spoons for soil sampling, water sampling pump, product level/water level meter and water quality instrument will be decontaminated using water and Alconox, and rinsed using a combination of potable and deionized water.

6.0 ANALYTICAL METHODS

The samples will be submitted to SGS in Anchorage, Alaska for sample analysis. SGS is an ADEC Contaminated Sites certified laboratory and meets the requirements of the Department of Defense Environmental Accreditation Program (DoD ELAP). The environmental consultant will be responsible for managing the lab contract and ensuring the laboratory analysis is conducted in accordance with this work plan.

The parameters to be sampled for in the monitoring well locations are a continuation of the monitoring previously conducted for these sampling locations.

These samples will be submitted for standard turnaround and analyzed for the list of parameters included on Table 1. Note the samples collected from the 2019 landfarm soil cell will be analyzed for DRO by AK 102. The 2020 landfarm soil cell will be analyzed for the parameters listed in Table 1 below. The cleanup levels for the list of parameters are included as Table 2 and 3.

Table 1 - List of Parameters

Parameter and Method	Soil Samples	Monitoring Wells
GRO – AK 101	X	X
DRO – AK 102	X	
DRO/RRO – AK 102/103		X
VOCs – SW8260B	X	X
PAHs – SW8270 SIMS	*	*

Notes:

* Analyze on 10 percent basis from most impacted sample(s)

Table 2 - Parameters Compared to Table B1/B2 Method Two Soil Cleanup Levels

Analyte	Analysis	Unit	MTG	HH/MAC
Gasoline Range Organics	AK101	mg/kg	300	1400
Diesel Range Organics	AK102	mg/kg	250	10250
Polyaromatic Compounds	-	-	-	-
1-Methylnaphthalene	8270D SIM (PAH)	ug/kg	410	68000
2-Methylnaphthalene	8270D SIM (PAH)	ug/kg	1300	310000
Acenaphthene	8270D SIM (PAH)	ug/kg	37000	4600000
Acenaphthylene	8270D SIM (PAH)	ug/kg	18000	2300000
Anthracene	8270D SIM (PAH)	ug/kg	390000	23000000
Benzo(a)Anthracene	8270D SIM (PAH)	ug/kg	700	14000
Benzo[a]pyrene	8270D SIM (PAH)	ug/kg	1900	1500
Benzo[b]Fluoranthene	8270D SIM (PAH)	ug/kg	20000	15000
Benzo[g,h,i]perylene	8270D SIM (PAH)	ug/kg	15000000	2300000
Benzo[k]fluoranthene	8270D SIM (PAH)	ug/kg	190000	150000
Chrysene	8270D SIM (PAH)	ug/kg	600000	1500000
Dibenzo[a,h]anthracene	8270D SIM (PAH)	ug/kg	6300	1500
Fluoranthene	8270D SIM (PAH)	ug/kg	590000	3100000
Fluorene	8270D SIM (PAH)	ug/kg	36000	3100000
Indeno[1,2,3-c,d] pyrene	8270D SIM (PAH)	ug/kg	65000	15000
Naphthalene	8270D SIM (PAH)	ug/kg	38	29000
Phenanthrene	8270D SIM (PAH)	ug/kg	39000	2300000
Pyrene	8270D SIM (PAH)	ug/kg	87000	2300000
Volatile Organic Compounds	-	-	-	-
1,1,1,2-Tetrachloroethane	SW8260D	ug/kg	22	21000
1,1,1-Trichloroethane	SW8260D	ug/kg	32000	360000
1,1,2,2-Tetrachloroethane	SW8260D	ug/kg	3	6100
1,1,2-Trichloroethane	SW8260D	ug/kg	1.4	1600
1,1-Dichloroethane	SW8260D	ug/kg	92	46000
1,2,3-Trichlorobenzene	SW8260D	ug/kg	150	81000

Table 2 - Parameters Compared to Table B1/B2 Method Two Soil Cleanup Levels (Continued)

Analyte	Analysis	Unit	MTG	HH/MAC
1,2,3-Trichloropropane	SW8260D	ug/kg	0.031	66
1,2,4-Trichlorobenzene	SW8260D	ug/kg	82	45000
1,2,4-Trimethylbenzene	SW8260D	ug/kg	610	43000
1,2-Dibromo-3-chloropropane	SW8260D	ug/kg	-	-
1,2-Dibromoethane	SW8260D	ug/kg	0.24	420
1,2-Dichlorobenzene	SW8260D	ug/kg	2400	78000
1,2-Dichloroethane	SW8260D	ug/kg	5.5	5500
1,2-Dichloropropane	SW8260D	ug/kg	30	17000
1,3,5-Trimethylbenzene	SW8260D	ug/kg	660	37000
1,3-Dichlorobenzene	SW8260D	ug/kg	2300	62000
1,3-Dichloropropane	SW8260D	ug/kg	-	-
1,4-Dichlorobenzene	SW8260D	ug/kg	37	21000
2,2-Dichloropropane	SW8260D	ug/kg	-	-
2-Butanone (MEK)	SW8260D	ug/kg	15000	23000000
2-Chlorotoluene	SW8260D	ug/kg	-	-
2-Hexanone	SW8260D	ug/kg	110	270000
4-Chlorotoluene	SW8260D	ug/kg	-	-
4-Isopropyltoluene	SW8260D	ug/kg	-	-
4-Methyl-2-pentanone (MIBK)	SW8260D	ug/kg	18000	2200000
Acetone	SW8260D	ug/kg	38000	81000000
Benzene	SW8260D	ug/kg	22	11000
Bromobenzene	SW8260D	ug/kg	360	160000
Bromochloromethane	SW8260D	ug/kg	-	-
Bromodichloromethane	SW8260D	ug/kg	4.3	3600
Bromoform	SW8260D	ug/kg	100	240000
Bromomethane	SW8260D	ug/kg	24	10000
Carbon disulfide	SW8260D	ug/kg	2900	500000
Carbon tetrachloride	SW8260D	ug/kg	21	9100
Chlorobenzene	SW8260D	ug/kg	460	180000
Chloroethane	SW8260D	ug/kg	72000	1400000
Chloroform	SW8260D	ug/kg	7.1	4000
Chloromethane	SW8260D	ug/kg	610	170000
Dibromochloromethane	SW8260D	ug/kg	2.7	110000
Dibromomethane	SW8260D	ug/kg	25	31000

Table 2 - Parameters Compared to Table B1/B2 Method Two Soil Cleanup Levels (Continued)

