

2021 Addendum to 2018 Groundwater Sampling Work Plan

Nome Tank Site 'E' POL Contamination

Nome Area Defense Region

Nome Alaska

Formerly Used Defense Site F10AK005211

Contract No. W911KB 20-D-0016

Delivery Order No. W911KB20F0137

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Prepared For:

U.S. Army Corps of Engineers
Alaska District

Prepared By:

CES-Rescon, LLC
8361 Petersburg Street
Anchorage, Alaska 99507

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ACRONYMS AND ABBREVIATIONS

° C	degrees Celsius
ADEC	Alaska Department of Environmental Conservation
AED	automated external defibrillator
AK	Alaska Method
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CASRN	Chemical Abstract Service Registry Number
CES-Rescon	CES-Rescon, LLC
CPR	cardiopulmonary resuscitation
DL	Detection limit
DO	dissolved oxygen
DoD	Department of Defense
DOT	Department of Transportation
DRO	diesel range organics
DQA	data quality assessment
FUDS	Formerly Used Defense Site
GAC	granulated active carbon
GRO	gasoline range organics
HCl	hydrochloric acid
HDPE	High Density Polyethylene
LOD	Limit of detection
LOQ	Limit of quantitation
LV	Low volume
mL	milliliters
MNA	monitored natural attenuation
MS	Matrix spike
MSD	Matrix spike duplicate
mV	millivolt
N/A	Not Applicable
NTU	nephelometric turbidity units
ORP	oxidation reduction potential
PAH	polycyclic aromatic hydrocarbons
PAL	Project Action Limit
POL	petroleum, oil, and lubricants
RRO	residual range organics
SGS	SGS North America
SIM	Selected Ion Monitoring
SOP	Standard Operating Procedure
µg/L	Micrograms per liter
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds

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1.0 INTRODUCTION

CES-Rescon LLC (CES-Rescon) developed this addendum to the 2018 Final Groundwater Sampling Work Plan (Work Plan) for the Nome Tank Site 'E' Formerly Used Defense Site (FUDS) in Nome, Alaska (Figure 1-1, in 2018 Work Plan) to detail groundwater monitoring activities to be performed at the facility in the fall of 2021. An electronic copy of the 2018 Work Plan (herein referred to as the "2018 WP") is provided as Appendix A to this document. The work described herein, will be performed by CES-Rescon on behalf of the United States Army Corps of Engineers (USACE), Alaska District, under Contract No. W911KB20D0016 and Delivery Order W911KB20F0137.

1.1 KEY PERSONNEL

Key personnel responsible for conducting project work are presented on the following page in Table 1-1, along with their qualifications and responsibilities. Copies of the key project team resumes are provided in Appendix B.

TABLE 1-1: Project Roles and Responsibilities

NAME/ TITLE/ CONTACT INFO	RESPONSIBILITIES	
Grant Lidren USACE Project Manager (907) 753-2584 Grant.M.Lidren@usace.army.mil	Maintaining oversight for the overall project. Responsible for the technical, quality assurance, and decision-making matters concerning project execution. Evaluates field changes and recommended solutions. Coordinates communications with regulators and stakeholders.	
Will Mangano USACE Environmental Engineer (907) 753-5689 William.F.Mangano@usace.army.mil	Ensuring the technical aspects of the project are carried out as intended and as presented in the approved Work Plan.	
Michael Hooper ADEC Regulator (907) 451-5174 Michael.hooper@alaska.gov	Providing regulatory project oversight.	
CES-Rescon Project Personnel	Education/ Experience	Specialized Training/ Certifications
Zack Kirk CES-Rescon Project Manager (907) 570-4806 zkirk@resconalaska.com	B.S. Environmental Science 14 years of experience	40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) 8-Hour HAZWOPER Refresher US Army Corps of Engineers Construction Quality Management DOT/IATA Hazardous Materials Shipping ADEC Qualified Environmental Professional First aid/bloodborne pathogens training Adult cardiopulmonary resuscitation/automated external defibrillator (CPR/AED) certification
Kynan Adams Field Team Lead / Site Safety Officer (907) 744-4695 kadams@resconalaska.com	B.S. Environmental Science 11 years of experience	40-Hour HAZWOPER 8-Hour HAZWOPER Refresher ADEC Qualified Environmental Professional USACE Construction Quality Management DOT/IATA Hazardous Materials Shipping First Aid / Bloodborne pathogens training Adult CPR / AED certification
Rodney Guritz, Project Chemist (907) 457-3147 rodney@arcticdataservices.com	BS Environmental Chemistry 14 years of experience	ADEC Qualified Environmental Professional 40-Hour HAZWOPER 8-Hour HAZWOPER refresher First Aid, CPR/AED certification

1.2 SITE BACKGROUND

A detail of the site background and remedial history is provided in Section 2 of the 2018 WP. The scope of the 2018 WP consisted of the gauging and sampling of the groundwater from sixteen onsite wells. However, due to little or no measurable water in several of the locations, the following changes to the sampling scope occurred in 2019:

- Six wells (MW2008-3, MW2008-4, MW2008-5, MW2015-04, MW2015-05, and MW2015-07) were decommissioned in 2019. Replacement wells (MW2008-7R and MW-E1R) were drilled at two of the six decommissioned well locations.
- Two new wells (MW2019-01 and MW2019-02) were installed at the site.

The above changes to the well suite reduced the sample scope to twelve (12) wells for the 2019 and subsequent sampling events.

During the 2019 event, the twelve monitoring wells were sampled for concentrations of gasoline range organics (GRO); diesel range organics (DRO); residual range organics (RRO); benzene, toluene, ethylbenzene, and xylenes (BTEX); polycyclic aromatic hydrocarbons (PAH); and the dissolved metals zinc and lead. Additionally, the groundwater was also sampled for concentrations of the monitored natural attenuation (MNA) parameters iron, manganese, nitrate/nitrite and sulfate to assess the natural attenuation potential of the petroleum contaminants in the groundwater.

The analytical results of the groundwater samples from the 2019 monitoring activity reported that three of the site wells (MW-E1R, MW2019-01 and MW2019-02) contained contaminant concentrations exceeding Alaska Department of Environmental Conservation (ADEC) cleanup levels. The sample results from the remaining wells were reported either below cleanup levels or the respective laboratory detection limits.

CES-Rescon conducted the groundwater sampling at the site in the late fall of 2020. However, due to several factors, the field team was only able to sample eight of the twelve (12) planned wells. Monitoring well MW2019-01 contained an insufficient water column for the collection of groundwater samples. Additionally, the field team was unable to locate wells MW2008-7R, MW2015-01 and MW-E1R. During a subsequent mobilization to the site in June 2021, the field team discovered that wells MW2015-01 and MW2008-7R had been partially damaged and or buried during recent earthwork activities at the site by a nearby gold mining entity. Monitoring well MW2015-01 was missing the steel monument and concrete casing, with only the PVC casing still intact. Well MW2008-7R was buried under approximately four (4) feet of gravel and was located with the help of nearby mining staff. It was also discovered during the subsequent June

site visit that well MW-ER1 was located approximately 30 feet from the GPS coordinates recorded in the 2019 Groundwater Sampling Report (USACE, 2020). The CES-Rescon field scientist was able to collect samples from the three located wells. The analytical results from that activity will be reported with the results of the fall 2021 sampling event.

1.3 2021 PROJECT OBJECTIVES AND SCOPE

The objective of the sampling activity is to ensure continued environmental compliance for the site through the performance of groundwater sampling of the wells in the fall of 2021. CES-Rescon will conduct the sampling effort in accordance with the methods and procedures detailed in the ADEC Field Sampling Guidance and the 2018 WP (USACE, 2018). The one exception is that similar to the 2019 and 2020 sampling events, the monitoring scope has been reduced from 16 to 12 of the site wells. This scope includes the sampling of monitoring wells MW2008-7R and MW2015-01, provided they remain intact and accessible. A detail of the wells to be sampled during the 2021 event is provided below in Table 1-2. Additionally, an updated site plan of the site showing the monitoring wells to be sampled is included with this work plan addendum as Figure 1.

TABLE-1-2: 2021 Monitoring Wells to be Sampled

Well ID	Monument Type	Latitude	Longitude	Past Productivity
MW2008-6	Flush	-165.403	64.54467	Good Recovery / No Drawdown
MW2008-7R	Flush	-165.400	64.54440	Good Recovery / Minimal Drawdown
MW2015-01	Flush	-165.399	64.54571	Good Recovery / Minimal Drawdown
MW2015-02	Flush	-165.401	64.54593	Fair Recovery / Minimal Drawdown
MW2015-03	Flush	-165.403	64.54634	Poor Recovery / Greater than 1 ft. Drawdown
MW2015-06	Flush	-165.401	64.54779	Poor Recovery / Approx. ½ ft. Drawdown
MW2015-08	Flush	-165.400	64.54662	Good Recovery / Minimal Drawdown
MW2015-09	Flush	-165.398	64.54757	Poor Recovery / Approx. ½ ft. Drawdown
MW2015-10	Flush	-165.400	64.54729	Poor Recovery / Approx. ¼ ft. Drawdown
MW2019-01	Flush	-165.399	65.54852	Fair Recovery / Minimal Drawdown
MW2019-02	Flush	-165.400	64.54819	Fair Recovery / Minimal Drawdown
MW-E1R	Flush	-165.399	64.54710	Fair Recovery / Minimal Drawdown

2.0 PROJECT ACTIVITIES

Upon approval of this work plan addendum, CES-Rescon will mobilize the field team along with the field sampling equipment, sample coolers and instrumentation to the site from Anchorage, AK. The field team will wear face masks during transit to the site and while indoors and adhere to all Department of Defense (DoD) and State and Local health mandates to minimize the potential for spread of COVID-19. All field data collection and management activities will be conducted in accordance with the associated Standard Operating Procedures (SOPs) provided in Appendix C

2.1 GROUNDWATER DEPTH MEASUREMENTS

Prior to the collection of groundwater samples, the project team will first measure the depth to water in each of the 12 wells within a 2-hour period. The 2-hour measurement period is intended to capture a snapshot of the groundwater elevations throughout the site for determining accurate gradient conditions. This approach mitigates the impacts of fluctuations in the water table from daily changes that could potentially result in non-representative gradient determinations.

The project team will locate, open and inspect the condition of the well casings and the protective monuments at each location. Any damage observed will be documented in the field notes and photographed. The field team will measure the total depth, groundwater depth and free product thickness (if any) in the wells using an oil-water interface probe. Depth measurements will be recorded from the north side of the well casing unless a specific measurement mark is evident at the top of the casing. The depth measurements will be recorded to the nearest hundredth of a foot in the field notes.

The groundwater elevations will be calculated by subtracting the groundwater depth measurements from the top of casing elevations of each respective well. CES-Rescon will utilize the calculated groundwater elevations to update the groundwater gradient contours at the site.

2.2 GROUNDWATER STABILIZATION

CES-Rescon will purge the monitoring wells in accordance with low-flow techniques outlined in the U.S. Environmental Protection Agency (USEPA) guidance (USEPA, 2010) and the ADEC Field Sampling Guidance (ADEC, 2019a). The wells will be purged using a stainless-steel submersible pump and dedicated tubing. CES-Rescon will deploy the pump to a depth within one foot of the top of the groundwater. The groundwater will be pumped through a flow-through cell connected to a YSI 556 meter for measuring the water quality parameters. In accordance with low-flow sampling requirements, water quality parameters are considered stable when three successive readings (four successive readings if temperature is used), collected 3-5 minutes apart, are within:

- ± 0.1 for pH,

- $\pm 3\%$ for conductivity,
- ± 10 mV for redox potential,
- $\pm 10\%$ for dissolved oxygen (DO), and
- < 5 nephelometric turbidity units (NTU) or $\pm 10\%$ for turbidity.

Visual observations (color, odor, sheening, etc.) will also be recorded in the field notes and on sample logs. All groundwater quality measurements and field observations will be recorded on groundwater monitoring data sheets. Turbidity measurements, in NTUs, will be measured with a portable Hach Turbidimeter.

The field team will monitor the depth to water during purging to avoid water level drawdown. In the event that the minimum drawdown requirement of less than 0.3 feet cannot be achieved, three well volumes will be purged prior to sampling. In the event that a low yield well is purged dry before stabilization is achieved, the well will be allowed to recover until approximately 80% of the initial well volume has recharged and then groundwater samples will be collected.

2.3 GROUNDWATER SAMPLING

Following stabilization of the water quality parameters, CES-Rescon will collect the groundwater samples from the monitoring wells (starting with the least contaminated wells) for the following analyses:

- GRO using Alaska Method (AK)101,
- DRO/RRO using AK102/AK103,
- BTEX using EPA Method (SW) 8260D,
- PAHs using SW8270D SIM,
- Iron, lead, manganese and zinc using SW6020, and
- Sulfate using SW9056A

Samples submitted for GRO and BTEX will be collected into laboratory-provided, 40-milliliter VOA vials preserved with hydrochloric acid (HCl). The vials will be filled completely to prevent volatilization. The containers will be capped, turned over and tapped to verify no air bubbles are present. Samples submitted for DRO/RRO analysis will be collected into laboratory-provided 250-mL containers preserved with HCl preservative. Samples submitted for PAH and sulfate analyses will be collected into separate unpreserved laboratory-provided 250-mL containers. Samples collected for metals will be collected into laboratory-provided 125-mL containers with nitric acid preservative. A complete list of analytes, sample containers, quality control samples, analysis hold times and other information is summarized in Table 2-1 below. Field personnel will collect the

analytical samples in order of the most volatile to least volatile analytes to ensure a minimal loss of volatile concentrations. The samples will be appropriately labeled, and immediately placed into a cooler with sufficient gel ice to maintain sample temperatures between 0 and 6 degrees Celsius (°C) during transport to the project laboratory. Quality control samples will consist of a trip blank sample accompanying all volatile analysis samples, temperature blanks in each sample cooler, field duplicates collected at a frequency of 10% of total number of samples per day and a matrix spike / matrix spike duplicate (MS/MSD) pair. If samples are broken up and sent to the laboratory separately, a MS/MSD set will be sent with each sample delivery group.

An equipment blank sample will also be collected from the sampling pump at the end of the sampling activity after decontamination procedures have been completed. An equipment blank sample will be collected by submersing the sampling pump into a new 1-gallon jug of deionized water with the top cut off (to fit in the jug) and pumping the water into clean sample containers.

TABLE-2-1: 2021 Analytes, Analytical Methods, Quality Control Samples, Sample Containers and Preservation

Analyte	Method	# of Samples	MS/MSD	Dup	Trip Blank	Equipment Blank	Containers	Preservation	Prep-Hold Time	Analysis Hold Time
GRO	AK101	12	1	2	1	1	(3) 40 ml VOA vial with Teflon-lined Septa	Cool, 0 to 6°C, HCl to pH<2	14 Days	
DRO/RRO	AK102/103	12	1	2		1	(2) 250 ml amber glass jar	Cool, 0 to 6°C, HCl to pH<2	14 Days	40 days
BTEX	SW8260 C	12	1	2	13	1	(3) 40 ml VOA vial with Teflon-lined Septa	Cool, 0 to 6°C, HCl to pH<2	14 Days	
PAH	SW8270 SIM	12	1	2		1	(2) 250 ml amber glass jar	Cool, 0 to 6°C,	7 days	40 days
Dissolved Metals (Lead, Iron, Manganese, Zinc)	SW6020	12	1	2		1	(1) 250 ml HDPE bottle	Cool, 0 to 6°C, HCl to pH<2	180 days	
Nitrate/Nitrite	SM4500	12	1	2		1	100 ml HDPE bottle	Cool, 0 to 6°C	28 Days	
Sulfate	SW9056 A	12	1	2		1	100 ml HDPE bottle	Cool, 0 to 6°C	28 Days	

Notes:

MS/MSD = Matrix Spike / Matrix Spike Duplicate

GRO = gasoline range organics

AK = Alaska Method

ml = milliliter

HCl = hydrochloric acid

°C = Degrees Celsius

DRO/RRO = diesel range organics / residual range organics

BTEX = benzene, toluene, ethylbenzene and total xylenes

PAH = polycyclic aromatic hydrocarbons

HDPE = High Density Polyethylene

2.4 SAMPLE MANAGEMENT

CES-Rescon will label the sample containers in accordance with the nomenclature structure detailed in Section 3 of the 2018 WP, which is shown below.

- Year: 21 (for 2021)
- Site: NSTE (for Nome Tank Site 'E')
- Well Identification Number (i.e. MW2008-6)

Consistent with the 2018 WP, duplicate samples will be named by adding a '9' to the monitoring well number (e.g. MW2008-69 will be a duplicate of MW2008-6). Equipment blanks and trip blanks will be labeled sequentially as EB-# and TB-# respectively.

The groundwater samples will be transported to SGS North America (SGS) in Anchorage under proper chain of custody procedures. For each chain-of-custody, the NDPL number associated with this project (21-030) will be included. SGS is a certified laboratory with the ADEC Laboratory Certification Program and DoD Environmental Laboratory Accreditation Program. The project action limits (PALs) and SGS laboratory limits are presented below in Table 2-2. A copy of the current accreditations for SGS is provided in Appendix D.