Analyte	Analysis	Unit	MTG	HH/MAC
Dichlorodifluoromethane	SW8260D	ug/kg	3900	150000
Ethylbenzene	SW8260D	ug/kg	130	49000
Freon-113	SW8260D	ug/kg	310000	740000
Hexachlorobutadiene	SW8260D	ug/kg	20	3300
Isopropylbenzene (Cumene)	SW8260D	ug/kg	5600	54000
Methyl-t-butyl ether	SW8260D	ug/kg	400	670000
Methylene chloride	SW8260D	ug/kg	330	460000
Naphthalene	SW8260D	ug/kg	38	29000
P & M -Xylene	SW8260D	ug/kg	-	-
Styrene	SW8260D	ug/kg	10000	180000
Tetrachloroethene	SW8260D	ug/kg	190	68000
Toluene	SW8260D	ug/kg	6700	200000
Trichloroethene	SW8260D	ug/kg	11	4900
Trichlorofluoromethane	SW8260D	ug/kg	41000	980000
Vinyl acetate	SW8260D	ug/kg	1100	1400000
Vinyl chloride	SW8260D	ug/kg	0.8	650
Xylenes (total)	SW8260D	ug/kg	1500	57000
cis-1,2-Dichloroethene	SW8260D	ug/kg	120	200000
cis-1,3-Dichloropropene	SW8260D	ug/kg	-	-
n-Butylbenzene	SW8260D	ug/kg	23000	20000
n-Propylbenzene	SW8260D	ug/kg	9100	52000
o-Xylene	SW8260D	ug/kg	-	-
sec-Butylbenzene	SW8260D	ug/kg	42000	28000
tert-Butylbenzene	SW8260D	ug/kg	11000	35000
trans-1,2-Dichloroethene	SW8260D	ug/kg	1300	960000
trans-1,3-Dichloropropene	SW8260D	ug/kg	-	-

Table 3 - Parameters Compared to Table C Groundwater Cleanup Levels

Analyte	Analysis	Unit	Cleanup Level
Gasoline Range Organics	AK101	mg/L	2.2
Diesel Range Organics	AK102/103 LV	mg/L	1.5
Residual Range Organics	AK102/103 LV	mg/L	1.1
Polyaromatic Hydrocarbons	-	-	-
1-Methylnaphthalene	8270D SIM LV	ug/L	11
2-Methylnaphthalene	8270D SIM LV	ug/L	36
Acenaphthene	8270D SIM LV	ug/L	530
Acenaphthylene	8270D SIM LV	ug/L	260

Table 3 - Parameters Compared to Table C Groundwater Cleanup Levels (Continued)

Analyte	Analysis	Unit	Cleanup Level
Anthracene	8270D SIM LV	ug/L	43
Benzo(a)Anthracene	8270D SIM LV	ug/L	0.3
Benzo[a]pyrene	8270D SIM LV	ug/L	0.25
Benzo[b]Fluoranthene	8270D SIM LV	ug/L	2.5
Benzo[g,h,i]perylene	8270D SIM LV	ug/L	0.26
Benzo[k]fluoranthene	8270D SIM LV	ug/L	0.8
Chrysene	8270D SIM LV	ug/L	2
Dibenzo[a,h]anthracene	8270D SIM LV	ug/L	0.25
Fluoranthene	8270D SIM LV	ug/L	260
Fluorene	8270D SIM LV	ug/L	290
Indeno[1,2,3-c,d] pyrene	8270D SIM LV	ug/L	0.19
Naphthalene	8270D SIM LV	ug/L	1.7
Phenanthrene	8270D SIM LV	ug/L	170
Pyrene	8270D SIM LV	ug/L	120
Volatile Organic Compounds	-	-	-
1,1,1,2-Tetrachloroethane	SW8260D	ug/L	5.7
1,1,1-Trichloroethane	SW8260D	ug/L	8000
1,1,2,2-Tetrachloroethane	SW8260D	ug/L	0.76
1,1,2-Trichloroethane	SW8260D	ug/L	0.41
1,1-Dichloroethane	SW8260D	ug/L	28
1,1-Dichloroethene	SW8260D	ug/L	280
1,1-Dichloropropene	SW8260D	ug/L	-
1,2,3-Trichlorobenzene	SW8260D	ug/L	7
1,2,3-Trichloropropane	SW8260D	ug/L	0.0075
1,2,4-Trichlorobenzene	SW8260D	ug/L	4
1,2,4-Trimethylbenzene	SW8260D	ug/L	56
1,2-Dibromo-3-chloropropane	SW8260D	ug/L	-
1,2-Dibromoethane	SW8260D	ug/L	0.075
1,2-Dichlorobenzene	SW8260D	ug/L	300
1,2-Dichloroethane	SW8260D	ug/L	1.7
1,2-Dichloropropane	SW8260D	ug/L	8.2
1,3,5-Trimethylbenzene	SW8260D	ug/L	30
1,3-Dichlorobenzene	SW8260D	ug/L	300
1,3-Dichloropropane	SW8260D	ug/L	-
1,4-Dichlorobenzene	SW8260D	ug/L	4.8
2,2-Dichloropropane	SW8260D	ug/L	-
2-Butanone (MEK)	SW8260D	ug/L	5600
2-Chlorotoluene	SW8260D	ug/L	-
2-Hexanone	SW8260D	ug/L	38
4-Chlorotoluene	SW8260D	ug/L	-
4-Isopropyltoluene	SW8260D	ug/L	-
4-Methyl-2-pentanone (MIBK)	SW8260D	ug/L	6300
Benzene	SW8260D	ug/L	4.6

Table 3 - Parameters Compared to Table C Groundwater Cleanup Levels (Continued)

Analyte	Analysis	Unit	Cleanup Level
Bromobenzene	SW8260D	ug/L	62
Bromochloromethane	SW8260D	ug/L	-
Bromodichloromethane	SW8260D	ug/L	1.3
Bromoform	SW8260D	ug/L	33
Bromomethane	SW8260D	ug/L	7.5
Carbon disulfide	SW8260D	ug/L	810
Carbon tetrachloride	SW8260D	ug/L	4.6
Chlorobenzene	SW8260D	ug/L	78
Chloroethane	SW8260D	ug/L	21000
Chloroform	SW8260D	ug/L	2.2
Chloromethane	SW8260D	ug/L	190
Dibromochloromethane	SW8260D	ug/L	8.7
Dibromomethane	SW8260D	ug/L	8.3
Dichlorodifluoromethane	SW8260D	ug/L	200
Ethylbenzene	SW8260D	ug/L	15
Freon-113	SW8260D	ug/L	10000
Hexachlorobutadiene	SW8260D	ug/L	1.4
Isopropylbenzene (Cumene)	SW8260D	ug/L	450
Methyl-t-butyl ether	SW8260D	ug/L	140
Methylene chloride	SW8260D	ug/L	110
Naphthalene	SW8260D	ug/L	1.7
P & M -Xylene	SW8260D	ug/L	-
Styrene	SW8260D	ug/L	1200
Tetrachloroethene	SW8260D	ug/L	41
Toluene	SW8260D	ug/L	1100
Trichloroethene	SW8260D	ug/L	2.8
Trichlorofluoromethane	SW8260D	ug/L	5200
Vinyl acetate	SW8260D	ug/L	410
Vinyl chloride	SW8260D	ug/L	0.19
Xylenes (total)	SW8260D	ug/L	190
cis-1,2-Dichloroethene	SW8260D	ug/L	36
cis-1,3-Dichloropropene	SW8260D	ug/L	-
n-Butylbenzene	SW8260D	ug/L	1000
n-Propylbenzene	SW8260D	ug/L	660
o-Xylene	SW8260D	ug/L	-
sec-Butylbenzene	SW8260D	ug/L	2000
tert-Butylbenzene	SW8260D	ug/L	690
trans-1,2-Dichloroethene	SW8260D	ug/L	360
trans-1,3-Dichloropropene	SW8260D	ug/L	-

7.0 FIELD QUALITY CONTROL MEASURES

The data will undergo quality control review to confirm that the data accurately represents site conditions. The review will include field equipment and field quality control samples, laboratory quality control samples, data quality evaluations, and data assessment and qualifications.

7.1 Field Equipment Quality Control

Field equipment will be calibrated on a daily basis during field activities and on an as needed basis if problems arise in the field. The field equipment will include a PID (MiniRae 2000 or 3000), YSI 556 (or equivalent) water quality meter, and turbidimeter. The field equipment will be calibrated and maintained per the manufacturer's recommendations.

The field equipment will be calibrated with a standard (i.e., for PID a standard gas of 100 ppm isobutylene) to set the span calibration. The field personnel will check the field equipment upon completion of the calibration and occasionally throughout the field day to check the readings in comparison to the known standard.

Decontamination of the equipment that is in direct contact with the soil and/or groundwater samples will be conducted between samples.

7.2 Field and Laboratory Quality Control Samples

Field and laboratory quality control samples will be evaluated for the project data quality objectives (DQO). The following table outlines the Quality Control (QC) samples to be evaluated and the sampling frequency for this project.

Table 4 - Field and Laboratory Quality Control Samples and Frequency

Field QC Samples	**Frequency/Number**
Trip Blank	Water: 1 per analysis per cooler for GRO, BTEX, or VOCs. Soil: 1 per preservation method per set of 20 with a minimum of 1 per analysis and cooler.
Temperature Blank	1 per cooler
Field Duplicate	1 per 10 samples for each sample matrix for each target analyte with a minimum of 1 per sampling day
Laboratory QC Samples	**Frequency/Number**
Method Blank	1 per 20 samples
Laboratory Control Sample / Laboratory Control Sample Duplicate	1 per 20 samples
Matrix Spike/Matrix Spike Duplicate	1 per 20 samples
Surrogates	Every field sample and QC sample (organics only)

8.0 INVESTIGATIVE DERIVED WASTE MANAGEMENT

Investigation derived waste will include purge/decontamination water, sampling disposables, and personal protective equipment (PPE).

- If free product or a visible sheen is encountered in the groundwater during excavation, the product/sheen will be noted in the field notes and documented in photographs and left in place.

- Purge/decontamination water will be treated using a GAC filter and discharged onsite.
- Investigation derived waste (IDW) will comprise of gloves, spoons, Ziplock bags, tubing from the groundwater monitoring, and other sampling disposables to be disposed of as solid waste at a permitted landfill.
- If any soil is transported from the landfarm, a *Contaminated Media Transport and Treatment or Disposal Approval Form* will be provided to the ADEC for approval prior to transport.
- GAC generated as part of the 2020 landfarm treatment activities was replaced in spring 2021. A sample of the GAC was submitted for analysis (TCLP benzene) and no detectable concentration was reported. Although the ADEC Contaminated Sites department approved the disposal at the Kotzebue Landfill, the ADEC Solid Waste Department did not approve disposal at the landfill. The GAC will be transported to a disposal facility; a *Contaminated Media Transport and Treatment or Disposal Approval Form* will be provided to the ADEC at a later date once a facility has been identified.

9.0 REPORTING

After completion of the field activities, a report will be developed to document the results. The report will contain the following:

- project objectives
- site background
- description of field activities and potential modifications/deviations
- description of calibration procedures in the report and field notes
- discussion on the laboratory sample results
- data interpretation
- recommendations for changes in the water monitoring program (i.e., well repairs, discontinued monitoring, well replacement)
- conceptual site model
- number of tilling events and volume and type of fertilizer used at each landfarm cell
- summary table of soil and groundwater results
- statistical analysis of groundwater monitoring data
- figures of the sample locations and ground water elevation contours
- field notes and logs
- photographs of the field activities including sampling activities and any other noteworthy observations
- ADEC *Laboratory Data Review Checklists* and a summary of the results of the review within the body of the report
- laboratory reports including the chain of custody paperwork

10.0 SCHEDULE

The following schedule is proposed for the scope outlined in this work plan. The ADEC will be notified of the dates of the field activities at least two weeks in advance.

Table 5 - Proposed Project Schedule

Task	**Date**
Landfarm Tilling and Maintenance	Bi-weekly during Summer and Fall 2022
Field Activities – Landfarm sampling, product and groundwater monitoring	Fall 2022
Receipt of analytical results	Two weeks from field activities
Draft Report to Maniilaq Association	Four weeks from receipt of final sampling results
Report to ADEC	Within six to eight weeks from receipt of final sampling results

11.0 REFERENCES

ADEC. 2013. *Monitoring Well Guidance.* September.

ADEC. 2015. Cleaning up fuel contamination: Kotzebue's former Indian Health Service hospital and Bureau of Indian Affairs school. July.