TABLE-2-2: Project Action Limits and Laboratory Limits

MATRIX	METHOD	CASRN	ANALYTE	UNIT	PAL ¹	DL	LOD	LOQ
GW	SW6020B	7439-89-6	Iron	ug/L	N/A ²	150	250	500
GW	SW6020B	7439-92-1	Lead	ug/L	15	0.31	0.5	1
GW	SW6020B	7439-96-5	Manganese	ug/L	430	0.62	1	2
GW	SW6020B	7440-66-6	Zinc	ug/L	6000	7.8	12.5	25
GW	AK101	GRO	Gasoline Range Organics	ug/L	2200	45	50	100
GW	SW8260D	71-43-2	Benzene	ug/L	4.6	0.12	0.2	0.4
GW	SW8260D	100-41-4	Ethylbenzene	ug/L	15	0.31	0.5	1
GW	SW8260D	95-47-6	o-Xylene ³	ug/L	N/A	0.31	0.5	1
GW	SW8260D	P & M -Xylene	P & M -Xylene ³	ug/L	N/A	0.62	1	2
GW	SW8260D	108-88-3	Toluene	ug/L	1100	0.31	0.5	1
GW	SW8260D	1330-20-7	Xylenes (total)	ug/L	190	1	1.5	3
GW	SW9056A	Sulfate	Sulfate	mg/L	N/A	0.05	0.1	0.2
GW	AK102/103 LV	DRO	Diesel Range Organics	mg/L	1.5	0.18	0.3	0.6
GW	AK102/103 LV	RRO	Residual Range Organics	mg/L	1.1	0.15	0.25	0.5
GW	8270D SIM LV (PAH)	90-12-0	1-Methylnaphthalene	ug/L	11	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	91-57-6	2-Methylnaphthalene	ug/L	36	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	83-32-9	Acenaphthene	ug/L	530	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	208-96-8	Acenaphthylene	ug/L	260	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	120-12-7	Anthracene	ug/L	43	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	56-55-3	Benzo(a)Anthracene	ug/L	0.30	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	50-32-8	Benzo[a]pyrene	ug/L	0.25	0.0062	0.01	0.02
GW	8270D SIM LV (PAH)	205-99-2	Benzo[b]Fluoranthene	ug/L	2.5	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	191-24-2	Benzo[g,h,i]perylene	ug/L	0.26	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	207-08-9	Benzo[k]fluoranthene	ug/L	0.8	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	218-01-9	Chrysene	ug/L	2.0	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	53-70-3	Dibenzo[a,h]anthracene	ug/L	0.25	0.0062	0.01	0.02
GW	8270D SIM LV (PAH)	206-44-0	Fluoranthene	ug/L	260	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	86-73-7	Fluorene	ug/L	290	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	193-39-5	Indeno[1,2,3-c,d] pyrene	ug/L	0.19	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	91-20-3	Naphthalene	ug/L	1.7	0.031	0.05	0.1
GW	8270D SIM LV (PAH)	85-01-8	Phenanthrene	ug/L	170	0.015	0.025	0.05
GW	8270D SIM LV (PAH)	129-00-0	Pyrene	ug/L	120	0.015	0.025	0.05

Notes:

¹ Project action limits are the Table C groundwater cleanup levels in 18 AAC 75 (ADEC 2021).

² Analyte not listed in ADEC Table C. PAL is listed as N/A.

³ The total xylenes cleanup level is presented for m,p-xylenes and o-xylene. For non-detected results, the LODs will be summed.

CASRN = Chemical Abstract Service Registry Number

PAL = Project Action Limit

DL = Detection Limit

LOD = Limit of Detection

LOQ = Limit of Quantitation
GW = Groundwater
ug/L = Micrograms per liter
N/A = Not Applicable
SIM = Selected Ion Monitoring
LV = Low volume

2.5 EQUIPMENT MANAGEMENT

CES-Rescon will calibrate all field instruments at the beginning of each workday. Operation and maintenance will be performed in accordance with the instrument manufacturer's specifications. The manufacturers' calibration instructions will accompany the field instruments so that on-site personnel can perform the proper calibration procedures. The dates, times and results of calibrations and on-site repairs to field instruments will be recorded in the field notebook. If at any time, it is observed that the instrument has drifted out of calibration, as evidenced by groundwater quality parameters measuring zero or a negative number for dissolved oxygen, pH, specific conductance, or turbidity (negative value only), the field team will recalibrate or replace the equipment

2.6 INVESTIGATIVE DERIVED WASTE

CES-Rescon anticipates that the investigative derived wastes generated during the project will include purge and decontamination water and miscellaneous consumables, such as personal protective equipment, disposable tubing, etc. Solid waste will be inspected for visible signs of contamination, sealed inside construction-grade garbage bags, and disposed of in a local municipal solid waste receptacle. Decontamination water or monitoring well purge water will be processed through a granular, activated carbon (GAC) filter prior to being discharged to a vegetated area on-site at least 100 feet away from nearby surface water bodies or drinking water wells. The field team will capture the purge water in 5-gallon buckets to inspect the water for evidence of hydrocarbon sheen formation prior to discharging to the ground. In the event that sheen formation or other evidence of contaminant breakthrough is observed, the water will be transferred to a steel open-topped, Department of Transportation (DOT)-approved 55-gallon drum for disposal offsite. The spent carbon from the GAC filter will be demobilized from the site and appropriately disposed of with other project impacted waste materials.

3.0 SCHEDULE AND REPORTING

In order to conduct the monitoring effort during the optimal groundwater conditions at the site, CES-Rescon intends to conduct the groundwater monitoring activity in late September or early October 2021.

Upon completion of the field activities CES-Rescon will prepare a report for USACE and ADEC review and approval. The report will also include the data and summarize the field activities performed in June 2021. The report will provide a thorough understanding of the activities conducted at the site and document any deviations to the work scope and the effects of the deviations, if any, to the overall project objectives. The report will also contain tables summarizing the groundwater sampling results, detailed figures showing sample locations and results, analysis of the data, a description of data gaps, if any, and the potential environmental issues that remain within the study area. Supporting documents in the appendices will include a photograph log, field notes (including monitoring well data sheets), laboratory reports with a completed ADEC Laboratory Data Review Checklist and Data Quality Assessment and waste disposal records.

All project reports will be submitted in electronic deliverables to USACE and ADEC in accordance with the Manual for Electronic Deliverables dated April 2017 (USACE, 2017).

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4.0 REFERENCES

- Alaska Department of Environmental Conservation (ADEC), 2021. Title 18 Alaska Administrative Code 75 (18 AAC 75) – Oil and Hazardous Substances Pollution Control. June.
- ADEC, 2019a. Field Sampling Guidance. Division of Spill Prevention and Response. Contaminated Sites Program. October.
- ADEC, 2019b. Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data. October.
- ADEC, 2017. Site Characterization Work Plan and Reporting Guidance. March.
- ADEC, 2013. Monitoring Well Guidance. September.
- United States Army Corps of Engineers (USACE), 2017. Manual for Electronic Deliverables. Requirements for Submittal of Documents, Chemistry Data, Geospatial Data, and Other Items., April. F10AKxxxxxx_yy.yy_zzzz_a
- USACE, 2018. Final Groundwater Sampling Work Plan 2018, Nome Tank Site ‘E’ Formerly Used Defense Site. July. F10AK005211_02.04_0509_a
- USACE, 2020. Final Groundwater Sampling Report 2019, Nome Tank Site ‘E’ POL Contamination, Nome Area Defense Region, Nome, Alaska. June. F10AK005211_07.11_0001_a
- USACE, 2021. 2020 Groundwater Sampling Report, Nome Tank Site ‘E’ POL Contamination, Nome Area Defense Region, Nome, Alaska, May. F10AK005211_02.13_0001_a
- United States Environmental Protection Agency (USEPA), 2010. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. January.

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FIGURES

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2021 Groundwater Monitoring
Well Locations
NOME TANK SITE 'E' POL
CONTAMINATION
NOME, ALASKA

LEGEND:

⬆ No exceedance in 2020 ⬆ Deonotes wells with historical POL exceedences

⊕ Decommissioned 2019

Site Features

⬆ Former Tank 'E' Location

⬆ Former Landfarm Cell Locations

⬆ Excavation and Landfarm Boundaries

⬆ Mining Claim Boundaries

⬆ Road

⬆ -120- Groundwater Elevation Contour (NAVD88 feet)

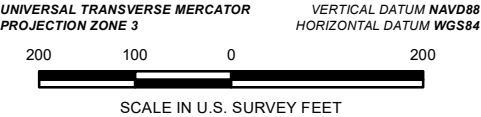
⬆ 115.10 2020 Groundwater Elevations (NAVD88 feet)

⬆ Groundwater Flow Direction

Abbreviations:

GIS geographic information system
NAVD88 North American Vertical Datum of 1988
POL petroleum, oil, and lubricants
WGS84 World Geodetic System 1984

- Notes:**
1. Depth to groundwater is posted next to wells. These were measured in December 2020. Elevations are in NAVD88 feet for all wells.
 2. Groundwater elevation contours were created using an Inverse Distance Weighted interpolation and are in NAVD88 feet.
 3. Aerial imagery and site features are taken from supplementary GIS materials provided with the final report on 2016 field activities:
USACE, 2017. *Final 2016 Report: Tank Demolition and Contaminated Soil Removal, Nome Tank Site 'E' Formerly Used Defense Site F10AK0052-11*.
Prepared by Bethel Environmental Solutions, LLC.
June. F10AK0052-11_07.08_0501_p
 4. Map produced using ESRI ArcMap v. 10.7.
 5. Wells decommissioned or destroyed prior to 2019 are not shown on this figure.



CONTRACT No.: W911KB-20-D0016	TASK ORDER No.: W911KB20F0137	FIGURE: 1
DATE: 7/15/2021	DRAWN: NJB	

APPENDIX A

FINAL GROUNDWATER SAMPLING WORK PLAN 2018

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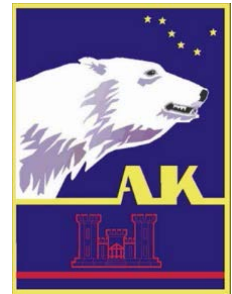
Final Groundwater Sampling Work Plan 2018
Nome Tank Site 'E' POL Contamination
Nome Area Defense Region
Nome, Alaska
Formerly Used Defense Site F10AK005211

Contract No. W911KB-17-D-0020

Task Order No. W911KB18F0023

July 2018

Prepared for:
U.S. Army Corps of Engineers



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Final Groundwater Sampling Work Plan 2018
Nome Tank Site 'E' POL Contamination
Nome Area Defense Region
Nome, Alaska
Formerly Used Defense Site F10AK005211

Contract No. W911KB-17-D-0020

Task Order No. W911KB18F0023

July 2018

Prepared for:
U.S. Army Corps of Engineers



Prepared by:
Brice Engineering, LLC
3800 Centerpoint Drive, Suite 417
Anchorage, Alaska 99503
www.BriceEng.com

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Appendix F Response to Comments	

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ACRONYMS AND ABBREVIATIONS

°	degrees
µs/cm	microsiemens per centimeter
%	percent
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AED	automated external defibrillator
aMLW	above mean lower low water level
BES LLC	Bethel Environmental Solutions, LLC
Brice	Brice Engineering, LLC
CFR	Code of Federal Regulations
CoC	chain-of-custody
CPR	cardiopulmonary resuscitation
CQM	Contractor Quality Management
DCA	1,2-dichloroethane
DoD	U.S. Department of Defense
DRO	diesel-range organics
EDB	ethylene dibromide
ELAP	Environmental Laboratory Accreditation Program
FUDS	Formerly Used Defense Site
GRO	gasoline-range organics
HAZWOPER	Hazardous Waste Operations and Emergency Response
IDW	investigation-derived waste
IT	International Technology Corporation
JMM	James M. Montgomery, Consulting Engineers
LIF	laser-induced fluorescence
MED	Manual for Electronic Deliverables
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL/min	milliliters per minute
MS/MSD	matrix spike/matrix spike duplicate
mV	millivolt
NTU	nephelometric units
PAH	polycyclic aromatic hydrocarbons
PMP	Project Management Professional
RI	remedial investigation
ROST	rapid optical screening tool
RRO	residual-range organics
SOP	standard operating procedure
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

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1.0 INTRODUCTION

This Work Plan describes the project approach and methods that will be used while conducting groundwater sampling at the Nome Tank Site 'E' Formerly Used Defense Site (FUDS) in Nome, Alaska (Figure 1-1) during the 2018 field season. Work will be performed for the United States Army Corps of Engineers (USACE), Alaska District, under Contract W911KB-17-D-0020, Task Order No. W911KB18F0023.

This Work Plan was prepared by Brice Engineering, LLC (Brice) in accordance with *18 Alaska Administrative Code (AAC) 75* (Alaska Department of Environmental Conservation [ADEC] 2017a), the *ADEC Field Sampling Guidance* (ADEC 2017b), and the *Manual for Electronic Deliverables* (MED) (USACE 2017b).

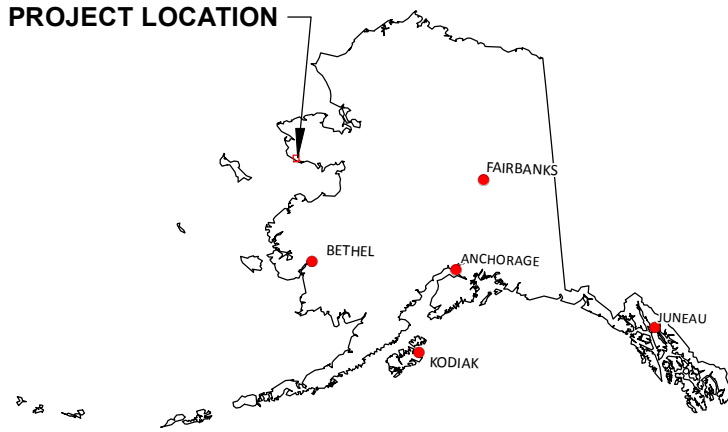
1.1 Work Plan Organization

The following sections are included:

- Section 1.0 (Introduction) – Provides introductory information, the Work Plan organization, and key project personnel.
- Section 2.0 (Nome Tank Site 'E' POL Contamination) – Provides a site description and summarizes the site history and previous investigations.
- Section 3.0 (2018 Groundwater Monitoring Activities) – Describes the planned 2018 groundwater monitoring activities and sampling procedures, and regulatory criteria for the analytical results comparison.
- Section 4.0 (Documentation and Reporting) – Details the elements that will be included in the Report.
- Section 5.0 (References) – Provides relevant references.
- The Work Plan is supported by the following appendices:
 - Appendix A Right-of-Entry Permits
 - Appendix B Field Forms
 - Appendix C Standard Operating Procedures
 - Appendix D Project Action Limits and Laboratory Limits
 - Appendix E Laboratory Certifications
 - Appendix F Response to Comments

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PROJECT LOCATION



PROJECT LOCATION

LONGITUDE
-165.3994°

NOME TANK SITE "E"

64.5485°
LATITUDE0 1 2
SCALE IN MILES

Basemap Source: Copyright: © 2013 National Geographic Society, i-cubed

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKAGROUNDWATER SAMPLING WORK PLAN 2018
NOME TANK SITE 'E' POL CONTAMINATION
NOME, ALASKA

LOCATION AND VICINITY

DATE: 4/23/2018

CONTRACT No.:
W911KB-17-D-0020TASK ORDER No.:
W911KB18F0023

DRAWN: AFS

FIGURE:

1-1

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1.2 Key Personnel

Table 1-1 presents the key personnel for the project, their qualifications, and their responsibilities on the project.

TABLE 1-1: KEY PERSONNEL

NAME/ TITLE/ CONTACT INFO	RESPONSIBILITIES		
Beth Astley USACE Project Manager (907) 753-5782 Beth.N.Astley@usace.army.mil	Maintaining oversight for the overall project. Responsible for the technical, quality assurance, and decision-making matters concerning project execution. Evaluates field changes and recommended solutions. Coordinates communications with regulators and stakeholders.		
Will Mangano USACE Environmental Engineer (907) 753-5689 William.F.Mangano@usace.army.mil	Ensuring the technical aspects of the project are carried out as intended and as presented in the approved Work Plan.		
Jake Sweet USACE Project Chemist (907) 753-2694 Jacob.M.Sweet@usace.army.mil	Ensuring the technical aspects of analytical chemistry are carried out as intended and as presented in the approved Work Plan.		
Dennis Shepard ADEC Regulator (907) 451-2180 dennis.shepard@alaska.gov	Providing regulatory project oversight.		
NAME/ TITLE/ CONTACT INFO	RESPONSIBILITIES	EDUCATION/EXPERIENCE	SPECIALIZED TRAINING/CERTIFICATIONS
Jennifer Anderson Brice Project Manager (907) 275-2895 janderson@briceenvironmental.com	Providing direction to the Brice project team to ensure project objectives are achieved, the project budget is tracked, and the project is on schedule.	Jennifer Anderson has over 17 years of experience working on State and Federal environmental projects across Alaska. She holds a BS in Civil Engineering (Environmental Engineering Emphasis) from the University of Missouri-Rolla and two PEs in Alaska (Civil and Environmental).	<ul style="list-style-type: none"> • PMP • 40-Hour HAZWOPER • 8-Hour refresher per 29 CFR 1910.120(e) • First-aid certification • Adult CPR/ AED certification • ADEC Qualified Environmental Professional

TABLE 1-1: KEY PERSONNEL (CONTINUED)

NAME/ TITLE/ CONTACT INFO	RESPONSIBILITIES	EDUCATION/EXPERIENCE	SPECIALIZED TRAINING/CERTIFICATIONS
Nicole Ward Brice Field Manager/ Site Safety and Health Officer (907) 275-2913 nward@briceenvironmental.com	Implementing, overseeing, and coordinating project activities and ensuring project objectives are met. Supporting Project Manager as needed. Implementing, overseeing, and coordinating safety for this project.	Nicole Ward has 7 years of experience working on contaminated sites projects throughout Alaska, including U.S. Department of Defense (DoD) RIs and feasibility studies. Her experience includes field sample collection for a variety of media, subcontractor oversight, and Work Plan and report preparation. She holds a MS in Environmental Science from Alaska Pacific University.	<ul style="list-style-type: none"> • 40-Hour HAZWOPER • 8-Hour refresher per 29 CFR 1910.120(e) • 8-Hour HAZWOPER Supervisor • 30-Hour OSHA Construction • Asbestos Hazard Emergency Response Act Building Inspector • CQM certification • Dakota Technologies Ultraviolet Optical Screening Tool Training Course • Hydrocarbon Risk Calculator Training Course • Alaska Certified Erosion and Sediment Control Lead • First-aid certification • Adult CPR/AED certification • All-terrain Vehicle Rider Course • ADEC-Qualified Environmental Professional
Alison Sacks Brice Project Engineer (907) 277-7290 asacks@briceenvironmental.com	Conducting field work and supporting the Field Manager and Project Manager as needed.	Alison Sacks has over 3 years of experience working as a geoscientist and over a year of experience working on DoD contaminated sites projects. She holds a BS in Civil Engineering, a BA in Geology, and a MS in Geoscience from Pennsylvania State University.	<ul style="list-style-type: none"> • 40-Hour HAZWOPER • 8-Hour refresher per 29 CFR 1910.120(e) • 30-Hour OSHA Construction • CQM certification • Remote first-aid certification • Adult CPR/AED certification • EIT • ADEC-Qualified Sampler
Kelly Carson Brice Project Chemist (907) 277-7297 kcarson@briceenvironmental.com	Coordinating with the analytical laboratory, reviewing analytical data, and ensuring that the data quality objectives are achieved.	Kelly Carson has over 15 years of technical and professional experience executing RI projects throughout Alaska, with specific experience managing laboratory subcontracts and reviewing and validating analytical data. She holds a MS in Environmental Quality Science from the University of Alaska Anchorage and a BS in Environmental Studies from Utah State University.	<ul style="list-style-type: none"> • 40-Hour HAZWOPER • 8-Hour refresher per 29 CFR 1910.120(e) • First-aid certification • Adult CPR/AED certification • ADEC-Qualified Environmental Professional

TABLE 1-1: KEY PERSONNEL (CONTINUED)

NAME/ TITLE/ CONTACT INFO	RESPONSIBILITIES	EDUCATION/EXPERIENCE	• SPECIALIZED TRAINING/CERTIFICATIONS
Dan Clark Brice Corporate Safety Officer (907) 978-3033 danc@bilista.net	Developing, implementing, and overseeing all safety and health-related aspects of the project.	Dan Clark is a Registered Safety Manager with over 28 years of professional experience. He has served Brice since 1993 and held the position of Corporate Safety Officer since 2006, overseeing safety for more than \$100M in environmental and construction projects. He holds a BA in Business Economics from the University of California Santa Barbara.	<ul style="list-style-type: none">• 40-Hour HAZWOPER• 8-Hour refresher per 29 CFR 1910.120(e)• First-aid certification• Adult CPR/AED certification• Blood borne Pathogens training• 30-Hour OSHA Construction• ADEC-Qualified Environmental Professional

Notes:

For definitions, see the Acronyms and Abbreviations sections.

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2.0 NOME TANK SITE 'E' POL CONTAMINATION

The Nome Tank Site 'E' site is located approximately four miles north of downtown Nome, and less than one half mile northeast of the Nome-Beltz High School off Glacier Creek Road (Figure 1-1). The former tank footprint is located (in decimal degrees) at 64.548503° North Latitude and 165.399418° West Longitude (USACE 2018).

Nome Tank Site 'E' was a bulk fuel storage site for the Army Air Corps during World War II serving the now abandoned Satellite Air Field. The site historically contained a 24,000-barrel (1,000,000-gallon) underground fuel storage tank covered with 5 to 15 feet of sand and gravel. The tank was demolished and removed in 2015 as part of a soil removal action by Bethel Environmental Solutions (BES LLC). Part of the area was reportedly dredged for gold in the past and soil at the site consists of tailings from prior mining operations. The site and surrounding lands are free of topsoil and have sparse vegetation in some areas, along with several small ponds presumably resulting from historic mining activities. The site is currently owned by the Bering Straits Native Corporation, which purchased the land from Nova Gold/Alaska Gold in November 2012 (USACE 2018).

Nome Tank Site 'E' is included in the Alaska Department of Environmental Conservation's (ADEC) Contaminated Sites Program Database under the name "Nome Tank Site 'E' / DERP / Site 6", with Hazard Identification (ID) #1154 and File ID #400.38.001L. The ADEC's Contaminated Sites Program Database is available through the State of Alaska's Division of Spill Prevention and Response web page [www.dec.alaska.gov/spar] (USACE 2018).

2.1 Site Description

The following subsections describe the geology and soils, hydrology/groundwater, and climate near Nome, Alaska. The following information was largely summarized from the *2017 Groundwater Sampling Report Nome Tank Site 'E' Formerly Used Defense Site F10AK005211, Nome, Alaska* (USACE 2018).

2.1.1 Geology

The Nome area is located on the south coastal plain of the Seward Peninsula, adjacent to Norton Sound and the Bering Sea. The coastal plain extends approximately 3.5 miles inland to the base of a series of hills and ridges that rise to 1,800 feet above sea level. The ridges are oriented predominantly north-south and are separated by south-flowing primary drainages. The Nome area was subjected to alpine glaciations during the Pleistocene Epoch (USACE 2018).

Paleozoic and tertiary metamorphic and igneous rocks in the Nome area are folded into broad anticlines and synclines. Several faults occur in the area, including a major northeast trending fault in the Anvil Creek Valley. Lower elevation areas are commonly mantled with colluvium, alluvium, glacial deposits, coastal plain sediments, and placer mine spoils. Nome lies in a region of discontinuous permafrost. Except for mined areas and alluvial sand and gravels associated with streams and rivers, the coastal plain is underlain with continuous or near continuous permafrost. The dominant soils within the area are poorly drained and shallow. The surface is commonly patterned with solifluction lobes on sloping areas, frost scars on low knolls, and polygons in some of the nearly level valleys bottoms. The vegetation is typically tundra dominated by sedges, mosses, lichens, and low shrubs (USACE 2018).

2.1.2 Hydrology and Groundwater

In September 2017, the overall groundwater flow direction was towards the southwest. Groundwater elevations measured during the September 2017 event are posted on Figure 2-1 (units are feet above mean lower low water level [aMLW]). Measured groundwater elevations ranged between 95 and 150 feet aMLW.

2.1.3 Climate

The climate over much of the Seward Peninsula is maritime when the Bering Sea is ice-free, roughly from May to October. The freezing of Kotzebue Sound (northeast of the Seward Peninsula) and Norton Sound (south and east of the Seward Peninsula) in November causes an abrupt change to the continental climate. During ice-free periods along the coast, cloudy skies prevail, fog occurs, daily temperatures are relatively uniform, and westerly winds predominate. January temperatures range from -3 to 11°F; July temperatures are typically 44 to 65°F. Average annual precipitation is 18 inches, including 56 inches of snowfall. The coastal areas experience temperatures cooler in summer and warmer in winter than interior areas. Precipitation and snow depths are strongly influenced by wind patterns. The sub-arctic climate of the Bering Straits Region varies between cold, predominantly dark winter days and mild, long summer days warmed by nearly 24 hours of sunlight (USACE 2018).

2.2 Previous Investigations

Several site investigations and removal actions have previously been conducted at the site. The following information was largely summarized from the *2017 Groundwater Sampling Report Nome Tank Site 'E' Formerly Used Defense Site F10AK005211, Nome, Alaska* (USACE 2018). Where a different reference was used, that reference is specified.

Initial and Remedial Investigations (1985-1989): The USACE originally investigated the Nome Area Defense Region from 1985 through 1988. Multiple areas of contamination and probable contamination were identified based on 1989 remedial investigation work by James M. Montgomery, Consulting Engineers (JMM) under contract to USACE. JMM conducted investigations at the following sites: Airport 'U', DOT 'J', Field 'R', Prison 'A', Tank Site 'E', and the Nome Spit.

Removal Actions and Soil Investigation (1994-1996): In 1993, the USACE contracted the construction services of International Technology Corporation (IT) to conduct a removal action at various FUDS properties throughout the Seward Peninsula including the Nome Area Defense Region. The major removal action work at the Nome Area Defense Region occurred during the 1994, 1995, and 1996 construction seasons. IT drilled 11 soil borings; installed three groundwater monitoring wells (MW-1, MW-2, and MW-3); and dug 25 test pits during the investigation at Nome Tank Site 'E'. Diesel-range contamination was found in soil up to 23,400 milligrams per kilogram (mg/kg).

ROST Investigation and Monitoring Well Installation (2007): In June 2007, USACE, Alaska District personnel conducted an environmental investigation at Nome Tank Site 'E'. The investigation used the Rapid Optical Screening Tool/Laser-Induced Fluorescence (ROST/LIF) system to investigate the extent of petroleum contamination in soil at the site. A total of 60 ROST/LIF probes were advanced during the field effort to depths ranging from 7.4 to 55.7 feet below ground surface. The ROST investigation determined that a contaminated soil plume extended approximately 1,200 feet south-southwest from Tank Site 'E', covering approximately 12 to 15 acres. Contamination extended down to bedrock at about 25 feet

beneath the base of the tank. South of the tank, an apparent smear zone was observed, beneath 28 to 43 feet of clean overburden, extending down or close to bedrock. The 2007 investigation also included the installation of three monitoring wells (MW-E1, MW-E2, and MW-E3). Existing wells MW-1 and MW-3 were destroyed and MW-2 had a broken casing that made sampling difficult. Groundwater was sampled and analyzed for diesel-range organics (DRO), residual-range organics (RRO), polycyclic aromatic hydrocarbons (PAHs) and BTEX at two of the three new monitoring wells, as well as at existing monitoring well MW-2. The third new monitoring well, MW-E3, could not be sampled due to extremely slow recharge rates. DRO concentrations were above the ADEC groundwater criterion in both MW-2 and MW-E1. RRO was found above the ADEC groundwater criterion in MW-E1. BTEX and PAH compounds were detected in most wells; however, concentrations did not exceed ADEC groundwater criteria. It was determined that groundwater at Tank Site 'E' was impacted by fuel contamination and that groundwater flow direction was to the southwest based on water levels recorded during the investigation.

Additional Monitoring Well Installation and Sampling (2008): Seven new monitoring wells were installed and sampled at Nome Tank Site 'E' by Fairbanks Environmental Services (FES) in August 2008 (MW2008-1 through MW2008-7). In addition, groundwater samples were collected from four existing wells (MW-2, MW-E1, MW-E2, and MW-E3). The groundwater investigation was conducted to further define the boundaries of the groundwater contaminant plume, to continue monitoring groundwater contaminant concentrations, and to evaluate natural attenuation. Groundwater samples were submitted for DRO, RRO, BTEX, and PAH analyses. DRO was detected at concentrations above the ADEC groundwater criterion in MW2008-1, MW2008-2, MW-2, MW-E1, and MW-E3. RRO was detected at concentrations above the ADEC groundwater criterion in MW2008-1 and MW-E1.

Tank Demolition, Contaminated Soil Removal, and Landfarming (2015-2019): In 2015, Bethel Environmental Solutions LLC demolished and disposed of the underground storage tank and excavated fuel-impacted soils within the tank footprint. The excavation progressed approximately 14 feet below the former tank foundation before groundwater was encountered and the excavation halted. Approximately 14,000 tons of contaminated soil were removed and the groundwater monitoring wells inside the excavation footprint were removed as part of the effort (USACE 2017c).

Excavation of an additional 16,000 tons of contaminated soil was completed by BES LLC in 2016. The excavation continued from the previous year's effort and extended down to the bedrock interface within the former tank footprint. Between the 2015 and 2016 excavation efforts, approximately 30,000 tons of fuel-impacted soil were removed. Landfarming activities associated with the remediation of the contaminated soil are scheduled to continue into 2019. Additional groundwater monitoring wells are also scheduled to be installed within the former tank footprint, once backfill activities are completed (USACE 2017c).

Ongoing Groundwater Sampling Program (2008-present): Groundwater has been sampled annually since 2008, except for 2012 when groundwater samples were not collected. Historical groundwater data are presented on Figure 2-2. FES installed and sampled monitoring wells in 2008, and continued sampling these wells annually through 2011. During these sampling events, DRO, RRO, benzene and 1-methylnaphthalene were detected in various wells at concentrations exceeding ADEC groundwater criteria. During the 2010 sampling event, approximately five feet of free product was measured in MW2008-1. A sampling event in the spring of 2011 found very low groundwater levels across the site, with few wells available to sample.

Five new groundwater wells (MW2012-1 through MW2012-5) were installed at the project site in July 2012 by USACE personnel to determine seasonal groundwater depths, measure water/free product levels, and evaluate remedial alternatives. Soil samples collected during this effort confirmed fuel-contaminated soils adjacent to the tank.

Free product was measured in one of the new wells in December 2012 and an effort was undertaken to characterize the reusability of the fuel. The fuel sample failed the U.S. Environmental Protection Agency (USEPA) Oil Burning Specification test for lead content in fuel. As a result, lead and lead scavengers 1,2-dibromoethane (EDB) and 1,2-dichloroethane (DCA), as well as gasoline-range organics (GRO) were included for analysis for subsequent sampling events.

Twelve of the sixteen groundwater wells were sampled in July 2013 by USACE personnel. MW2008-4 was not sampled or measured as the well was completely frozen. Monitoring wells MW2012-1 and MW2012-4 were not sampled due to the presence of free product. DRO concentrations were above the ADEC groundwater criterion in MW2008-1, MW2012-2, MW2012-3, MW2012-4, MW-E1, and MW-E3. RRO concentrations were detected above the ADEC groundwater criterion in MW-E1. The PAH compound 1-methylnaphthalene was detected in MW2008-1 exceeding ADEC groundwater criterion.

Groundwater samples were collected from ten monitoring wells in September 2014 by USACE personnel. DRO concentrations were above the ADEC groundwater criterion in MW2008-1, MW2012-2, and MW-E1. The 1-methylnaphthalene concentration in MW2008-1 was above the ADEC groundwater criterion. No other compounds were detected above ADEC groundwater criteria. Monitoring wells MW2012-1, MW2012-4, and MW2012-5 were not sampled due to measurable free product in the wells. MW-E3 had frost jacked and broken the casing, filling the well with bentonite, and was considered destroyed. MW2012-3 was not sampled due to slow recharge of extremely silty water.

In 2016, USACE personnel sampled fifteen of the sixteen wells onsite. These were analyzed for GRO, DRO, RRO, BTEX, lead, PAHs, and geochemical parameters (sulfate, manganese, and iron). Nitrate was not sampled due to an error in the sample container order. Monitoring well MW2015-04 was dry and could not be sampled. DRO, GRO, naphthalene, and 1-methylnaphthalene were the only compounds detected in exceedance of ADEC cleanup levels applicable at that time. DRO concentrations of 3900 µg/L and 1700 µg/L were detected in wells MW-E1 and MW2015-10, respectively. In the duplicate sample from MW-E1, two PAH constituents were detected in exceedance of cleanup levels: 1-methylnaphthalene was detected at a concentration of 160 µg/L, and naphthalene was detected at a concentration of 4.7 µg/L. Elevated concentrations of DRO were detected in the primary (1300 µg/L) and duplicate (1500 µg/L) samples at MW2015-01. Monitoring well MW2008-7 contained GRO at a concentration of 2300 µg/L. This well had never previously exceeded cleanup levels. Geochemical parameters (including sulfate, iron, and manganese) were also analyzed for a correlation to fuel concentrations. It was concluded that the iron and manganese concentrations did not correlate well with fuel concentrations, while sulfate concentrations were typically lower in wells with higher contaminant concentrations, and higher in wells with lower concentrations of fuel contaminants. This was interpreted as an indication of biodegradation taking place within the contaminant plume (USACE 2016).

In 2017, groundwater sampling was conducted by USACE personnel to evaluate groundwater contaminant trends and monitor the effectiveness of contaminated soil excavation efforts completed at the site in 2015 and 2016 by BES LLC. In May 2017, six wells (MW2008-3, MW2008-5, MW2008-6, MW2008-7, MW2015-01, and MW2015-09, selected as sentry wells), were sampled at a time expected to be coincident with the

annual low groundwater level (USACE 2017a). There were no exceedances in samples collected during the May 2017 event (USACE 2018). Geochemical samples were collected and analyzed during the May 2017 event. The distributions of geochemical concentrations generally did not correlate well with fuel concentrations, and were not indicators of biodegradation trends (USACE 2018).

In September 2017, all fifteen viable wells remaining on site were sampled by USACE personnel. Monitoring well MW2015-04 was dry (dry during all sampling events since it was installed). Free product was not measured in any well. The DRO concentration detected in MW-E1 was 5100 µg/L, exceeding the ADEC groundwater criterion of 1500 µg/L. Two PAH constituents were detected in MW-E1 exceeding applicable groundwater criteria: 1-Methylnaphthalene was detected above the ADEC groundwater criterion of 11 µg/L at a concentration of 33 µg/L, and naphthalene was detected above the ADEC groundwater criterion of 1.7 µg/L at a concentration of 5.2 µg/L. No other results exceeded ADEC groundwater criteria (USACE 2018).

2.3 As-Built Analysis

Based on ADEC comments generated on the 2017 Groundwater Sampling Report (F10AK005211_02.04_0508_a), USACE conducted an updated historical document review and as-built analysis of fuel storage and distribution infrastructure at Nome Tank Site “E”. Results of that effort identified multiple appurtenant piping runs and storage structures in the vicinity of the former tank footprint (Figure 2-3). The evaluation of information generated from that as-built analysis is beyond the scope of this groundwater sampling effort. However, USACE will coordinate future actions to address this new information with the ADEC, landowners, and other pertinent stakeholders as necessary.

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GROUNDWATER SAMPLING WORK
PLAN 2018
NOME TANK SITE 'E'
NOME, ALASKA

NOME TANK SITE 'E'
WELL LOCATIONS AND SITE FEATURES

LEGEND:

Well Locations

- Well to be sampled in 2018: historical analytical result(s) exceeding ADEC Table C cleanup levels
- Well to be sampled in 2018: no historical analytical result(s) exceeding ADEC Table C cleanup levels
- Dry well

Site Features

- Former Tank 'E' Location
- Landfarming Cells
- Excavation and Landfarm Boundaries
- Mining Claim Boundaries
- BES Job Trailer
- Road

Abbreviations:

BES = Bethel Environmental Solutions LLC

Notes:

- Depth to groundwater is posted in blue text next to wells. These were measured in September 2017. Elevations are in feet above mean lower low water level.
- Aerial imagery and site features are taken from supplementary GIS materials provided with the final report on 2016 field activities:
U.S. Army Corps of Engineers, 2017, prepared by Bethel Environmental Solutions, LLC. *Final 2016 Report: Tank Demolition and Contaminated Soil Removal, Nome Tank Site 'E' Formerly Used Defense Site F10AK0052-11*. June. F10AK0052-11_07.08_0501_p
- Map produced using ESRI ArcMap v. 10.5.
- Decommissioned or destroyed wells are not shown on this figure.