ADEC. 2021. Oil and Other Hazardous Substances Pollution Control, 18 AAC 75. November 18.

ADEC. 2018. Water Quality Standards, 18 AAC 70. April 6.

ADEC. 2022. Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tank Sites. January.

EPA. 2010. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. January 19.

Shannon & Wilson. 1990. Phase II Recommendations & Recovery, 1989 Field Season, Underground Oil Spill, Kotzebue, Alaska. May.

Shannon & Wilson. 2010. Site Characterization Report, Kotzebue City Oil Spill Area, Kotzebue, Alaska. January.

Tanana Commercial-Environmental Management JV. 2019. 2019 Underground Storage Tank Removal and Groundwater Monitoring Report, Kotzebue Former IHS/BIA Hospital – School Pipeline Release (ADEC File. No. 410.38.025), Kotzebue, Alaska. December.

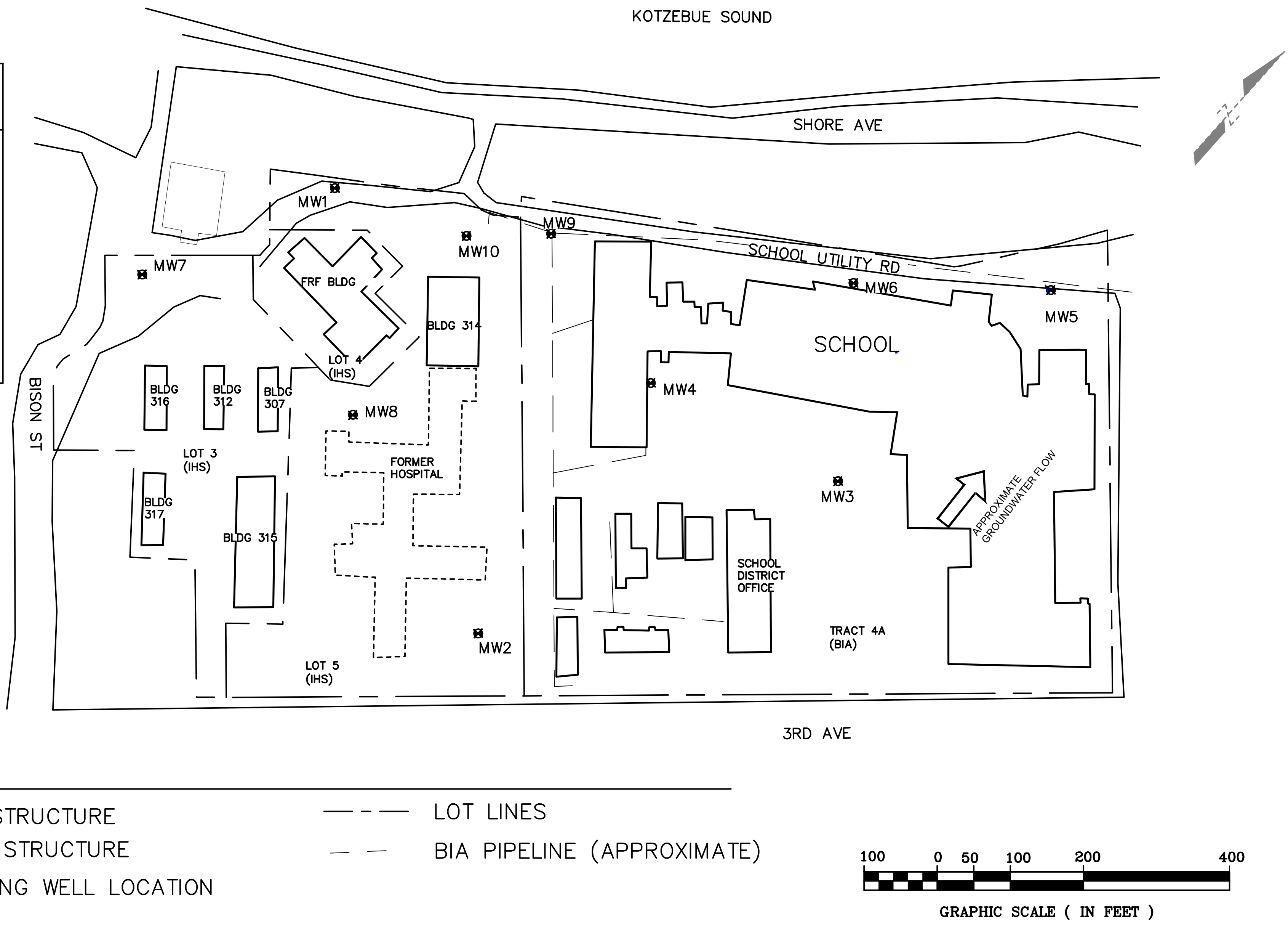
Tanana Commercial-Environmental Management JV. 2021. 2020 Site Characterization, Limited Removal Action, and Groundwater Monitoring Report, Kotzebue Former IHS/BIA Hospital – School Pipeline Release (ADEC File. No. 410.38.025), Kotzebue, Alaska. April.

Tanana Commercial-Environmental Management JV. 2021. Draft 2021 Limited Removal Action and Groundwater Monitoring Report, Kotzebue Former IHS/BIA Hospital – School Pipeline Release (ADEC File. No. 410.38.025), Kotzebue, Alaska. December.

WHPacific. 2015. Draft 2015 Site Investigation Report. Former IHS/BIA Hospital – School Pipeline Release. December.

VICINITY MAP	IHS BIA PIPELINE OIL SPILL KOTZEBUE, AK	TC-EM JV	JOB NO: 17855 DRAWN: HJD/DYD REVIEWED: SIM DATE: 2/1/2022	FIGURE 1

Responsible Party	
MW-1	IHS
MW-2	IHS
MW-3	BIA
MW-4	BIA
MW-5	BIA
MW-6	BIA
MW-7	IHS
MW-8	IHS
MW-9	BIA
MW-10	IHS



GROUNDWATER MONITORING WELL LOCATIONS	IHS BIA PIPELINE OIL SPILL KOTZEBUE, AK	TC-EM JV	JOB NO: 17855 DRAWN: HJD/DYD REVIEWED: SIM DATE: 2/18/2022	FIGURE 2

LANDFARM	IHS BIA PIPELINE OIL SPILL KOTZEBUE, AK	TC-EM JV	EMI JOB: 17855 DRAWN: HJD/DYD REVIEWED: SIM DATE: 6/06/2022	FIGURE 3

APPENDIX A
Resumes of Qualified Environmental Professionals

DELANEY DENT, E.I.T.