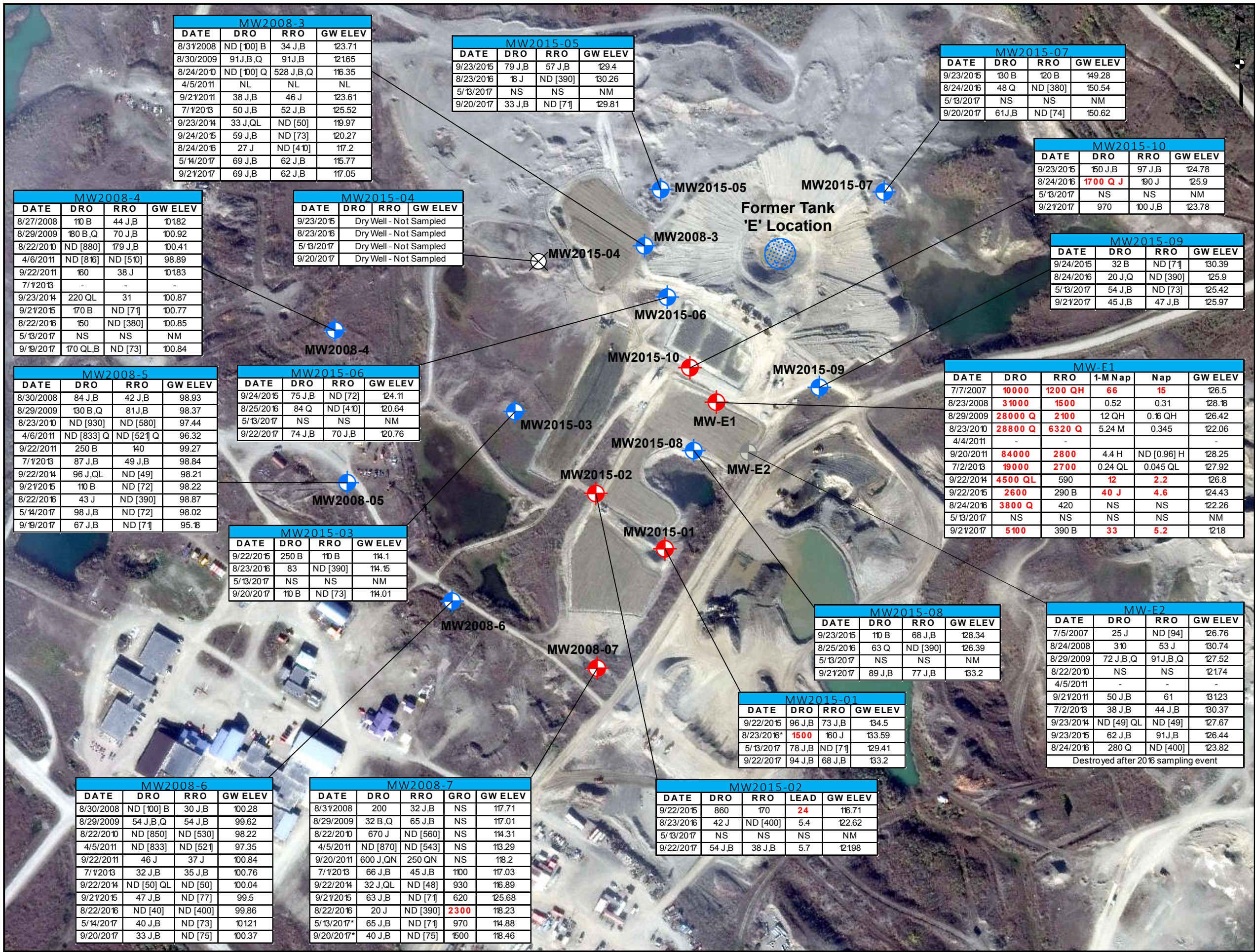
U.S. SURVEY FEET
HORIZONTAL DATUM: WGS84
VERTICAL DATUM: NGVD '88

UNIVERSAL TRANSVERSE
MERCATOR
COORDINATE SYSTEM ZONE 3



CONTRACT No.: W911KB-17-D-0020	TASK ORDER No.: W911KB18F0023	FIGURE: 2-1
DATE: 4/27/2018	DRAWN: AFS	

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GROUNDWATER SAMPLING WORK
PLAN 2018
NOME TANK SITE 'E'
NOME, ALASKA

NOME TANK SITE 'E' HISTORICAL
GROUNDWATER DATA

LEGEND:

Well Locations
Well with analytical result(s) exceeding ADEC Table C cleanup levels
Well with no analytical result(s) exceeding ADEC Table C cleanup levels
Well destroyed or decommissioned
Dry well
Former Tank 'E' Location

Abbreviations:

- = no water available for sampling
µg/L = micrograms per liter
ADEC = Alaska Department of Environmental Conservation
[LOD] = limit of detection
1-MNap = 1-Methylnaphthalene

Nap = Naphthalene
ND = not detected
NL = not located
NM = not measured
NS = not sampled
GRO = gasoline range organics
DRO = diesel range organics
RRO = residual range organics

Notes:

1. An asterisk (*) by a sample date indicates that a duplicate sample was collected.
2. Groundwater elevation is in feet above mean lower low water level.

Chemistry Notes:

1. Results shown as red text exceed ADEC Table C cleanup levels revised as of January 2018.
2. Groundwater results reported in µg/L.
3. For duplicate samples, the highest result is reported.
4. DRO and RRO are included by default in each table. Other analytes are included if there has been an exceedance.

Chemistry Qualifiers:

1. B - Analyte result is considered a high estimated value due to contamination present in the method blank or trip blank.
2. J - Estimated value; result is less than the LOQ.
3. M - Result is estimated with a high, low, or unknown (H, L, or N) bias due to matrix effects.
4. Q - Analyte result is considered an estimated value biased high, low, unknown (H,L, or N) due to a quality control failure.

Project Action Levels:

ANALYTE	ADEC GROUNDWATER CLEANUP LEVELS (µg/L)
GRO	2200
DRO	1500
RRO	1100
Lead	15
1-Methylnaphthalene	11
Naphthalene	1.7

References:

1. Aerial imagery and site features are taken from supplementary GIS materials provided with the final report on 2016 field activities:
U.S. Army Corps of Engineers, 2017, prepared by Bethel Environmental Solutions, LLC. *Final 2016 Report: Tank Demolition and Contaminated Soil Removal, Nome Tank Site 'E' Formerly Used Defense Site F10AK0052-11*. June. F10AK0052-11_07.08_0501_p
2. Map produced using ESRI ArcMap v. 10.5.

U.S. SURVEY FEET
HORIZONTAL DATUM: WGS84
VERTICAL DATUM: NGVD '88

UNIVERSAL TRANSVERSE
MERCATOR
COORDINATE SYSTEM ZONE 3

320 160 0 320
SCALE IN FEET

CONTRACT No.:
W911KB-17-D-0020

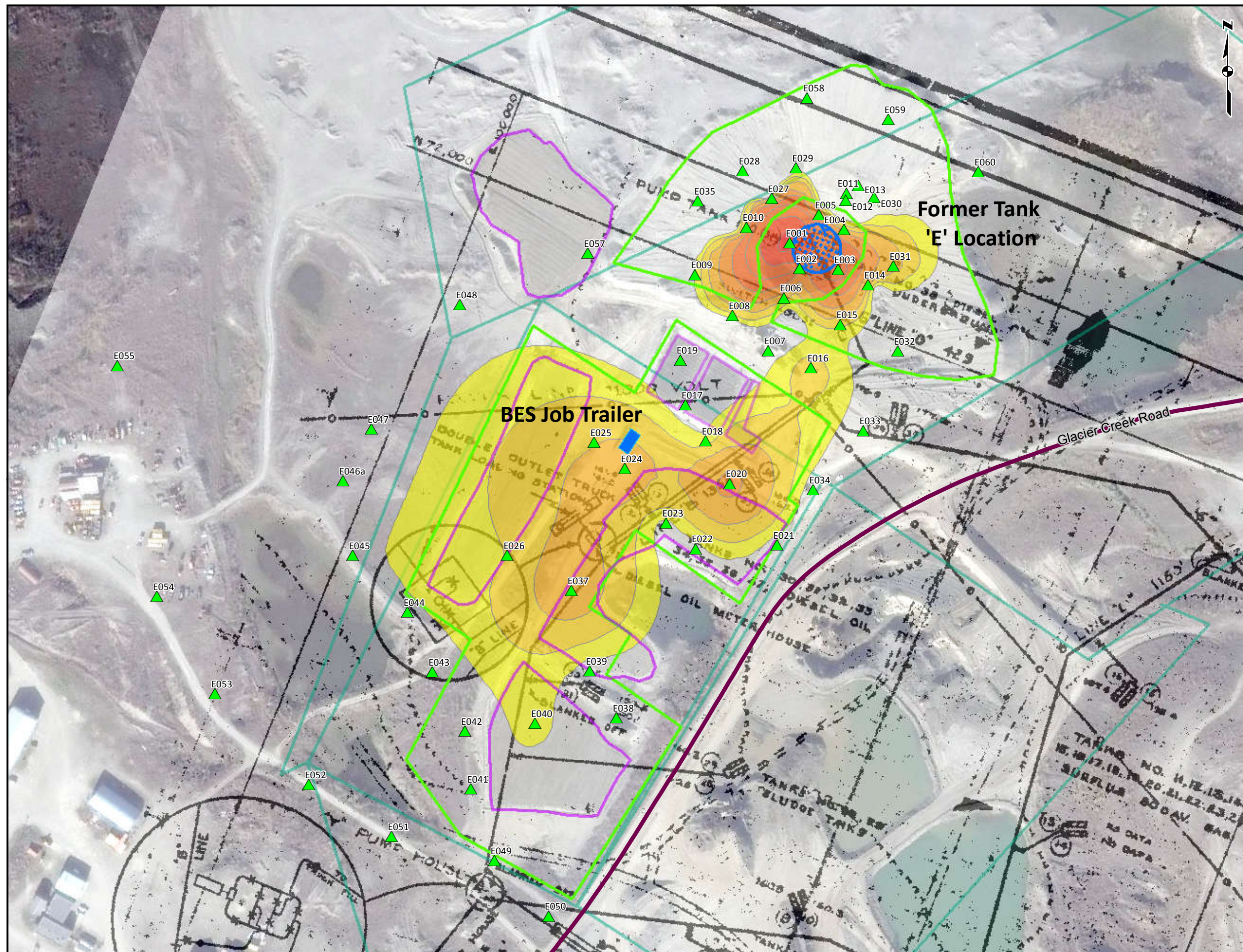
TASK ORDER No.:
W911KB18F0023

DATE: 4/27/2018

DRAWN: AFS

FIGURE:
2-2

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GROUNDWATER SAMPLING WORK
PLAN 2018
NOME TANK SITE 'E'
NOME, ALASKA

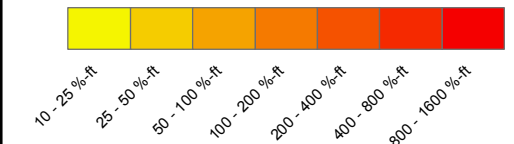
NOME TANK SITE 'E' LIF PROBE
LOCATIONS, EFFECTIVE CONTAMINANT
MASS, AND SITE FEATURES

LEGEND:

Site Features

- LIF Probe Locations
- Former Tank 'E' Location
- Landfarming Cells
- Excavation and Landfarm Boundaries
- Claim Boundaries
- BES Job Trailer
- Road

Effective Contaminant Mass (%-ft.)



Abbreviations:

BES = Bethel Environmental Solutions LLC
ft. = feet
LIF = laser induced fluorescence

Notes:

- Aerial imagery, site features, and 1947 Bulk Liquid Storage System schematic are taken from supplementary GIS materials provided with the final report on 2016 field activities:
U.S. Army Corps of Engineers, 2017, prepared by Bethel Environmental Solutions, LLC. *Final 2016 Report: Tank Demolition and Contaminated Soil Removal, Nome Tank Site 'E' Formerly Used Defense Site F10AK0052-11*. June. F10AK0052-11_07.08_0501_p
- Map produced using ESRI ArcMap v. 10.5.

U.S. SURVEY FEET
HORIZONTAL DATUM: WGS84
VERTICAL DATUM: NGVD '88

UNIVERSAL TRANSVERSE
MERCATOR
COORDINATE SYSTEM ZONE 3



CONTRACT No.:
W911KB-17-D-0020

TASK ORDER No.:
W911KB18F0023

FIGURE:
2-3

DATE: 7/6/2018

DRAWN: AFS

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3.0 2018 GROUNDWATER MONITORING ACTIVITIES

Groundwater monitoring activities are scheduled for mid-October 2018. Sixteen groundwater monitoring wells (MW2008-3, MW2008-4, MW2008-5, MW2008-6, MW2008-7, MW-E1, MW2015-01, MW2015-02, MW2015-03, MW2015-04, MW2015-05, MW2015-06, MW2015-07, MW2015-08, MW2015-09, and MW2015-10) will be gauged and sampled to evaluate contaminant concentration trends (Figure 2-2). Of these monitoring wells, seven have historically had low volume, poor recovery, and/or high turbidity (MW2008-3, MW2015-02, MW2015-05, MW2015-06, MW2015-08, MW2015-09, and MW2015-10). Prior to sampling, these wells will be evaluated for potential redevelopment. If a well contains silt build-up at the bottom of the screen, the water is turbid and does not clear after purging, or the well is not producing adequate yield, the well will be redeveloped in accordance with the ADEC *Monitoring Well Guidance* (ADEC 2013) to improve connection to the aquifer and increase yields. Table 3-1 lists the wells to be sampled and indicates the wells requiring redevelopment before sampling.

TABLE 3-1: LIST OF WELLS TO BE SAMPLED IN 2018

WELL NAME	MONUMENT TYPE	PAST PRODUCTIVITY/NOTES	REDEVELOPMENT IN 2018	SHEEN/ ODOR
MW-E1	None, casing stickup	Good	No	2016: Fuel odor, gas in water 2017: Not noted
MW2008-3	Flush	Very poor – Sufficient recharge after 15 hours	Yes	No
MW2008-4	Flush	Fair	No	Not noted
MW2008-5	Flush	Good	No	No
MW2008-6	Flush	Good	No	No
MW2008-7	Flush	Good	No	No
MW2015-01	Flush	Good – water silty at first, cleared	No	No
MW2015-02	Flush	Good	Yes	No
MW2015-03	Flush	Fair	No	Not noted
MW2015-04	-	Dry since installation in 2015	No	Dry
MW2015-05	Flush	Poor – turbid water, stabilized ~48 NTU	Yes	No
MW2015-06	Flush	Very poor – purged dry, sufficiently (but not fully) recharged to sample after 20 hours, turbid and orange water	Yes	No
MW2015-07	Flush	Good	No	Not noted

TABLE 3-1: LIST OF WELLS TO BE SAMPLED IN 2018 (CONTINUED)

WELL NAME	MONUMENT TYPE	PAST PRODUCTIVITY/NOTES	REDEVELOPMENT IN 2018	SHEEN/ ODOR
MW2015-08	Flush	Fair – 120 mL/min slight drawdown, 75 mL/min no drawdown – minimum turbidity ~400 NTU	Yes	No
MW2015-09	Flush	Very poor – purge dry and sampled when recharged	Yes	No
MW2015-10	Flush	Poor – turbid and orange water	Yes	No

Notes:

For definitions, see the Acronyms section.

Past productivity derived from stated pump rates, observations on drawdown, or estimated pump rates using sample volume and time to sample as noted in the Fall 2016 and Fall 2017 groundwater sampling logbooks (USACE 2016, USACE 2018). Generally: Very poor = recharge to 80% required 15 hours or more after purging dry; Poor = 40 – 80 mL/min; Fair = 80 – 120 mL/min, drawdown noted at higher rate; Good = 120-180 mL/min, no drawdown noted.

Notes on sheen and odor from the Fall 2016 and Fall 2017 groundwater sampling logbooks (USACE 2016, USACE 2018).

Gray shading indicates a well to be redeveloped in 2018 according to the Task Order.

The contaminants of concern identified during previous site investigations were GRO, DRO, RRO, BTEX, PAH, and lead. As part of this sampling effort, GRO, DRO, RRO, BTEX, PAH, and dissolved metals (zinc, iron, lead, and manganese) will be analyzed. In addition, compounds indicative of natural attenuation will be sampled, including nitrate/nitrite and sulfate. The monitoring well locations are shown on Figure 2-2. Proposed activities are described in the subsections below.

Mobilization. Right-of-entry permits were obtained by the USACE and are included as Appendix A. Coordination with the BES LLC Site Superintendent will be conducted prior to mobilization. All equipment, supplies, materials, and personnel will mobilize to Nome via Alaska Airlines.

Monitoring Well Development. If necessary, monitoring wells will be redeveloped using a surge block and submersible pump to cyclically remove sediment from the bottom of the well and well screen. Once the water is visually clear or turbidity decreases, water quality parameters will be monitored for stabilization. If a well is purged dry, it will be allowed to recover to 80 percent (%) of the initial volume and then sampled with no further purging. Well development will be conducted in accordance with the ADEC *Monitoring Well Guidance* (ADEC 2013), and documented using the *Well Purge and Development* form included in Appendix B. Development procedures are detailed in *BE-Standard Operating Procedure (SOP)-22 Monitoring Well Installation and Development* (Appendix C).

Groundwater Sample Collection. Groundwater wells will be gauged and sampled working from the least contaminated wells to the most contaminated. Groundwater levels and total well depths will be measured to a precision of 0.01 feet relative to the notched side of the well casing using an electronic water level meter or oil-water interface probe. If the casing is not notched, the water level will be measured relative to the north side of the casing. Depth to groundwater and depth to product (if present) will be measured. All wells at a site will be gauged consecutively.

Wells will be purged and sampled with a pneumatic bladder pump using low-flow methods. Dedicated Teflon-lined bladders and tubing will be used. To maintain consistency with prior sampling events for the subsequent trend analysis, the pump intake will be set approximately 1 to 2 ft into the water table. When sufficient yield is available, monitoring well parameters will be continuously monitored using a YSI 556 water quality meter with a flow-through cell and turbidity meter. Water quality parameters will be considered stable when at least three (four when using temperature) parameters have three successive readings, collected three to five minutes apart, within the criteria listed in Table 3-2. In addition to parameter stabilization, drawdown during purging will not exceed 0.3 feet (at a minimum flow rate of approximately 50 to 100 milliliters [mL]/min), when possible. If a well is purged dry, it will be allowed to recharge for 24 hours. Without further purging, the well will be sampled. For low yield wells that are purged dry, the well may be sampled when it has recharged to approximately 80% of its pre-purge volume per the ADEC *Field Sampling Guidance* (ADEC 2017b). Field stabilization readings will be recorded on the *Well Purge and Sampling Form* provided in Appendix B.

After stabilization, the flow-through cell will be disconnected and groundwater samples will be collected in accordance with low-flow sampling procedures based on USEPA and ADEC guidelines (USEPA 1996, ADEC 2017b) and *BE-SOP-09 Groundwater Sampling* (Appendix C). Volatile samples will be collected first followed by nonvolatile constituents. Dissolved metals samples (zinc, lead, iron and manganese) will be field-filtered using 0.45-micron filters. The samples will be stored in coolers containing frozen gel ice to maintain the proper holding temperature (2° to 6° Celsius). The sample coolers will be shipped to an ADEC-approved and DoD Environmental Laboratory Accreditation Program (ELAP) certified analytical lab (EMAX in Torrance, CA). Laboratory limits and project action limits are provided in Appendix D. Copies of the laboratory certifications are provided as Appendix E. Analytical methods, sample containers, and required quality control samples are listed in Table 3-3.

TABLE 3-2: STABILITY CRITERIA FOR LOW-FLOW PURGING

PARAMETER	UNITS	RECORDING PRECISION	STABILITY CRITERION	TYPICAL VALUE RANGE FOR STABILITY CRITERION
pH	—	0.01	±0.1	5 to 8
Temperature	°C	0.01	±3% (minimum of ±0.2°C)	0.1 to 15
Conductivity	µS/cm	1	±3%	80 to 1,000
Turbidity	NTU	0.1	± 10% or ± 1 NTU (whichever is greater)	0.3 to > 900
ORP	mV	1	±10 mV	-120 to 350
DO	mg/L	0.1	±10% or 0.2 mg/L (whichever is greater)	0 to 12

Notes:

For definitions, see the Acronyms section.

Stability criteria from ADEC *Field Sampling Guidance* (ADEC 2017b).

Only three parameters are required to stabilize, four when using temperature.

Field duplicate samples will be collected at a frequency of one per day and one for every 10 or fewer field samples (whichever is greater), for each matrix and for each target analyte (10%). At a minimum, one field duplicate will be collected per day of sampling at a site. Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of one MS/MSD set for every 20 or fewer field samples (5%). A trip blank will be submitted with each cooler containing volatile samples (GRO by AK101, or BTEX by SW8260B). One equipment blank will be collected per site (one per 20 samples).

Samples will be given a unique identifier reflecting the sample collection year, site, and location. Sample containers will be labeled to match the chain-of-custody (CoC) forms (CoC form example provided in Appendix B). Samples will be identified as follows:

- Year (18 for 2018)
- Site (NTSE)
- Well identification number (e.g., MW2008-3)

Location identifiers will be the well identification numbers and will be included on the CoC forms. Duplicate samples will be named by adding a '9' to the monitoring well number (e.g. MW2008-39 will be a duplicate of MW2008-3). Duplicate samples will be given a sample collection time one hour after the primary sample time.

Investigation-Derived Waste (IDW) Management. IDW streams anticipated during the project include non-hazardous solid wastes (e.g. personal protective equipment and sampling supplies) and decontamination and purge water. Solid non-hazardous IDW will include nitrile gloves, paper towels, used (empty) glass jars, tubing, sample bladders, and other disposable sampling equipment. Solid IDW will be transported to the Nome Municipal Landfill for disposal. The decontamination and purge water will be collected in 5-gallon buckets and treated through a granular activated carbon filter on site. The treated water will be observed for sheen, and if no sheen is visible, will be discharged to a vegetated area away from surface water bodies. Non-hazardous solid wastes will be taken to the Nome Municipal Landfill for disposal.

Demobilization. All project equipment and supplies will be demobilized from the site via Alaska Air Cargo to Anchorage, Alaska. Once in Anchorage, equipment will be returned to its point of origin.

3.1 Regulatory Framework

Analytical groundwater samples will be compared to the ADEC Table C cleanup levels provided under 18 AAC 75 (ADEC 2017a). These cleanup levels (project action limits) are provided in Appendix D.

TABLE 3-3: NOME TANK SITE 'E' ANALYTES, ANALYTICAL METHODS, QUALITY CONTROL SAMPLES, SAMPLE CONTAINERS, PRESERVATION

ANALYTE	METHOD	# OF SAMPLES	MS/ MSD	DUP	TRIP BLANK	EQUIP. BLANK	CONTAINERS	PRESERVATION	PREPARATION HOLDING TIME	ANALYSIS HOLDING TIME
GRO	AK101	16	1	4	1	1	(3) 40-mL VOA vial with Teflon-lined septa	Cool 0 to 6 °C, HCl to pH<2	14 days	
DRO/RRO	AK102/ AK103	16	1	4	0	1	(2) 1-L amber glass jar	Cool 0 to 6 °C, HCl to pH<2	14 days	40 days
BTEX	SW8260B	16	1	4	1	1	(3) 40-mL VOA vial with Teflon-lined septa	Cool 0 to 6 °C, HCl to pH<2	14 days	
PAH	SW8270D SIM	16	1	4	0	1	(2) 1-L amber glass jar	Cool 0 to 6 °C	7 days	40 days
Dissolved Metals (Lead/ Zinc/Iron/ Manganese)	EPA 6020	16	1	4	0	1	(1)-250 ml HDPE bottle	Cool 0 to 6 °C, HNO ₃ to pH<2	180 days	
Nitrate/ Nitrite	SM4500- NO ₃ E	16	1	4	0	1	(1) 100-mL poly	Cool 0 to 6 °C	28 days	
Sulfate	SW9056A	16	1	4	0	1	(1) 100-mL poly	Cool 0 to 6 °C	28 days	

Notes:

For definitions, see the Acronyms and Abbreviations sections

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4.0 DOCUMENTATION AND REPORTING

After completion of the field activities and receipt of all analytical laboratory data, a report will be submitted for Nome Tank Site 'E' in pre-draft, draft, and final versions. The content of this report will include the following:

- A summary of project objectives;
- Key personnel involved in the project and their responsibilities;
- A narrative describing activities conducted, including a description of any deviations from the approved Work Plan;
- A summary of the 2018 findings; analytical results; analytical data tables; an interpretation of the analytical data, a contaminant trend analysis using MAROS software, and a summary of the data quality and usability;
- A discussion of historical data plus recently acquired groundwater geochemistry parameters to assess natural attenuation and evaluate the potential for biodegradation;
- Graphs displaying historical plus recently acquired groundwater concentrations versus time to assess contaminant trends;
- Tables and figures supporting the narrative report;
- Conclusions and recommendations;
- Appendices containing copies of all chemical data generated and field documentation (field notes, forms, copies of the chains-of-custody including the NPDL WO# 18-047, a sample summary, cooler receipt forms, and any variance requests; site photographs, Chemical Quality Data Review, ADEC Checklists, etc.); and
- A separate appendix that presents ADEC and stakeholder comments, as well as the associated responses.

The reports will be prepared in accordance with the MED (USACE 2017b).

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5.0 REFERENCES

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

ADEC 2017a. Alaska Administrative Code (18 AAC 75), *Oil and Other Hazardous Substances Pollution Control*, November.

ADEC 2017b. *ADEC Field Sampling Guidance*. Division of Spill Prevention and Response. Contaminated Sites Program. August.

U.S. Army Corps of Engineers (USACE) 2016. *Fall 2016 Groundwater Sampling Report - Final, Nome Tank Site 'E' Formerly Used Defense Site*. December. F10AK005211_04.04_0500_a

USACE 2017a. *Nome Tank Site 'E' POL Contamination Groundwater Sampling Work Plan Addendum*. March. F10AK005211_02.04_0502_a

USACE 2017b. *Manual for Electronic Deliverables, Requirements for Submittal of Documents, Chemistry Data, Geospatial Data, and Other Items*. April.

USACE 2017c. Prepared by Bethel Environmental Solutions LLC (BES). *Final 2016 Annual Report: Tank Demolition and Contaminated Soil Removal, Nome Tank Site 'E' Formerly Used Defense Site F10AK0052-11*. June. F10AK005211_07.08_0501_p

USACE 2018. *2017 Groundwater Sampling Report - Nome Tank Site 'E' Formerly Used Defense Site F10AK005211*. February. F10AK005211_02.04_0508_a

United States Environmental Protection Agency 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. April.

Western Regional Climate Center (WRCC) 2017. <<https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak9313>>

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APPENDIX B

Field Forms

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Well Development Data Sheet

<u>Site Name</u>	<u>Event</u>	<u>Well ID</u>	<u>Project Number</u>
<u>Weather Conditions</u>	<u>PID Readings of Total VOCs (ppm)</u> Ambient _____ Breathing Zone _____ In Well _____	<u>Date</u>	<u>Developer Initials</u>

Well Information

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

Borehole Vol. (BV) water table well = (TD of casing – depth to water) * gal/ft; submerged well = (TD of casing – Depth Top Filter Pack *gal/ft

Min Purge Vol. = 2 * Added Water + 3 * BV Max Purge Vol. = 2 * Added Water + 10 * BV

BV = (_____ ft – _____ ft) * _____ gal/ft = _____ gal (* 3.785 L/gal = _____ L)

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

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

Well Purging Information

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

[illegible]

Suggested Notation

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

Additional observations on back

Well Development Data Sheet

<u>Site Name</u>	<u>Event</u>	<u>Well ID</u>	<u>Project Number</u>
		<u>Date</u>	<u>Developer Initials</u>

[illegible]

of

[illegible]

[illegible]

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APPENDIX C

Standard Operating Procedures

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STANDARD OPERATING PROCEDURE

BE-SOP-01

Logbook Documentation and Field Notes

1.0 SCOPE AND PURPOSE

This Standard Operating Procedure (SOP) describes the criteria for the content and format of field logbooks. This SOP should be used to direct field personnel in the requirements for recording information in logbooks 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 useful 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.

2.0 PERSONNEL RESPONSIBILITIES

All site personnel who make logbook entries are responsible for maintaining the required documentation. The Field Team Lead will inform personnel as to who will be responsible for field notebook and form entries, care, and maintenance.

3.0 FIELD NOTEBOOK PROCEDURE

Field logbooks are bound, sequentially paginated, weatherproof notebooks used to record daily field activities. All notes will be entered in permanent ink.

3.1 FRONT COVER

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

- Project Name and Site ID
- Project Month(s) and Year
- Name(s) of field logbook author(s)

3.2 PROJECT CONTACT INFORMATION

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

3.3 DAILY ENTRIES

Logbook entries should abide by the following guidelines:

- Pages should never be removed from the logbook.

- All information must be printed legibly and in permanent ink.
- Entries should be written using objective and factual language and should be made in chronological order.
- Entries should be made on subsequent lines such that no blank lines exist on any page.
- If any space remains on the bottom of the last page of field entries at the conclusion of the day's entries, a diagonal line will be drawn and signed to obscure any additional entries on that page.
- If corrections are necessary, a single line may be drawn through the original entry. The corrected information may then be added and should be initialed and dated.

Each logbook page should include the following:

- Job name or number, date, and personnel at the top of each page.
- Date and signature at the bottom of each page, with a line through any remaining blank lines.

The daily standard logbook entries will include the following:

- Project name/ Site ID / Client
- Date and time of each activity (including work start/stop times); time will be based on the 24-hour clock (i.e., 2100 instead of 9 pm)
- Location of activity
- Weather conditions and changing weather that may impact site conditions
- Pertinent observations and comments
- Level of Personal Protective Equipment
- Full names of onsite personnel and affiliations (including all visitors)
- Daily objectives
- Field measurements and calibrations
- Deviations from the project-specific Work Plan
- Log of photographs
- Location of work areas (sketches or photographs when appropriate, with north arrow and approximate scale or "not-to-scale" noted)
- Survey and/or location of any sampling points, including swing-tie measurements
- For each sample record: date, time, sampler(s), sample ID, media, sample depth taken below ground surface (bgs), container(s), preservatives, QC (dup/MS/MSD), analysis, MeOH lot number, tare weight
- Sample shipments (when, what, destination)
- Waste tracking (when, how much, destination)
- References to relevant data sheets and documentation preserved outside of the logbook such as groundwater sampling data sheets, soil boring logs, etc. Do not duplicate information from the referenced sheets in the logbook.
- Decontamination times and methods
- Daily summary of activities (i.e. number of samples collected)

3.4 FIELD DATA SHEETS

All other supportive unbound data documentation that is a part of the field records should be maintained as part of the field forms. These records should be recorded in weatherproof ink and on

weatherproof paper as necessary. Once back in the office, the unbound records should be scanned to create an electronic record to ensure document preservation.

3.5 ELECTRONIC DATA SHEETS

Electronic data documents include photographs, GPS and survey data, etc. All electronic data that are part of the field records will be downloaded to a designated location and maintained for project use. Take care when downloading, storing, and managing data. Naming conventions (according to the project-specific Work Plan) should be used to indicate the project, date, and other relevant information to ensure accurate use.

3.6 DOCUMENT CONTROL

At the conclusion of a task or project, all field documentation should be submitted to the Project Admin for record retention. All original documents should be kept in the project file.

STANDARD OPERATING PROCEDURE

BE-SOP-02

Sample Chain-of-Custody

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) describes the guidelines that will be met during sample handling, with respect to custody, and the proper techniques for documenting the custody on the Chain of Custody (COC) Form. This SOP will be used to direct field personnel in the techniques and requirements for maintaining the sample COC.

Proper handling, COC, and documentation are necessary to provide an accurate written record to track the possession, handling, and location of samples from the moment of collection through reporting.

2.0 MATERIALS

Materials needed for COC documentation include the following:

- Sample jars that have been filled and labeled in accordance with the project-specific Work Plan
- Quality control (QC) sample bottles
- Coolers with return address written on inside lid
- COC forms
- Two custody seals for the outside of each cooler
- Gallon-sized re-sealable plastic bag
- Clear tape
- Field logbook and/or appropriate field form
- Weatherproof pen

3.0 SAMPLE HANDLING PROCEDURE

The following sections describe sample COC documentation, field custody procedures, COC record, sample packaging, custody seals, transfer of custody, and laboratory custody procedures.

3.1 SAMPLE COC DOCUMENTATION

Sample identification documents will be 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:

- In an authorized person's physical possession,

- in an authorized person's view after being in possession,
- was in an authorized person's possession then secured (locked up), or
- kept in a secured area that is restricted to authorized personnel.

3.2 FIELD CUSTODY PROCEDURES

The following procedures will be used by field personnel:

- The sample collector will be 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 will record sample data (time of collection, sample number, analytical requirements, and matrix) in the field logbook and/or appropriate field form.
- Sample labels shall be completed for each sample, using weatherproof ink.

3.3 CHAIN-OF-CUSTODY RECORD

The COC record will be fully completed prior to the shipment of samples. Information that should be included on a COC form includes the following:

- COC Number
- Cooler ID
- Project number
- Contractor name
- Sampler name or initials
- Sample identification
- Location ID
- Sample date and time (in 24-hour format)
- Laboratory analysis methods required for each sample jar
- Volume submitted
- Preservatives added to each sample jar
- Sample matrix (soil, water, or other)
- Quantity of containers per sample
- Turn-around-time
- Instructions or notes regarding the samples in the "Notes" section of the custody record

3.4 SAMPLE PACKAGING

Samples will be labeled and packaged according to the *Labeling, Packaging, and Shipping Samples* SOP (BE-SOP-03). The COC record will accompany all sample shipments. Two COC records should be prepared for each shipment. One COC record will be placed in a re-sealable plastic bag with the bag sealed shut to prevent water intrusion from the moisture in the cooler, and the bag taped to the inside lid of the cooler. The duplicate copy of the COC record will be retained by the sampler and distributed as necessary to the sample coordinators. Airway bills will also be retained with the COC record as documentation of transport.

3.5 CUSTODY SEALS

Custody seals are preprinted, adhesive-backed seals with security slots designed to break if the seals are disturbed. Seals will be signed and dated at the time of use. Sample shipping containers will be sealed in as many places as necessary to ensure that the container cannot be opened without tearing the custody seals. Typically one custody seal will be placed along the front opening, and one along the side or back opening of a cooler. Clear tape will be placed over the seals to ensure that seals are not accidentally broken during shipment.

If a sampler hand-transportes the samples to the laboratory without sample shipment, custody seals are not required.

3.6 TRANSFER OF CUSTODY

When transferring the possession of samples from the field sampler to a transporter or to the laboratory, the sampler will sign, date, and note the time as “relinquished by” on the COC record. The receiver will also sign, date, and note 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 will not sign the COC record.

3.7 LABORATORY CUSTODY PROCEDURES

A designated sample custodian will accept custody of the shipped samples and verify that the sample identification number matches the COC record. Pertinent information about shipment, pickup, and courier will be entered in the “Remarks” section. The custodian then will enter sample identification number data into a bound logbook that is arranged by a project code and station number.

STANDARD OPERATING PROCEDURE

BE-SOP-03

Labeling, Packaging, and Shipping Samples

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) will be used to direct field personnel in the techniques and requirements of labeling samples for identification, packaging samples for safe transport, and shipping samples from the field to laboratory for analysis.

Proper labeling, packaging, transport, and shipping are necessary to maintain an accurate record to track the samples, as well as safe methods of packing and transporting samples.

2.0 MATERIALS

The term “environmental sample” refers to any sample that has less than reportable quantities of any hazardous constituents according to Department of Transportation (DOT) 49 CFR - Section 172.

Equipment required for labeling, packaging, and shipping environmental samples includes:

- Weatherproof labels for sample containers
- Coolers
- Contractor-grade plastic bags
- Sorbent pads
- Plastic zip-top bags, quart and gallon
- Clear tape
- Strapping tape
- Bubble wrap and/or foam inserts
- Wet ice or gel ice packs
- Cooler labels: “keep cool/refrigerate/do not freeze,” “this end up,” “fragile,” address, dangerous goods, excepted quantities, Saturday delivery (as necessary), etc.

3.0 PROCEDURES

This section describes the procedures for labeling, packaging, and shipping collected samples.

3.1 LABELING

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

- Project number
- Sampler name or initials
- Sample identification

- Sample date and time (in 24-hour format)
- Laboratory analysis methods required for sample jar
- Volume submitted
- Preservatives added to sample jar
- Sample matrix (soil, water, or other)
- Turn-around-time

Adhesive sample labels will be placed directly on the sample containers. If the labels do not adequately adhere because of moisture, secure the label by placing clear packaging tape over the label. Sample containers that are weighed by the laboratory prior to use **should not** have any additional labels 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.

3.2 PACKAGING

When packing sample containers for shipment, the steps below must be followed. Depending on how the sample temperatures are being maintained, follow either section 3.2.1 or 3.2.2.