Qualified Sampler, Engineer In Training

ddent@emi-alaska.com

Education

- B.S. in Chemical Engineering, 2019, University of Wyoming

Professional Certifications

- 40 Hour HAZWOPER Certification
- EPA / AHERA Inspector
- Nielsen Environmental Field School Environmental Sampling Certification

Experience and Qualifications

Ms. Dent began her environmental engineering career at EMI in 2021, and shortly afterwards, began serving as an ADEC Qualified Sampler as defined per 18 AAC 75.333(c). Her education for her Bachelor's degree included a minor in geology and lab work in chemistry. While receiving her Bachelor's degree, she worked as an intern at a chemical plant collecting water samples and learning air, water, and land regulations under an environmental engineer. She continued to learn sampling techniques and associated regulations through the Nielsen Environmental Field School. With that experience and the onsite training with EMI, she has become EMI's primary ADEC Qualified Sampler to conduct field investigations under the direction of qualified environmental professionals.

Specific Environmental Project Experience

Ninilchik Water Well Sampling, Ninilchik, Alaska | Private Client | 2022
Investigated the efficacy of an on-site water treatment system, and sampled tap water under the direction of a QEP. Lead author on report documenting field work, results, and analysis discussion.

Three Bears Phase I Environmental Site Assessments, Alaska | Private Client | 2022
Lead author on seven Phase I ESA's for developed and undeveloped parcels across Alaska. Co-authored two other Phase I ESA's, and conducted multiple site visits, interviews, and research under the guidance of a QEP.

College Station Groundwater Monitoring, Fairbanks, Alaska | USPS | 2021 – Present
Conducting quarterly groundwater sampling at an on-site monitoring well, transporting samples, and upon completion, evaluating the sample data and drafting the report.

Storm Water Outfall Foam Investigation, Anchorage, Alaska | Private Client | 2021 – Present
Assisted in the investigation of a source of foam located at the outfall of a storm sewer system draining a large area. Worked to maintain a remote camera used to monitor foam and water quality for PFAS and glycol.

Spenard Buckets Characterization, Anchorage, Alaska | Central Environmental, Inc. | 2021
Assisted the field lead collecting characterization samples from several unlabeled containers of unidentified liquids found during demolition. Inventoried containers that had labels and contained their original contents.

Seward Well Decommissioning, Seward, Alaska | Private Client | 2021
Under the guidance of a QEP, conducted field activities consisting of directing and documenting the decommissioning of two monitoring wells. Lead author on report discussing the activities and conclusions.

Valdez Demo Heating Oil Underground Storage Tank, Valdez, Alaska | Central Environmental, Inc. | 2021
Conducted a site investigation upon discovery of a leaking underground storage tank. Worked as the field environmental lead in determining the location of cleanup activities, as well as documenting, field screening, and sampling the excavation.

IHS-BIA Pipeline Oil Spill, Kotzebue, Alaska | Maniilaq Association | 2021
Worked under the direction of a QEP on contaminated soil removal, sampling, and groundwater monitoring conducted at the former hospital – school pipeline release. Conducted soil removal activities with subsequent field screening and analytical sampling at the limits of excavation. Managed asbestos containing material discovered during excavation activities as a certified EPA/AHERA Inspector. To provide an efficient use of resources, also assisted in landfarm soil sampling and groundwater monitoring of on-site wells. Upon completion of field activities, provided a report documenting work done, analyzing analytical results, and final conclusions.

3319 Industrial Avenue Heating Oil Overfill Cleanup, Fairbanks, Alaska | National Express, LLC | 2021
Worked alongside a QEP on an environmental cleanup in Fairbanks associated with a heating oil overfill. Drafted the work plan on cleanup activities, field screened soil onsite after contaminated soil removal, and collected analytical samples from the sidewalls and excavation base. Field activities also included coordination with the vac truck company, backfill source, and trucking company. Once sample results were received, served as the primary author of the cleanup report.

Platinum Mining Historic District ACM Survey & Monofil Permitting, Platinum, Alaska | Private Client | 2021
Worked alongside an ADEC Qualified Environmental Professional on a survey conducted at the Platinum Mining Historic District. There were a total of 43 buildings at the site, with ten of those buildings being slated for demolition. Conducted an asbestos assessment of camp buildings as required by 40 CFR 61 (NESHAP) under the field lead. To provide cost savings, also assisted in evaluation of the locations of potential sites for the construction of a monofil of the demolition debris.

Adler School Demo Soil Cleanup, North Pole, Alaska | Central Environmental, Inc. | 2021
Assisted in compiling the work plan for the sampling approach on removing soil and characterizing the extent of fuel impacted soils associated with the heating oil tank at the former Adler School, North Pole, Alaska. Assisted the accompanying ADEC Qualified Environmental Professional in performing the site work, transporting samples, and upon completion, evaluating the sample data and drafting the report.

Water Treatment Plant Diesel Overflow, Selawik, Alaska | City of Selawik | 2021 – Present
Assisted in compiling a work plan for the analysis of samples to delineate the extent of contamination at the diesel overflow site in Selawik, Alaska, under the supervision of an ADEC Qualified Environmental Professional.

Sitka USPS Tank Closure, Sitka, Alaska | United States Postal Service | 2021
Drafted the release investigation work plan for continued site assessment at a former underground storage tank site in Sitka, Alaska. The work was done under the direct supervision of an ADEC Qualified Environmental Professional.

Home Heating Oil Tank, Chugiak, Alaska | Private Client | 2021
Conducted a site investigation for the removal of a home heating oil tank at a property in Chugiak, Alaska. To check for potential contamination from a home heating oil tank, checked condition of the tank, the removed soils, and the soils at the limits of the excavation. Collected samples for field testing with the PID, documented the photoionization readings, and collected laboratory samples from the locations most likely to be contaminated. Sampling and testing procedures followed ADEC's *Field Sampling Guidance*. Work was checked by an ADEC Qualified Environmental Professional.

Echo Lake Home Heating Oil Spill, Echo Lake, Alaska | Private Client | 2021
Spent two days observing, assisting, and documenting soil sampling at a home on Echo Lake outside Wasilla, Alaska. Duties included assisting in collecting samples in order to characterize the extent of contamination from a home heating oil tank spill, documenting photoionization readings on in-situ soils, taking headspace samples to delineate the vertical and horizontal extent of contamination, and assisting with the sampling of the soil along the lakeshore to characterize the spread of contamination in relation to the lake, all under the supervision of an ADEC Qualified Environmental Professional.