1. Choose a cooler with structural integrity that will withstand shipment. Secure and tape the drain plug with duct tape.
2. Be sure that the caps on all containers are tight and will not leak. Make sure not to over-tighten and/or break the cap.
3. Ensure that the sample labels are intact, fully completed with the correct information, and that identification exactly matches the chain-of-custody record.
4. Use sufficient ice in packaging to ensure that samples are received by the laboratory at the proper temperature of $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$.
5. Wrap and package containers sufficiently to prevent cross contamination, and ensure that containers remain intact during shipment.

3.2.1 Wet Ice

Note that if shipping via commercial air transport (e.g Alaska Air Cargo, Goldstreak), gel ice MUST be used as wet ice is NOT accepted.

When packing samples with wet ice, the following steps must be taken:

1. Place a sorbent pad in the cooler.
2. Line the cooler with a large contractor grade plastic bag. This will contain the wet ice and prevent fluids from reaching the cooler vessel.
3. Place a layer of bubble wrap along the bottom of the cooler, inside the garbage bag.
4. Wrap each sample container in bubble wrap or place it in a foam insert.
5. Place all sample containers in separate re-sealable plastic bags. Remove excess air and seal the bags. Three volatile organic analysis vials may be placed in one re-sealable bag.
6. Place the wrapped and bagged sample containers into the cooler with caps up.
7. Fill excess space between sample containers with additional bubble wrap.
8. Place wet ice around all sample containers. If desired, wet ice can be placed into re-sealable plastic bags and then placed around all sample containers.

9. Securely fasten the large plastic bag.
10. Fill remaining headspace with additional packing material.

3.2.2 Gel Ice

When packing samples with gel ice packs, the following steps must be taken:

1. 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.
2. 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.
3. Place the containers into the cooler with caps up.
4. Fill excess space between sample containers with additional bubble wrap or gel ice.
5. Place another layer of bubble wrap along the top of the cooler, and as possible, place a layer of gel ice packs along the top of the cooler.
6. Fill remaining headspace with additional packing material.

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.

After either wet ice or gel ice have been placed in cooler, the following steps must be taken:

1. 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.
2. Place the completed Chain-of-Custody record for the laboratory into a plastic zip-top bag, tape the bag to the inner side of the cooler's lid, and then close the cooler.
3. Conduct a "shake test" by gently shaking the cooler and listen 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.
4. Wrap strapping tape around each end of the cooler two times to secure the lid. Place completed custody seals spanning from the side of the cooler to the top of the lid at both the front and back of the cooler, at diagonally opposed corners, so that the cooler cannot be opened without breaking the seals. Place clear tape over custody seals.
5. Attach an address label containing the name and address of the shipper to the top of the cooler. Attach other stickers 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.

3.3 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) for 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 send shipments.

Attach a shipping address label to the top or front of the cooler, with sender information. Samples that are being shipped as “Dangerous Goods in Excepted Quantities” must have the appropriate labelling and be declared as dangerous goods to the shipping carrier. However, the dangerous goods “candy-striped” form and the Notification to Caption (NOTOC) are not required (IATA 2016).

3.3.1 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 300 mL per cooler. The class number is 3, flammable liquid, UN 1230.

3.3.2 Water Sample Shipments

Water samples preserved with hydrochloric acid or other insignificant amounts of preservative are not shipped as dangerous goods. However, excess pre-preserved sample containers with preservative 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 300 mL per cooler, respectively. The class number is 8, corrosive.

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

4.0 REFERENCES

IATA. (2016). *Dangerous Goods Regulations (DGR) Limited/Excepted Quantities Labels*.

STANDARD OPERATING PROCEDURE

BE-SOP-04

Quality Control Samples

1.0 INTRODUCTION

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 matrices. Field QC samples are collected to ensure the reliability and validity of field and laboratory data.

2.0 PROCEDURE

The following sections describe different QC sample types that will be required in project-specific Work Plans.

2.1 FIELD DUPLICATE

A field duplicate is collected to evaluate whether sample matrix inhomogeneity, contaminant distribution, or sample collection methods affect analytical precision. The field sampler will ensure the primary and duplicate samples are effectively identical. The duplicate sample is collected from the same location, at the same time, with the same techniques, and the same matrix.

Frequency of field duplicates, at a minimum, are 1 blind field duplicate per day and 1 blind field duplicate per 10 samples for each analytical method and matrix for offsite laboratory analysis of all field samples

The ADEC Field Sampling Guidance (August 2017) requires field duplicates be submitted as blind samples with a unique sample number and collection time to the approved laboratory for analysis.

2.2 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE (MS/MSD)

An MS/MSD sample is collected to evaluate the precision and accuracy of laboratory procedures in the project sample matrix. The MS/MSD compound will be 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 the same sample identification and time, and denoted on the Chain of Custody (CoC) to ensure that the project MS/MSD pair is used in the laboratory report. The frequency of MS/MSD samples collected at a minimum, is 1 per 20 or fewer samples, or one for each analytical batch, whichever is more frequent. The required frequency of the MS/MSD sample collected is specified in the Quality Assurance Project Plan (QAPP) and/or project-specific Work Plan, and the evaluation process is specified in the QAPP.

2.3 TEMPERATURE BLANK

A temperature blank will 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 0-6 degrees Celsius (°C). Temperature blanks consist of plastic bottles filled with water, which the laboratory typically prepares. Once shipments are received by the laboratory, the temperature will be recorded on the CoC to document preservation requirements were met.

2.4 TRIP BLANKS

Trip blanks will accompany samples analyzed for volatile analysis including GRO, BTEX, and VOCs. Trip blanks are prepared by the laboratory and used to establish that the sample has not been contaminated by external sources during the transport of sample bottles to and from the field. Trip blanks are samples of reagent-grade water, and properly preserved in a controlled environment by the laboratory prior to field mobilization. Trip blanks should be kept with the sample containers throughout the sampling process and returned to the laboratory with the other samples. One trip blank must accompany each cooler containing VOC and/or GRO samples, or as specified in the QAPP or project-specific Work Plan, and the evaluation process is specified in the QAPP. All trip blanks will be labeled and included on the CoC. Trip blank sample times will generally be recorded as 0800 on the CoC.

2.5 EQUIPMENT BLANKS

Equipment blanks will be used to evaluate the effectiveness of a decontamination procedure. The equipment rinsate blank is collected by pouring deionized water onto or into the sampling equipment after the equipment has been decontaminated, and then collecting the rinsate water for analysis of an identical analytical suite to that performed for the associated primary sample(s). The required frequency of equipment rinsate blanks collected is specified in the QAPP and/or project-specific Work Plan, and the evaluation process is specified in the QAPP. Decontamination procedures should be performed according to the *Equipment Decontamination* SOP (BE-SOP-14).

STANDARD OPERATING PROCEDURE

BE-SOP-09

Groundwater Sample Collection

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) provides field operation and protocols applicable to the collection of representative water samples from groundwater monitoring wells and temporary well points. This SOP is consistent with the Alaska Department of Environmental Conservation (ADEC) *Field Sampling Guidance* (ADEC 2017) and with the U.S. Environmental Protection Agency (EPA) *Low-flow (Minimal Drawdown) Ground-Water Sampling Procedure* (EPA 1996). For specific sampling locations and analytes, refer to the project-specific Work Plan.

2.0 EQUIPMENT AND SUPPLIES

Groundwater sampling equipment will include, but is not limited to the following:

- Appropriate level of Personal Protective Equipment (PPE)
- Camera
- Logbook, weatherproof pen, sharpie, etc.
- RAE Systems MiniRAE photoionization detector (PID) (or similar)
- *Well Purge and Sampling Forms*
- Sample labels
- Sampling containers and packing materials
- Tape measure
- Oil/water interface probe
- Submersible (stainless steel centrifugal Proactive Monsoon pump with low-flow controller, or equivalent), bladder pump, or peristaltic pump
- Disposable Teflon bailers and twine
- 5-gallon bucket
- Graduated cylinder or beaker
- Yellow Springs Instruments (YSI) water-quality meter (or similar)
- Potable water and/or deionized water
- Tubing (Teflon and/or silicone)
- Liquinox, Alconox, or equivalent

3.0 PROCEDURES

The following sections describe methods of recording field observations, field instrument calibration, air monitoring, free product and water level measurements; and purging and groundwater sampling using a submersible or peristaltic pump.

3.1 RECORDING FIELD OBSERVATIONS

The *Well Purge and Sampling Form* is intended to capture the information routinely collected during the sampling process for established monitoring wells. The field logbook is intended to record all equipment calibration checks, the wells sampled, sampling start and end times, or any other pertinent information not captured on the Groundwater Sampling Data Form. All data collected from temporary well points will be recorded in the field logbook.

3.2 FIELD INSTRUMENT CALIBRATION

Field instruments will be calibrated in accordance with the manufacturer's recommended procedures and frequency for each instrument. Operation and maintenance manuals will be available in the field for reference. Calibrations will be evaluated at the beginning of each day prior to use. If any reading is outside $\pm 5\%$ from the expected calibration standard, the equipment will be re-calibrated. If after calibration, the instrument remains outside the expected calibration standard, the instrument will be removed from project use and replaced as soon as practicable.

3.3 AIR MONITORING

Air monitoring will be conducted to determine the presence of volatile organic compounds (VOCs) using a PID (MiniRAE 2000 or similar). PID readings will be monitored until stable and then recorded in the field logbook. Procedures in the Site-specific Safety and Health Plan (SSHP) will be followed if organic vapors are detected above concentrations listed in the air monitoring section of the SSHP. PID readings will be collected in the following situations:

- To monitor ambient conditions prior to removing the well plug and opening the well monument (either above ground or flush mount type).
- To monitor the ambient conditions in the breathing zone when opening the well or removing the well plug.
- To monitor the headspace immediately after removing the well plug.
- To monitor the breathing zone after the well plug has been removed.

3.4 FREE PRODUCT AND WATER LEVEL MEASUREMENT

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. The type and order of measurement activities include determining the reference elevation, taking product and water level measurements, removing free product, and measuring the total casing depth as described below:

- Reference Elevation:
 - Pre-existing reference elevation (mark or notch on the casing)
 - No pre-existing reference elevation (typically for new wells)
 - Place a mark on the outside of the top north side of the well casing with indelible ink
- Product and Water Level Measurements (measured to the nearest 0.01 foot):
 - Measure the depth to free product (if present)

- Measure the thickness of free product (if present)
- Measure the depth to groundwater
- Free Product Removal (if present and more than 0.1 feet thick):
 - Remove free product with a bailer or peristaltic pump
 - Determine the volume of product removed
 - Dispose in accordance with the project-specific Work Plan
- Total Well Depth (after well construction is complete or after sampling in established wells):
 - Measure the depth to the bottom of the well casing
 - Compare to constructed well depth to determine the thickness of silt

3.5 PURGING

Purging is the process by which stagnant water is removed from the location prior to sampling and replaced with groundwater from the adjacent formation. This allows for a representative sample to be collected from the actual aquifer condition.

Purging will be conducted in accordance with EPA and ADEC low-flow guidelines (EPA 1996, ADEC 2017). Monitoring wells will be purged, at minimum, the equivalent of three times the well volume, or until the specific conductance, temperature, and pH parameters stabilize. 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 the water volume to be purged is as follows:

Purge volume = 3 well casing volumes = (total depth of casing (ft) – depth to groundwater) * gallons per linear foot * 3. Refer to the *Well Purge and Sampling Form* for the various gallons per linear foot based on the casing diameter of the well.

$$V = *0.041D^2(d_2-d_1)$$

V= Volume in gallons

D = Inside diameter of well casing in inches

d_2 = Total depth of well in feet

d_1 = Depth to water surface in feet

*0.041 is based on a 1-inch diameter well.

Criteria for low-flow sampling are described below:

- Drawdown during purging will be less than 0.3 feet, if possible.
- Flow rates typically range from 0.1 to 1.0 liters per minute (0.03 to 0.3 gallons per minute), but higher rates are consistent with low-flow guidelines as long as the drawdown requirement is met.
- Water quality parameters will be measured and recorded as tabulated in Table 1.

If a well is purged dry, it will be allowed to recharge for 24 hours, or to 80% of its pre-purge volume. Without further purging, the well will be sampled. Water quality parameter stabilization is reached when three consecutive changes between successive readings at approximately 3-5 minute intervals are

within the criteria in Table 1. Turbidity readings consistently below 10 nephelometric turbidity units (NTU) are considered stabilized.

Table 1 Stability Criteria for Low-Flow Purging

Parameter ¹	Units	Recording Precision	Stability Criterion	Typical Value Range for Stability Criterion
pH	-	0.01	±0.1	5 to 8
Temperature	°C	0.01	±0.2°C or ±3%	0.1 to 15
Conductivity	µS/cm	1	±3%	80 to 1,000
Turbidity	NTU	0.1	± 10% or ± 1 NTU (whichever is greater)	0.3 to > 900
Oxidation Reduction Potential (ORP)	mV	1	± 10	-120 to 350
Dissolved Oxygen (DO)	mg/L	0.1	± 10% or 0.2 mg/L (whichever is greater)	0 to 12

Note: Stability criteria from ADEC *Field Sampling Guidance* (ADEC 2017).

¹ Only three parameters are required to stabilize, four when using temperature.

3.6 GROUNDWATER SAMPLE COLLECTION USING A SUBMERSIBLE OR PERISTALTIC PUMP

Low-flow sampling will use a submersible, bladder, or peristaltic pump. For 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. Samples should be collected using the following steps:

- Line the ground with plastic sheeting to provide a clean work environment
- 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 *Well Purge and Sampling Form*. For wells screened across the groundwater interface, a pump intake of 1.0 to 2.0 feet below the static water level is typically used. For wells with submerged screens, set the pump intake at the middle of the screened interval.
- Begin purging water into a container (i.e. 5-gallon bucket). Adjust the flow rate so that drawdown does not exceed 0.3 feet (where possible). The flow rate can be slowly increased or decreased as needed.
- After the turbidity of the water decreases, connect the flow-through cell to begin measuring stabilization parameters. Continue to purge until stabilization criteria are met (Table 1) or three well casing volumes are removed. Remove the supply line from the flow-through cell and place such that the purge water is captured in a container.
- Don new nitrile gloves prior to handling sample bottles.
- Collect samples in the appropriate containers (with preservatives if required by the analytical methods):

- If ADEC approves the use of a peristaltic pump for the collection of VOC samples, the following procedure will be followed: 40 mL vials for VOCs/GRO must be filled slowly 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.
 - If a Hydrasleeve groundwater sampler is used in conjunction with a peristaltic pump for VOC/GRO sample collection, the *Hydrasleeve Standard Operating Procedure: Sampling Ground Water with a HydraSleeve* will be followed.
- Remove the submersible pump or the tubing.
- Measure the total depth of the well as described in Section 3.4
- Record measurements on *Groundwater Purge and Sampling Form*.

Waste will be handled in accordance with the project-specific Work Plan.

4.0 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 come in contact with samples, will be decontaminated prior to use at a different location. The *Equipment Decontamination SOP* (BE-SOP-14) outlines the decontamination procedure. To ensure that representative conditions within the aquifer are captured during sample collection, the purge rate will be maintained at a rate that produces minimal drawdown until three well casings have been collected or until water quality parameters have stabilized as described in Section 3.5.

5.0 SAMPLE HANDLING, PRESERVATION, AND STORAGE

The following procedure will be followed for sample handling, preservation, and storage:

1. Transfer the sample into a labeled container
2. Preserve the sample or use pre-preserved sample bottles (if required by analytical method)
3. Cap the container and place into a cooler to maintain $4 \pm 2^{\circ}\text{C}$ (if required by analytical method)
4. Record all pertinent data in the site logbook and/or on the field data sheet
5. Complete the chain of custody form
6. Attach the custody seals to the cooler prior to shipment

Refer to the *Labeling, Packaging, and Shipping SOP* (BE-SOP-03) for procedures on labeling, packaging, and shipping samples.

6.0 DATA AND RECORD MANAGEMENT

The chain of custody form is signed over to the laboratory. A copy is kept with the sampling records. Refer to *Sample Chain of Custody* SOP (BE-SOP-02) for procedures on sample chain-of-custody.

7.0 QUALITY CONTROL AND QUALITY ASSURANCE

All field Quality Control (QC) sample requirements in the project-specific Work Plan must be followed. These 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 samples will be outlined in the project-specific Work Plan. Refer to the *Quality Control* SOP (BE-SOP-04) for procedures on quality control samples.

8.0 DECONTAMINATION

Refer to the *Equipment Decontamination* SOP (BE-SOP-14) for procedures on decontamination.

9.0 REFERENCES

ADEC. 2017 (August). Field Sampling Guidance.

EPA. 1996 (April). Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. EPA/540/S-95/504. R.W. Puls and M.J. Barcelona (authors).

STANDARD OPERATING PROCEDURE

BE-SOP-14

Equipment Decontamination

1.0 INTRODUCTION

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

2.0 MATERIALS

Materials used for decontamination, include but are not limited to the following:

- Modified Level D Personal Protective Equipment (PPE)
- Brushes, typically stiff bristle
- 5-gallon buckets
- Liquinox, Alconox, or equivalent
- Spray or rinse bottles, or pump sprayer
- Paper towels
- Potable water and/or deionized water
- Distilled or deionized water
- Other hand tools for gross contamination (shovels, brooms, etc.)
- Garbage bags
- Plastic sheeting
- Approved waste containers

3.0 PROCEDURE

Decontamination of reusable sampling equipment will be conducted between sample locations and at the end of each work day. Drilling and excavation equipment will be decontaminated prior to beginning site activities, at the termination of site activities, and, if used for sampling, prior to each sampling event. Materials removed during decontamination will be collected and managed with similar waste streams in accordance with the project-specific Work Plan.

3.1 DECONTAMINATION AREA

Identify a localized decontamination area for drill rigs and other sampling equipment. Select the decontamination area so that decontamination fluids and soil wastes can be managed in a controlled area with minimal risk to the surrounding environment. The decontamination area should be large enough to allow temporary storage of cleaned equipment and materials before use, as well as to stage drums of decontamination investigation-derived waste (IDW). In the case of large decontamination

areas (for example, for hollow-stem auger decontamination), line each area with a heavy-gauge plastic sheeting and include a collection system designed to capture potential decontamination IDW.

Decontamination areas should be laid out in such a manner as to prevent overspray while performing equipment and personnel decontamination.

Smaller decontamination tasks, such as surface water and sediment equipment decontamination, may take place at the sampling locations. In this case, all required decontamination supplies and equipment must be mobilized to the site and smaller decontamination areas for personnel and portable equipment will be provided as necessary. These locations will include basins or tubs to capture decontamination IDW, which will be transferred to larger containers as necessary.

3.2 PERSONNEL AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personnel decontamination involves removal of gross contamination first. Contaminated solids, such as mud, should be scraped and wiped from boots, and gloves should be removed by rolling off the hands, starting at the cuff, in such a way that the gloves are turned inside out during removal. If necessary, a clean pair of gloves should be worn to complete the boot cleaning process. Boots can be cleaned while being worn or following removal. Any remaining contamination should be removed using soapy water, brushes or other similar means such as a pressure washer, if available. Once all debris is removed, rinse with clean water. If boots are not laden with gross solid materials, a brush can simply 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 disposed of and a replacement pair obtained before conducting any further field activities.

Following removal and cleaning of reusable PPE, field personnel should wash their hands or any exposed body parts which may have been in contact with the associated contaminated substances.

3.3 SAMPLING EQUIPMENT DECONTAMINATION

All reusable sampling equipment will be cleaned prior to use. The following procedure will be used by field personnel:

1. Remove as much gross contamination as possible off equipment at the sampling site.
2. If heavy petroleum residuals are encountered during sampling, an appropriate solvent such as methanol should be used to remove any petroleum residues from sampling equipment.
3. Wash water-resistant equipment thoroughly and vigorously with potable water containing laboratory-grade detergent such as Liquinox, Alconox, or equivalent. Use a bristle brush or similar utensil to remove any remaining residual contamination.
4. Rinse equipment thoroughly with potable water (1st rinse).
5. Rinse equipment thoroughly with distilled or deionized water (2nd rinse).
6. For sensitive field instruments, rinse equipment with distilled, deionized, or reagent grade water (3rd rinse).
7. Air dry at a location where dust or other fugitive contaminants may not contact the sample equipment. Alternatively, wet equipment may be dried with a clean, disposable paper towel to assist the drying process. All equipment should be dry before reuse.

Clean, dry sampling equipment will be stored within a protective medium (plastic bag, etc.) or staged in a clean area for future use.

Cleaning and decontamination of the equipment will be accomplished in stages and in such a way that the contamination does not discharge into the environment. Cleaning and decontamination wastes must be properly contained and disposed of in accordance with applicable state and federal regulations.

Disposable sampling equipment should be used whenever possible (e.g. drum thieves, bailers, spoons, etc.) to minimize the need to decontaminate these items.

3.4 HEAVY EQUIPMENT DECONTAMINATION

Gross decontamination of equipment will be performed prior to transporting or walking equipment within different areas or between contaminated areas or exclusion zones. Gross decontamination will focus on minimizing the spread of contaminated media as a result of equipment movement or transport. This decontamination process will use dry methods (brooms, wipes, shovels, etc.) within the exclusion zone in order to remove large, easily dislodged deposits of soil and other contaminated media prior to exiting the exclusion zone. The Site Manager may increase the level of gross decontamination based upon the effectiveness of dry decontamination.

Final decontamination will occur when equipment is no longer needed on site within a decontamination pad to allow for the collection of decontamination materials, sludge, and water. When equipment is removed permanently, it will be decontaminated using brushes and/or a pressure washer with a detergent wash followed by a fresh water rinse. All areas of the equipment that were potentially contaminated will be decontaminated as described in Section 3.3.

3.5 DRY DECONTAMINATION

Where dry decontamination is required, the following steps will be followed at the sampling site by field personnel:

1. Remove as much debris or contamination as possible using a dry brush or paper towel.
2. Spray equipment with a detergent/water mix.
3. Wipe down with a clean, dry paper towel.
4. Spray equipment with potable water.
5. Wipe down with a clean, dry paper towel.
6. Spray equipment with deionized or distilled water.
7. Wipe down with a clean, dry paper towel.

Dispose of all paper towels with other IDW and disposable sampling supplies.

4.0 INTERFERENCES

Improper decontamination may cause cross-contamination between sampling locations, analytical samples, or field screening instruments. To prevent cross-contamination of analytical samples, sampling equipment will be disposed of after one use, or decontaminated after, or prior to each use. Additionally, laboratory-certified clean glassware will only be used for storing analytical samples.

5.0 QUALITY CONTROL

Quality Control (QC) samples may be collected to verify that the decontamination process is effective. QC samples include the equipment rinsate blank and the equipment wipe sample, which are described in detail in the *Quality Control* SOP (BE-SOP-04).

STANDARD OPERATING PROCEDURE

BE-SOP-20

Water Quality Measurements

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) describes the methods for calibrating, maintaining, and operating the YSI 556 Multi-Parameter Water Quality Meter. The YSI 556 simultaneously measures numerous water quality parameters including temperature, conductivity, salinity, dissolved oxygen (DO), pH, and oxidation Reduction Potential (ORP). This SOP also describes the guidelines of operation for the Hach Portable Turbidity Meter.

2.0 EQUIPMENT

Water quality meters and instruments vary. Below is a list of the typical instruments used in the field:

- YSI 556 MDS Multi-Parameter Datalogger
- YSI 6-Series Sonde Field Cable
- Flow-Thru Cell
- Hach 2100P Portable Turbidity Meter
- Discharge hoses and fittings to attach sample tubing to the flow-thru cell
- Distilled water
- Calibration solution for YSI (pH 4, 7, and 10, ORP, and conductance)

3.0 PROCEDURES

It is important to note that different instrument models exist and therefore the appropriate operation and procedure manual should be referenced prior to use.

3.1 CALIBRATION FOR YSI 556

Calibration of all instruments for all field parameters needs to be conducted daily. Calibration readings should be documented in the field logbook. If a field instrument will not calibrate, perform troubleshooting as described in the manufacturer's manual. If the issue cannot be resolved, use a backup instrument. If that is not an option, contact the PM on whether data collection will continue or any other corrective actions should be taken. Flag any data recorded from a meter with suspected calibration problems on the field forms. Calibrate the YSI for pH, conductivity, ORP, and DO.

3.1.1 pH Calibration

Always calibrate pH with a 3-point calibration method. The 3-point calibration method accounts for the full pH range and assures maximum accuracy when the pH of the media to be monitored cannot be anticipated.

3.2 YSI MULTI-PARAMETER WATER QUALITY METER

3.2.1 Groundwater parameters

Follow the general procedure for collecting water quality parameters using a flow-thru cell:

- Secure the multi-meter probe to the flow-thru cell. Connect a short discharge tube to the effluent connector at the top of the flow-thru cell and run the other end of the discharge tube into a purge water container.
- Place the tube from the pump directly into the 5-gallon purge water bucket and start to purge approximately half a minute or until the purge water begins to visually clear up. The intent is to limit any initially high turbidity water from filling and settling in the flow-thru cell.
- Once visually clear, turn off pump briefly and secure the tube from the pump to the influent connector at the bottom of the flow-thru cell. Turn on the pump again and allow the flow-thru cell to completely fill with water.
- Begin low flow purging of the well at a flow rate of approximately 1 liter (0.25 gallons) every 3-5 minutes.
- Routinely measure and record DO, ORP, conductivity, pH, turbidity, temperature, and the depth to groundwater every 3-5 minutes until stabilized. A minimum of three recordings will be monitored and recorded.
- Continue to monitor until stabilized or until three well casing volumes have been purged. Use the following stabilization parameters:
 - $\pm 3\%$ for temperature (minimum of $\pm 0.2\text{ }^{\circ}\text{C}$),
 - ± 0.1 for pH,
 - $\pm 3\%$ for conductivity,
 - $\pm 10\text{ mv}$ for redox potential,
 - $\pm 10\%$ for dissolved oxygen (DO), and
 - $\pm 10\%$ for turbidity.

Note: Low flow purging and sampling are particularly useful for wells that purge dry or take one hour or longer to recover. If a well is low yield and purged dry, do not collect a sample until it has recharged to approximately 80% of its pre-purge volume, when practical.

- When parameters have stabilized, record final measurements and collect samples as per the project-specific Work Plan.

3.2.2 Surface Water Parameters

When collecting surface water samples a flow-thru cell is not required. Instead connect the probe sensor guard to the connector nut to protect the sensors. Place the probe in the water being careful not to disturb the bottom. Let sit for about 5 – 10 minutes and then take parameters.

3.3 HACH 2100P PORTABLE TURBIDITY METER

The Hach Model 2100P Portable Turbidimeter measures turbidity from 0.01 to 1000 NTU in automatic range mode with automatic decimal point placement. Use the following generic procedure for turbidity measurements:

- Collect a representative sample in a clean container. Fill a sample cell to the line (about 15 mL), taking care to handle the sample cell by the top. Cap the cell.
- Wipe the cell with a soft cloth to remove water spots and fingerprints.
- Apply a thin film of silicone oil. Wipe with a soft cloth to obtain an even film over the entire surface.
- Turn the instrument on and place on a flat sturdy surface.
- Insert the sample cell in the instrument cell compartment so the diamond or orientation mark aligns with the raised orientation mark in front of the cell compartment.
- Press READ and the result will show in units of NTU.

Refer to the user's manual provided with rental equipment for calibration and maintenance documentation.

4.0 REFERENCES

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

YSI Environmental. 2009 (August). *YSI 556 Multi Probe System Operations Manual*

STANDARD OPERATING PROCEDURE

BE-SOP-21

Groundwater and LNAPL Measurements

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) describes the procedures and equipment that should be used to determine water levels, depth to floating product, or total depth in a groundwater monitoring well. Groundwater measurements can be used for several purposes during field activities, including but not limited to, measuring changes in time, and determining the magnitude of horizontal and vertical hydraulic gradients in an aquifer system.

A water level meter will typically be used to measure depth to groundwater (DTW), depth to product (DTP), and total depth (TD) in wells. If Light Non-Aqueous Phase Liquid (LNAPL) is present in the well, an oil-water interface probe will be used.

2.0 EQUIPMENT

Groundwater and LNAPL measurement equipment will include:

- Water Level meter with audible alarm and a cable marked in 0.01 foot increments
- Oil-water interface meter (only if LNAPL layer is suspected)
- Decontamination equipment

2.1 DEPTH TO WATER/DEPTH TO LNAPL MEASUREMENT

If the well is sealed with an airtight cap, allow time for the pressure to equilibrate after the cap is removed before measuring water levels. Take measurements until consecutive readings are within 0.01 foot.

Before taking measurements, ensure a reference point is established. For easy reference, mark the point 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. If no reference mark is present, mark the north side of the monitoring well casing.

Measure DTW and DTP as follows:

- With the water level indicator switched on, slowly lower the water level meter or oil-water indicator 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 tip and tape free-fall down the well. Always hold onto the meter's reel handle.
- 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.

- If LNAPL is present in the well, measure and record the depth from the TOC reference point to the top surface of the LNAPL layer (that is, DTP). The oil-water indicator probe alarm will sound a continuous tone when LNAPL is detected.
- Continue to lower the probe until the meter indicates the presence of groundwater. The alarm will typically emit a beep when water is detected. Measure the first static groundwater level and record the measurement (DTW) from the reference point to the top of the static groundwater level.
- Record the measurements in the field logbook or on the *Well Purge and Sampling Form*.

2.2 TOTAL DEPTH MEASUREMENT

Use the following procedures to measure the TD of a groundwater monitoring well:

- Slowly lower the water level meter until the cable goes slack. Do not let the probe tip and tape free-fall down the well. Always hold onto the meter's reel handle.
- Gently raise and lower the water level meter probe to tap the bottom of the well.
- Record the reading on the cable at the established reference point to the nearest 0.01 foot.

If there is an offset between the bottom of the probe and the water level sensor, adjust the measurement accordingly. Record the TD measurement in the field logbook or on the *Well Purge and Sampling Form*.

STANDARD OPERATING PROCEDURE

BE-SOP-51

Material Handling/ Manual Lifting

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) describes the guidelines that should be met when material handling/manual lifting at and around a job site.

2.0 GENERAL POLICY

Back injuries are one of the most common and most preventable injuries on the job site. After determining the object is within lifting capabilities, warm up by stretching before doing any lifting or strenuous work. Use proper lifting procedures - bend at the knees rather than the waist, and use your leg muscles, not your back. Keep a wide base of support by standing with legs hip distance apart, and never twist while lifting. Take proper breaks during repetitive tasks, and get help when moving heavy or awkward objects. Use lifting devices when possible. If necessary, have a competent worker or supervisor demonstrate the proper method of bending and lifting.

Identifying when materials require lifting equipment, such as slings and chokers, is key. Conduct an evaluation of the proper equipment to use to assist in lifting if manual lifting techniques are not safe.

STANDARD OPERATING PROCEDURE

BE-SOP-52

Driver Safety Program

1.0 INTRODUCTION

This standard operating procedure (SOP) is for all individuals who will operate motorized vehicles.

2.0 DRIVER SAFETY AND POLICIES

Statistics show that many accidents involve those in company vehicles. The purpose of this SOP is to avoid injuries, possible loss of life, and costs related to accidents involving company vehicles.

2.1 COMPANY AUTO USAGE POLICIES

- Company vehicles are for company business only, and are to be driven by active employees only (unless permission is given by a supervisor) who are appropriately licensed, certified, and/or trained for the vehicle in which they are operating.
- Vehicles are to be maintained in good operating condition. Drivers will conduct a complete safety walk-around prior to entering the vehicle and inspect the vehicle on a daily basis prior to use.
- Occupants will wear seatbelts when vehicles are in motion.
- Vehicles may not be operated while using cell phones. This includes sending or receiving calls, texting, emailing or any other application on the phone (this includes personal vehicles on company business).
- Vehicles are strictly prohibited from use while under the influence of alcohol.
- Vehicles may not be operated while eating or drinking, reading, or using other devices that distract from driving.
- Vehicles must be driven within the laws and regulations for operating motorized vehicles (i.e. valid license, posted speed limits, etc.) and within the manufacturer's operating guidelines.
- Vehicles may not be used to transport alcohol.
- Vehicles must be clean of all garbage, paper, boxes, etc. when no longer in use.
- Smoking is prohibited in company vehicles.
- Vehicle loads must be secured and within the manufacturer's specs and the legal size/weight limits.
- If involved in an accident while on company business, it must be reported to the Safety Officer as soon as possible. All required forms must be completed in a timely manner.

2.2 NEAR MISS POLICY

Near misses should be reported to one's immediate supervisor and forwarded to the Safety Officer. An investigation will be conducted as soon as possible.

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APPENDIX D

Project Action Limits and Laboratory Limits

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Project Action Limits and Laboratory Limits

Analyte	Method	CASRN	c/nc/m	Units	Project Action Limit ¹	Laboratory Limits ²		
						DL	LOD	LOQ
POL								
Gasoline range organics (GRO)	AK101	NS	nc	µg/L	2200	20	50	100
Diesel range organics (DRO)	AK102	NS	nc	µg/L	1500	100	200	500
Residual range organics (RRO)	AK103	NS	nc	µg/L	1100	79	200	1000
Metals/Inorganics								
Dissolved Lead	SW6020A	7439-92-1	nc	µg/L	15	0.05	0.1	1
Dissolved Zinc	SW6020A	7440-66-6	nc	µg/L	6000	5	10	20
Dissolved Iron	SW6020A	7439-89-6	-	µg/L	N/A	50	100	200
Dissolved Manganese	SW6020A	7439-96-5	-	µg/L	N/A	0.25	0.5	1
Sulfate	SW9056A	14808-79-8	-	µg/L	N/A	125	250	500
Nitrate + Nitrite	SM 4500-NO3 E	NS	-	µg/L	N/A	20	50	100
VOC								
Benzene	SW8260B	71-43-2	ca	µg/L	4.6	0.1	0.2	1
Ethylbenzene	SW8260B	100-41-4	ca	µg/L	15	0.1	0.2	1
m/p-Xylenes ⁴	SW8260B	136777-61-2	nc	µg/L	190	0.21	0.5	2
o-Xylene ⁴	SW8260B	95-47-6	nc	µg/L	190	0.1	0.2	1
Toluene	SW8260B	108-88-3	nc	µg/L	1100	0.1	0.2	1
PAH								
Acenaphthene	SW8270D SIM	83-32-9	nc	µg/L	530	0.005	0.01	0.02
Acenaphthylene	SW8270D SIM	208-96-8	nc	µg/L	260	0.005	0.01	0.02
Anthracene	SW8270D SIM	120-12-7	nc	µg/L	43	0.005	0.01	0.02
Benz[a]anthracene	SW8270D SIM	56-55-3	m	µg/L	0.12	0.005	0.01	0.02
Benzo[a]pyrene	SW8270D SIM	50-32-8	m	µg/L	0.034	0.005	0.01	0.02
Benzo[b]fluoranthene	SW8270D SIM	205-99-2	m	µg/L	0.34	0.005	0.01	0.02
Benzo[g,h,i]perylene	SW8270D SIM	191-24-2	nc	µg/L	0.26	0.005	0.01	0.02
Benzo[k]fluoranthene	SW8270D SIM	207-08-9	m	µg/L	0.8	0.005	0.01	0.02
Chrysene	SW8270D SIM	218-01-9	m	µg/L	2	0.005	0.01	0.02
Dibenz[a,h]anthracene	SW8270D SIM	53-70-3	m	µg/L	0.034	0.005	0.01	0.02
Fluoranthene	SW8270D SIM	206-44-0	nc	µg/L	260	0.005	0.01	0.02
Fluorene	SW8270D SIM	86-73-7	nc	µg/L	290	0.005	0.01	0.02
Indeno[1,2,3-cd]pyrene	SW8270D SIM	193-39-5	m	µg/L	0.19	0.005	0.01	0.02
Methylnaphthalene, 1-	SW8270D SIM	90-12-0	ca	µg/L	11	0.005	0.01	0.02
Methylnaphthalene, 2-	SW8270D SIM	91-57-6	nc	µg/L	36	0.005	0.01	0.02
Naphthalene	SW8270D SIM	91-20-3	ca	µg/L	1.7	0.01	0.02	0.05
Phenanthrene	SW8270D SIM	85-01-8	nc	µg/L	170	0.005	0.01	0.02
Pyrene	SW8270D SIM	129-00-0	nc	µg/L	120	0.005	0.01	0.02

Notes:
¹ Project action limits are the Table C groundwater cleanup levels in 18 AAC 75 (ADEC 2017).