HANNAH DEENEY, E.I.T.

QUALIFIED ENVIRONMENTAL PROFESSIONAL, ENGINEER IN TRAINING
hdeeney@emi-alaska.com

EDUCATION

- B.S. in Environmental Engineering, 2016, Montana Tech of The University of Montana

PROFESSIONAL CERTIFICATIONS

- 40 Hour HAZWOPER Certification
- OSHA Confined Space Certification
- OSHA 30-Hour Construction Safety and Health Certification
- EPA / AHERA Inspector
- EPA / HUD Lead Inspector / Risk Assessor
- 12 Hour DOT / 12 Hour IATA Hazardous Materials Transportation

EXPERIENCE AND QUALIFICATIONS

Ms. Deeney began her environmental engineering career at EMI in 2018. She has been serving as an ADEC Qualified Environmental Professional as defined per 18 AAC 75.333(b) since 2019. Her previous environmental experience included multiple field seasons interning at an environmental engineering and consulting company while getting her degree and working at an environmental laboratory. At EMI, her experience includes sampling soil, groundwater, hazardous building materials, site characterizations using soil borings and monitoring wells, characterizing stockpiles and excavations in association with USTs, assisting with, editing, and completing Spill Prevention, Control, and Countermeasure Plans for various facilities using ASTs, and assisting with engineering design and CAD design of multiple landfill projects. She also conducts quality control review of laboratory data, writes work plans, compiles project specific deliverables, and is EMI's primary CAD designer.

SPECIFIC ENVIRONMENTAL PROJECT EXPERIENCE—QEP SITE CHARACTERIZATION

Waldo's Center Dry Cleaners Investigation, Kodiak, Alaska | Worthington Kodiak Properties, LLC | 2021 – Present
Primary field personnel for the drilling investigation to determine the extents of contamination in the soil and groundwater in relation to a dry cleaner's solvent release. Conducted soil sampling from borings and groundwater sampling from temporary wells.

Nome Elementary School Spill, Nome, Alaska | Nome Public Schools | 2021 - Present
Conducted release investigation of a heating oil release under the Nome Elementary School (NES) to determine impact on soil under the boiler room and to determine extent of additional cleanup necessary. Lead author of the report documenting site characterization activities.

Site Characterization, Glennallen, Alaska | Glennallen Fuel and Service | 2021
Primary field personnel for the drilling investigation to determine the extents of contamination in the soil and groundwater in relation to a previously removed UST and heating oil release. Conducted soil sampling from borings and groundwater sampling from temporary monitoring wells.

Groundwater Sampling at the Former Kenai Lake Trailer Park, Moose Pass, Alaska | United States Forest Service | 2020 – Present
Conducted a site characterization to identify the current site concentrations at the former trailer location where the last soil sampling activities from the 1990s indicated elevated concentrations and where there was subsequent soil vapor remediation activities. The field activities included advancing soil borings to both the deep and shallow groundwater to assess the current concentrations and collecting groundwater samples. Primary field personnel for the following quarterly groundwater sampling events to determine the presence of contamination in the groundwater. In 2021, conducted additional quarterly groundwater sampling events.

Former IHS/BIA Pipeline Spill Remediation and Long-Term Groundwater Monitoring, Kotzebue, Alaska | Maniilaq Association | 2020 – Present
Advanced soil borings across the project site to identify areas where contamination from the former pipeline exceeded human health cleanup levels. This information was used to determine soil removal efforts for the Fall of 2020. Designed the placement of a curtain in the fall excavation to minimize the migration of off-site contamination into the remediated area.

The Hub Corrective Action, Glennallen, Alaska | The American Village of Alaska | 2018 – Present
Worked with the client in developing a landfarm for the contaminated soil generated during UST removal activities. Prior to landfarm development, worked with the client to site the landfarm and collect baseline soil samples from the footprint of the landfarm. In 2021, primary field personnel for the drilling investigation to determine the extents of contamination in the soil and groundwater in relation to a previously removed UST. Installed permanent monitoring wells. Conducted soil sampling from borings and groundwater sampling from monitoring wells.

436 D Street Phase I and Phase II Environmental Site Assessments, Anchorage, Alaska | Diamond Parking | 2018
Lead author of the Phase I ESA for a developed property in downtown Anchorage. Based on the results on the Phase I ESA, a Phase II ESA was conducted and included advancing soil borings and collecting soil samples. Conducted the field activities, which included drilling and sampling from six borings across the site, with the intent to determine if there was contamination from past underground storage tanks.

Phase II Environmental Site Assessment, Bethel, Alaska | NorthStar Energy, LLC | 2018
Conducted the field activities and was the prime author in the evaluation of recognized environmental conditions (RECs) that were previously identified in a Phase I ESA. Directed drilling and temporary monitoring well installation near the former and current aboveground storage tanks, dispenser islands, offsite fill that came from contaminated sites, and beneath the maintenance shop and associated floor drains.

Southern Cross Neighborhood Propylene Glycol Release Investigation, Fort Wainwright, Alaska | Central Environmental, Inc. | 2018
Served as the QES under the direction of a QEP for the release investigation associated with a propylene glycol release. Collected soil and groundwater samples from borings and temporary monitoring wells to assess whether the concentrations naturally attenuated from levels observed in samples collected six months prior. Authored the report documenting the field activities.

Tanana Commercial / Environmental Management LLC JV
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(907) 388-2361 | (907) 451-6161 (fax)
dale@tananacommercial.com

Shayla Marshall email: shayla@tananacommercial.com
Qualified Environmental Professional

EDUCATION:
M. S. in Environmental Science, 2004, Alaska Pacific University
B. A. in Environmental Studies, 2002, Concordia College

PROFESSIONAL CERTIFICATIONS:
40 Hour HAZWOPER Certification (Intl. 2001)
Professional Certification in Wetland Delineation

EXPERIENCE AND QUALIFICATIONS:
Ms. Marshall has 17 years of experience in the environmental field, specializing in environmental assessments, investigation and cleanups, landfill compliance, statistical analysis, geographical information systems (GIS), and wetland delineations and permitting. As an Environmental Professional (ASTM) and ADEC Qualified Environmental Professional, Shayla has worked on or managed numerous site investigations and remedial actions throughout urban and rural Alaska and is familiar with the logistical issues associated with conducting environmental work in the State. Prior to 2015, Shayla worked at Shannon & Wilson for nearly eleven years as a project manager.

SELECTED ENVIRONMENTAL PROJECT EXPERIENCE:

Chernofski Harbor-Mutton Cove FUDS Site Investigation - USACE (Unalaska Island, AK) (2017 to 2018)
Project manager for the site investigation at the Formerly Used Defense Site (FUDS) site on the west side of Unalaska Island. The scope of work includes investigation associated with transformers, grease pit, batteries, paint cans, 55-gallon drums, and aboveground storage tanks. The work plan development for this site investigation includes a field sampling plan, quality assurance project plan, accident prevention plan, environmental protection plan, and contractor quality plan. Shayla was lead during the field activities and also authored the report documenting the site investigation and logistical evaluation results.

Release Investigation, Cleanup and Closure of Spill at Pilot Mountain Tower – DRS (Outside of Galena, AK) (2018-2019) Shayla served as the project manager for the spill response at the Pilot Mountain telecommunications tower. In October 2018, EMI conducted a release investigation in response to a spill caused by bear activity at the fuel line. Based on the results of the 2018 sampling activities, EMI mobilized to the site in 2019 to begin cleanup activities. Due to the remote nature of the site, a mini-excavator was slung to the top of the mountain via helicopter to facilitate filling of supersacks of contaminated soil. The supersacks were transported to the barge landing in Galena then transported to OIT via barge and then truck. Due to the limited availability of fill material in the region and cost to transport fill to the site, Shayla also coordinated with landowner (Doyon) to obtain a fill permit to use material from the site for backfill of the excavation. Based on the results of the 2019 removal actions, the site was eligible for closure with institutional controls. Shayla coordinated with the ADEC, landowner, and responsible party to develop a closure document that outlines the covenants on the site that is agreeable to all three parties.

Shungnak Tank Farm Release Spill Assessment and Cleanup – Village of Shungnak (Shungnak, AK) (2020 to present) Project manager for the spill response associated with an approximately 15,000-gallon fuel release at the Shungnak School heating oil tank farm. Due to the close proximity of the spill to the Kobuk River, Shungnak's source for drinking water, the project was expedited to remove the most grossly impacted soil and assess the potential impact to the drinking water source. In 2020 the project involved a survey of the spill area and landfarm area including mapping using drones. Test pits and hand tools were also used to assess the soil conditions and delineate the extent of contamination. In 2021, the scope will entail further delineation of select areas at the site and development of a cleanup plan for the removal and local landfarming of impacted soil.

Haines Tank Farm Spill Response and Cleanup – Delta Western (Haines, AK) (2020 to present) Project manager associated with the spill response associated with a breach of the secondary containment at a tank farm in Haines. An estimated 735 gallons of diesel fuel was released from the tank. In order to prevent any further migration of fuel, earthen dams were constructed and sorbent booms were deployed at the time of the spill along the drainage swales around the secondary containment area. Contaminated soil was removed along the swales and placed in supersacks for transport to Juneau for treatment. Due to the presence of product in the swales, skimmers were deployed and the skimmed product-water mixture was transported to Ketchikan for recycling. As the project site was proximate to the waterfront, the project entailed close coordination with the US Coast Guard, community, landowner, and ADEC.

Remediation of Pipeline Release – Maniilaq Association (Kotzebue, AK) (2017 to present) Project manager for remediation from the Former Indian Health Service/Bureau of Indian Affairs (IHS/BIA) Hospital – School Pipeline Release in Kotzebue, Alaska. In 2017 a work plan was developed to remove an underground storage tank (UST). In 2018, a geophysical survey was conducted to identify the location of the UST, associated piping, and dispensers. In 2019, the UST was removed, groundwater samples were collected from the area, and a landfarm was developed to treat the impacted soil removed during the UST excavation activities. The 2020 field activities were conducted in two phases. In the spring, the field activities focused on the investigation into the extent of contamination on the three formerly IHS-occupied lots using soil borings. In addition, due to the previous presence of free product at the site, passive product recovery was conducted. In the fall, TC-EM JV conducted the first phase of cleanup on the lots, with the cleanup being phased due to the availability of local resources and short field season. The cleanup entailed removal of contaminated soil and placement of a locally-managed landfarm and placement of a curtain to minimize to migration of contamination into the cleaned area. TC-EM JV also conducted additional groundwater monitoring in the fall of 2020 to assess the trend of contamination in the groundwater as the contaminated soil and sources (i.e., tank) after removal.

Site Investigation and Cleanup - ASRC (Kenai, AK) (2015-2019) Project manager for the site investigation and cleanup work associated with industrial activities that resulted in POL, solvent, and TENORM contamination at the site, including within buildings. Field activities included several field efforts identifying extent of contamination using test pits and soil borings, and soil removal from discrete locations across the property. Due to the presence of an on-site drinking water well, collected drinking water well samples to determine if the contamination extended to the drinking water aquifer.

Buried Debris Evaluation and Site Characterization - CH2MHill/Jacobs (Deadhorse, AK) (July to September 2018) Shayla served as the project manager for the geophysical survey and environmental site characterization activities on Tract 22. The environmental activities included collecting soil and porewater samples from borings, and collecting sediment and surface water samples from a nearby unnamed water body. Shayla also coordinated the geophysical survey including conducting the data processing of EM31 (conductivity and magnetivity) and Resistivity data and associated writeup to determine the lateral and vertical extent of buried debris.

Peacock Cleaners Site Characterization, Tank Removal, and Cleanup 4501 Lake Otis Parkway - Municipality of Anchorage (2007-2011) Performed soil and groundwater sampling to evaluate the potential presence and concentration magnitude of target compounds of potential concern associated with on-site dry cleaning operations. The information obtained during the site characterization work was used to develop a comprehensive cleanup plan for the site. Shayla worked directly with the field personnel and subcontractors in implementing the cleanup plan which included removal of drums from the drum disposal area, removal of USTs, application of ORC remedial additives to the source area, and installation of an in-situ remediation system for the Brownfields site.

APPENDIX B
ADEC Review Comment-Response Table

Document: 2022 Work Plan: Landfarm Sampling and Groundwater Monitoring, Kotzebue Former IHS/BIA Hospital – School Pipeline Release, Draft, February 2022, Tanana Commercial/Environmental Management LLC JV
File No: 410.38.025

Comment No.	Page/ Section	DEC Comment/Recommendation 03/30/2022	Responsible Party (IHS) Response: May 27, 2022 ADEC Response: 06/03/2022, 06/07/2022
1.	General / Photos	DEC requests that the contractor take photos of all of the monitoring wells and submit labeled photos with the final report. If the landfarm is tilled in 2022 (as recommended in the 2021 report), please provide photos of the landfarm during and after tilling.	Updated in Section 5.3 ADEC, 06/03/2022: **Response accepted.**
2.	General	The 2021 *Limited Removal Action, Groundwater Monitoring, and Landfarm Sampling Report* recommended passive product recovery if measurable product continues to be present in MW1 and MW6. When will a determination be made about whether to proceed with free product recovery? Note that 18 AAC 75.325(f)(B) specifies that a responsible person shall recover free product to the maximum extent practicable.	Updated Section 5.2 ADEC, 06/03/2022: **Response accepted.**
3.	General	The above-referenced 2021 report noted that the landfarm would be tilled in 2022; however, the submitted work plan does not mention tilling. Please clarify whether tilling will occur. If so, please include a section on tilling in the work plan with a detailed description of how tilling will be conducted.	Updated Section 3.0 ADEC, 05/31/2022: **Response accepted with comments**. With the final report, please provide an explanation of how the fertilizer was selected, how the volume used was determined and which cells the fertilizer was applied to. TC-EM JV, 06/06/2022: Updated Sections 3.0 and 9.0 ADEC, 06/07/2022: **Response accepted.**

Comment No.	Page/ Section	DEC Comment/Recommendation 03/30/2022	Responsible Party (IHS) Response: May 27, 2022 ADEC Response: 06/03/2022, 06/07/2022
4.	General	Based on review of the above-referenced report, one DRO sample marginally exceeded the applicable cleanup level (250 mg/kg) with a concentration of 299 mg/kg. DEC cannot approve removal of soil that exceeds the cleanup level. DEC recommends either 1) sampling the 2019 cell again at the beginning of the 2022 field season or 2) tilling the 2019 cell one more time, followed by sampling.	Updated Sections 3.0 and 5.1 ADEC, 06/03/2022: **Response accepted.**
5.	Transport Form	Note that a DEC transport approval form is required before moving any soil out of the landfarm. https://dec.alaska.gov/media/24930/transport-treatment-disposal-approval-form-for-contaminated-media-fillable.pdf	Updated Section 8.0 ADEC, 06/03/2022: **Response accepted.**
6.	Page 4, 1.3 Figures	a. Please provide the dimensions of the landfarm (length and width) and the depth of soil in each cell. b. Please specify the highest known concentrations present within the landfarm. c. Please provide a figure showing the locations and size of the 2019 and 2020 landfarm cells.	a. Updated Section 4.1.1 b. Updated Section 1.3 c. Updated Figure 1 ADEC, 06/03/2022: **Further clarification requested.** Figure 3 shows both cells of the landfarm but lacks several details or features. Please include dimensions of each cell and include the location of the water sump. TC-EM JV, 06/06/2022: Figure 3 has been updated to reflect dimensions and water sump location ADEC, 06/07/2022: **Response accepted.**

Comment No.	Page/ Section	DEC Comment/Recommendation 03/30/2022	Responsible Party (IHS) Response: May 27, 2022 ADEC Response: 06/03/2022, 06/07/2022
7.	Page 4, 2.0	Please include a table that includes sampling analytes and the applicable Table B1/B2 Method Two Soil Cleanup Levels and Table C Groundwater Cleanup levels.	Added Tables 2 and 3 within Section 6.0 ADEC, 06/03/2022: **Response accepted.**
8.	Page 5, 3.0	*Analytical samples will follow ADEC's January 2022 Field Sampling Guide, Table 2A, collected at the highest headspace results and/or other indications of impact (i.e., odor, staining).* DEC notes that this sampling method has been approved in the past; however, sampling in accordance with Table 2A (Excavated Soil Sample Collection Guide) of the FSG is not intended for a landfarm. Table 2A is best applied for screening soil as it is removed from an excavation. DEC needs additional information to evaluate appropriate sampling options: a. Size and depth of soil in the landfarm cells b. Clarification on the number and size of decision units	Updated Section 4.1.1 and 4.2.1 ADEC, 06/03/2022: **Further clarification requested.** How many decision units will there be during the landfarm sampling? Will the 2019 and 2020 cell be treated as individual decision units? TC-EM JV, 06/06/2022: Each cell will be treated as individual decision units. Section 4.1.1 updated accordingly. ADEC, 06/07/2022: **Response accepted.**

Comment No.	Page/ Section	DEC Comment/Recommendation 03/30/2022	Responsible Party (IHS) Response: May 27, 2022 ADEC Response: 06/03/2022, 06/07/2022
9.	Page 9, 7.0	*Purge/decontamination water will be treated using a GAC filter and discharged onsite.* a. Please clarify that filtered purge water will be discharged at a minimum of 100 feet away from any drinking water wells and/or surface waters. b. Please provide additional detail about GAC monitoring and tracking procedures, as well as plans for final disposition of spent GAC filters. Please note, transport and disposal of GAC filters offsite require the approval of a *Contaminated Media Transport and Treatment or Disposal Approval Form*: https://dec.alaska.gov/media/24930/transport-treatment-disposal-approval-form-for-contaminated-media-fillable.pdf	a. Vicinity Map Figure 1 shows the location of the landfarm. Discharge of the treated water occurs at the southeast corner approximately 950 feet from the coast. Included Section 3.0 b. Updated Section 8.0 ADEC, 06/03/2022: **Response accepted.**
10.	Page 9, 8.0	Reporting: Please review DEC's *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites*, which includes a checklist for Elements of a Complete Characterization Report. This guidance was developed to increase the consistency of site characterization work plans and reports submitted by numerous consultants working on contaminated sites throughout Alaska. DEC also recommends that contractors review the "Elements of a Complete Work Plan" checklist when preparing work plans. https://dec.alaska.gov/media/12119/site-characterization-work-plan-reporting-guidance-2017.pdf	Noted ADEC, 06/03/2022: **Response accepted.**
11.	References	DEC notes the 2019 version of the Field Sampling Guidance document is referenced. Please reference the most current version of the Field Sampling Guidance: *Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tank Sites* (2022) https://dec.alaska.gov/media/18727/field-sampling-guidance.pdf	Updated ADEC, 06/03/2022: **Response accepted.**
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