² Laboratory limits for all methods from EMAX.

³ Analyte not listed in ADEC Table C. Project Action Limit is listed as N/A.

⁴ The total xylenes cleanup level is presented for m,p-xylenes and o-xylene. For non-detect results, the LODs will be summed.

ca = carcinogen

DL = detection limit

LOD = limit of detection

LOQ = limit of quantitation

m = mutagen

N/A = not applicable

nc = noncarcinogen

NS = not specified

µg/L = microgram(s) per liter

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APPENDIX E

Laboratory Certifications

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CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

EMAX Laboratories, Inc.

1835 W. 205th Street

Torrance, CA 90501

has been assessed by ANAB
and meets the requirements of

ISO/IEC 17025:2005 and DoD-ELAP

while demonstrating technical competence in the field of

TESTING

Refer to the accompanying Scope of Accreditation for information regarding the types of tests to which this accreditation applies.

L2278

Certificate Number

ANAB Approval

Certificate Valid: 11/13/2017-01/10/2020
Version No. 001 Issued: 11/13/2017



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



ANSI-ASQ National Accreditation Board

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 AND DOD
QUALITY SYSTEMS MAUAL FOR ENVIRONMENTAL
LABORATORIES (DOD QSM V5.0)**

EMAX Laboratories, Inc.

1835 W. 205th Street
Torrance, CA 90501
Kenette Pimentel
310-618-8889

TESTING

Valid to: **January 10, 2020**

Certificate Number: **L2278**

Environmental

Non-Potable Water

Technology	Method	Analyte
GC	AK101	GRO
GC	AK102	DRO
GFAA	CA 939M	Organo Lead
Platinum Electrode	EPA 120.1	Specific Conductance
Titrimetric	EPA 130.2	Hardness
Electrode	EPA 150.1	pH
Gravimetric	EPA 160.1	TDS
Gravimetric	EPA 160.2	TSS
Gravimetric	EPA 160.3	Total Residue
Gravimetric	EPA 160.5	Settleable Residue
Turbidimetric	EPA 180.1	Turbidity
ICP	EPA 200.7	Aluminum
ICP	EPA 200.7	Antimony
ICP	EPA 200.7	Arsenic
ICP	EPA 200.7	Barium
ICP	EPA 200.7	Beryllium
ICP	EPA 200.7	Boron
ICP	EPA 200.7	Cadmium
ICP	EPA 200.7	Calcium
ICP	EPA 200.7	Chromium
ICP	EPA 200.7	Cobalt





Non-Potable Water		
Technology	Method	Analyte
ICP	EPA 200.7	Copper
ICP	EPA 200.7	Iron
ICP	EPA 200.7	Lead
ICP	EPA 200.7	Lithium
ICP	EPA 200.7	Magnesium
ICP	EPA 200.7	Manganese
ICP	EPA 200.7	Molybdenum
ICP	EPA 200.7	Nickel
ICP	EPA 200.7	Potassium
ICP	EPA 200.7	Selenium
ICP	EPA 200.7	Silver
ICP	EPA 200.7	Sodium
ICP	EPA 200.7	Strontium
ICP	EPA 200.7	Thallium
ICP	EPA 200.7	Tin
ICP	EPA 200.7	Titanium
ICP	EPA 200.7	Vanadium
ICP	EPA 200.7	Zinc
ICP-MS	EPA 200.8	Aluminum
ICP-MS	EPA 200.8	Antimony
ICP-MS	EPA 200.8	Arsenic
ICP-MS	EPA 200.8	Barium
ICP-MS	EPA 200.8	Beryllium
ICP-MS	EPA 200.8	Boron
ICP-MS	EPA 200.8	Cadmium
ICP-MS	EPA 200.8	Calcium
ICP-MS	EPA 200.8	Chromium
ICP-MS	EPA 200.8	Cobalt
ICP-MS	EPA 200.8	Copper
ICP-MS	EPA 200.8	Iron
ICP-MS	EPA 200.8	Lead
ICP-MS	EPA 200.8	Lithium
ICP-MS	EPA 200.8	Magnesium
ICP-MS	EPA 200.8	Manganese
ICP-MS	EPA 200.8	Molybdenum
ICP-MS	EPA 200.8	Nickel
ICP-MS	EPA 200.8	Potassium
ICP-MS	EPA 200.8	Selenium



Non-Potable Water		
Technology	Method	Analyte
ICP-MS	EPA 200.8	Silver
ICP-MS	EPA 200.8	Sodium
ICP-MS	EPA 200.8	Strontium
ICP-MS	EPA 200.8	Thallium
ICP-MS	EPA 200.8	Tin
ICP-MS	EPA 200.8	Titanium
ICP-MS	EPA 200.8	Uranium
ICP-MS	EPA 200.8	Vanadium
ICP-MS	EPA 200.8	Zinc
IC	EPA 218.6	Hexavalent Chromium
COLD VAPOR	EPA 245.1	Mercury
IC	EPA 300.0	Fluoride
IC	EPA 300.0	Chloride
IC	EPA 300.0	Nitrite
IC	EPA 300.0	Bromide
IC	EPA 300.0	Nitrate
IC	EPA 300.0	Phosphate
IC	EPA 300.0	Sulfate
IC	EPA 300.0	Bromate
IC	EPA 300.0	Chlorate
IC	EPA 300.0	Nitrate-Nitrite
IC	EPA 300M	Lactate
IC	EPA 300M	Acetate
IC	EPA 300M	Propionate
IC	EPA 300M	Butyrate
IC	EPA 300M	Pyruvate
IC	EPA 310.1	Alkalinity
IC	EPA 314.0	Perchlorate
Spectrometric	EPA 353.3	Nitrate-N
Spectrometric	EPA 354.1	Nitrite-N
Spectrometric	EPA 365.2	Ortho-phosphate
Spectrometric	EPA 335.2	Cyanide
Spectrometric	EPA 350.2	Ammonia
Spectrometric	EPA 351.3	TKN
Spectrometric	EPA 365.2	Phosphorus
Spectrometric	EPA 370.1	Silica
Titrimetric	EPA 376.1	Sulfide
Spectrometric	EPA 376.2	Sulfide



Non-Potable Water		
Technology	Method	Analyte
Electrode	EPA 405.1	BOD
Spectrometric	EPA 410.4	COD
Combustion-IR	EPA 415.1	TOC
Spectrometric	EPA 420.1	Phenols
Spectrometric	EPA 425.1	MBAS
GC	EPA 504.1	DBCP
GC	EPA 504.1	EDB
GC	EPA 608	Aldrin
GC	EPA 608	alpha-BHC
GC	EPA 608	beta-BHC
GC	EPA 608	delta-BHC
GC	EPA 608	gamma-BHC (Lindane)
GC	EPA 608	DDD (4,4)
GC	EPA 608	DDE (4,4)
GC	EPA 608	DDT (4,4)
GC	EPA 608	Dieldrin
GC	EPA 608	Endosulfan I
GC	EPA 608	Endosulfan II
GC	EPA 608	Endosulfan sulfate
GC	EPA 608	Endrin
GC	EPA 608	Endrin Aldehyde
GC	EPA 608	Heptachlor
GC	EPA 608	Heptachlor epoxide
GC	EPA 608	Methoxychlor
GC	EPA 608	alpha-Chlordane
GC	EPA 608	gamma-Chlordane
GC	EPA 608	Endrin Ketone
GC	EPA 608	Toxaphene
GC	EPA 608	Technical Chlordane
GC	EPA 608	cis-Nonachlor
GC	EPA 608	DDD (2,4)
GC	EPA 608	DDE (2,4)
GC	EPA 608	DDT (2,4)
GC	EPA 608	Mirex
GC	EPA 608	Oxychlordane
GC	EPA 608	trans-Nonachlor
GC	EPA 608	PCB1016
GC	EPA 608	PCB1221



Non-Potable Water		
Technology	Method	Analyte
GC	EPA 608	PCB1232
GC	EPA 608	PCB1242
GC	EPA 608	PCB1248
GC	EPA 608	PCB1254
GC	EPA 608	PCB1260
GC	EPA 608	PCB1262
GC	EPA 608	PCB1268
GC-MS	EPA 624	Acrolein
GC-MS	EPA 624	Acrylonitrile
GC-MS	EPA 624	Benzene
GC-MS	EPA 624	Bromodichloromethane
GC-MS	EPA 624	Bromoform
GC-MS	EPA 624	Bromomethane
GC-MS	EPA 624	Carbon tetrachloride
GC-MS	EPA 624	Chlorobenzene
GC-MS	EPA 624	2-Chloroethyl vinyl ether
GC-MS	EPA 624	Chloroethane
GC-MS	EPA 624	Chloroform
GC-MS	EPA 624	Chloromethane
GC-MS	EPA 624	Dibromochloromethane
GC-MS	EPA 624	1,1-Dichloroethane
GC-MS	EPA 624	1,2-Dichloroethane
GC-MS	EPA 624	1,2-Dichlorobenzene
GC-MS	EPA 624	1,3-Dichlorobenzene
GC-MS	EPA 624	1,4-Dichlorobenzene
GC-MS	EPA 624	Dichlorodifluoromethane
GC-MS	EPA 624	1,1-Dichloroethene
GC-MS	EPA 624	cis-1,2-Dichloroethene
GC-MS	EPA 624	trans-1,2-Dichloroethene
GC-MS	EPA 624	1,2-Dichloropropane
GC-MS	EPA 624	cis-1,3-Dichloropropene
GC-MS	EPA 624	trans-1,3-Dichloropropene
GC-MS	EPA 624	Ethylbenzene
GC-MS	EPA 624	Methylene Chloride
GC-MS	EPA 624	tert-Butyl methyl ether
GC-MS	EPA 624	Styrene
GC-MS	EPA 624	1,1,2,2-Tetrachloroethane
GC-MS	EPA 624	Tetrachloroethene



Non-Potable Water

Technology	Method	Analyte
GC-MS	EPA 624	Toluene
GC-MS	EPA 624	1,1,1-Trichloroethane
GC-MS	EPA 624	1,1,2-Trichloroethane
GC-MS	EPA 624	1,2,4-Trichlorobenzene
GC-MS	EPA 624	Trichloroethene
GC-MS	EPA 624	Trichlorofluoromethane
GC-MS	EPA 624	1,1,2-Trichloro 1,2,2-trifluoroethane
GC-MS	EPA 624	Vinyl Chloride
GC-MS	EPA 624	m-Xylene & p-xylene
GC-MS	EPA 624	o-Xylene
GC-MS	EPA 625	Acenaphthene
GC-MS	EPA 625	Acenaphthylene
GC-MS	EPA 625	Aniline
GC-MS	EPA 625	Anthracene
GC-MS	EPA 625	Azobenzene
GC-MS	EPA 625	Benzidine
GC-MS	EPA 625	Benzo(a)anthracene
GC-MS	EPA 625	benzo(a)pyrene
GC-MS	EPA 625	Benzo(b)fluoranthene
GC-MS	EPA 625	Benzo(e)pyrene
GC-MS	EPA 625	Benzo(g,h,i)perylene
GC-MS	EPA 625	Benzo(k)fluoranthene
GC-MS	EPA 625	Benzoic Acid
GC-MS	EPA 625	Benzyl Alcohol
GC-MS	EPA 625	Biphenyl
GC-MS	EPA 625	bis(2-chloroethoxy)methane
GC-MS	EPA 625	bis(2-chloroethyl)ether
GC-MS	EPA 625	bis(2-chloroisopropyl)ether
GC-MS	EPA 625	bis(2-Ethylhexyl)adipate
GC-MS	EPA 625	bis(2-Ethylhexyl)phthalate
GC-MS	EPA 625	4-Bromophenyl-phenylether
GC-MS	EPA 625	Butylbenzylphthalate
GC-MS	EPA 625	Carbazole
GC-MS	EPA 625	4-Chloro-3-methylphenol
GC-MS	EPA 625	4-Chloroaniline
GC-MS	EPA 625	2-Chloronaphthalene
GC-MS	EPA 625	2-Chlorophenol



Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 625	4-Chlorophenyl-phenylether
GC-MS	EPA 625	Chrysene
GC-MS	EPA 625	Dibenzo(a,h)anthracene
GC-MS	EPA 625	Dibenzofuran
GC-MS	EPA 625	1,2-Dichlorobenzene
GC-MS	EPA 625	1,3-Dichlorobenzene
GC-MS	EPA 625	1,4-Dichlorobenzene
GC-MS	EPA 625	3,3'-Dichlorobenzidine
GC-MS	EPA 625	2,4-Dichlorophenol
GC-MS	EPA 625	Diethylphthalate
GC-MS	EPA 625	2,6-Dimethylnaphthalene
GC-MS	EPA 625	2,4-Dimethylphenol
GC-MS	EPA 625	Dimethylphthalate
GC-MS	EPA 625	Di-n-butylphthalate
GC-MS	EPA 625	4,6-Dinitro-2-methylphenol
GC-MS	EPA 625	2,4-Dinitrophenol
GC-MS	EPA 625	2,4-Dinitrotoluene
GC-MS	EPA 625	2,6-Dinitrotoluene
GC-MS	EPA 625	Di-n-octylphthalate
GC-MS	EPA 625	1,2-Diphenylhydrazine
GC-MS	EPA 625	Fluoranthene
GC-MS	EPA 625	Fluorene
GC-MS	EPA 625	Hexachlorobenzene
GC-MS	EPA 625	Hexachlorobutadiene
GC-MS	EPA 625	Hexachlorocyclopentadiene
GC-MS	EPA 625	Hexachloroethane
GC-MS	EPA 625	Indeno(1,2,3-cd)pyrene
GC-MS	EPA 625	Isophorone
GC-MS	EPA 625	1-Methylnaphthalene
GC-MS	EPA 625	2-Methylnaphthalene
GC-MS	EPA 625	1-Methylphenanthrene
GC-MS	EPA 625	2-Methylphenol
GC-MS	EPA 625	4-Methylphenol
GC-MS	EPA 625	Naphthalene
GC-MS	EPA 625	2-Nitroaniline
GC-MS	EPA 625	3-Nitroaniline
GC-MS	EPA 625	4-Nitroaniline
GC-MS	EPA 625	Nitrobenzene



Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 625	2-Nitrophenol
GC-MS	EPA 625	4-Nitrophenol
GC-MS	EPA 625	n-Nitrosodimethylamine
GC-MS	EPA 625	n-Nitroso-di-n-propylamine
GC-MS	EPA 625	n-Nitrosodiphenylamine
GC-MS	EPA 625	Pentachlorophenol
GC-MS	EPA 625	Perylene
GC-MS	EPA 625	Phenanthrene
GC-MS	EPA 625	Phenol
GC-MS	EPA 625	Pyrene
GC-MS	EPA 625	Pyridine
GC-MS	EPA 625	2,3,4,6-Tetrachlorophenol
GC-MS	EPA 625	1,2,4-Trichlorobenzene
GC-MS	EPA 625	2,3,4-Trichlorophenol
GC-MS	EPA 625	2,3,5-Trichlorophenol
GC-MS	EPA 625	2,4,5-Trichlorophenol
GC-MS	EPA 625	2,4,6-Trichlorophenol
GC-MS	EPA 625	2,3,5-Trimethylnaphthalene
Gravimetric	EPA 1664A / 1664 B	Oil & Grease
Pensky-Martens	EPA 1010 / 1010A	Ignitability
ICP	EPA 6010B / 6010C	Aluminum
ICP	EPA 6010B / 6010C	Antimony
ICP	EPA 6010B / 6010C	Arsenic
ICP	EPA 6010B / 6010C	Barium
ICP	EPA 6010B / 6010C	Beryllium
ICP	EPA 6010B / 6010C	Boron
ICP	EPA 6010B / 6010C	Cadmium
ICP	EPA 6010B / 6010C	Calcium
ICP	EPA 6010B / 6010C	Chromium
ICP	EPA 6010B / 6010C	Cobalt
ICP	EPA 6010B / 6010C	Copper
ICP	EPA 6010B / 6010C	Iron
ICP	EPA 6010B / 6010C	Lead
ICP	EPA 6010B / 6010C	Lithium
ICP	EPA 6010B / 6010C	Magnesium
ICP	EPA 6010B / 6010C	Manganese
ICP	EPA 6010B / 6010C	Molybdenum
ICP	EPA 6010B / 6010C	Nickel



Non-Potable Water		
Technology	Method	Analyte
ICP	EPA 6010B / 6010C	Potassium
ICP	EPA 6010B / 6010C	Selenium
ICP	EPA 6010B / 6010C	Silver
ICP	EPA 6010B / 6010C	Sodium
ICP	EPA 6010B / 6010C	Strontium
ICP	EPA 6010B / 6010C	Thallium
ICP	EPA 6010B / 6010C	Tin
ICP	EPA 6010B / 6010C	Titanium
ICP	EPA 6010B / 6010C	Vanadium
ICP	EPA 6010B / 6010C	Zinc
ICP-MS	EPA 6020A	Aluminum
ICP-MS	EPA 6020A	Antimony
ICP-MS	EPA 6020A	Arsenic
ICP-MS	EPA 6020A	Barium
ICP-MS	EPA 6020A	Beryllium
ICP-MS	EPA 6020A	Boron
ICP-MS	EPA 6020A	Cadmium
ICP-MS	EPA 6020A	Calcium
ICP-MS	EPA 6020A	Chromium
ICP-MS	EPA 6020A	Cobalt
ICP-MS	EPA 6020A	Copper
ICP-MS	EPA 6020A	Iron
ICP-MS	EPA 6020A	Lead
ICP-MS	EPA 6020A	Magnesium
ICP-MS	EPA 6020A	Manganese
ICP-MS	EPA 6020A	Molybdenum
ICP-MS	EPA 6020A	Nickel
ICP-MS	EPA 6020A	Potassium
ICP-MS	EPA 6020A	Selenium
ICP-MS	EPA 6020A	Silver
ICP-MS	EPA 6020A	Sodium
ICP-MS	EPA 6020A	Strontium
ICP-MS	EPA 6020A	Thallium
ICP-MS	EPA 6020A	Tin
ICP-MS	EPA 6020A	Titanium
ICP-MS	EPA 6020A	Tungsten
ICP-MS	EPA 6020A	Uranium
ICP-MS	EPA 6020A	Vanadium



Non-Potable Water		
Technology	Method	Analyte
ICP-MS	EPA 6020A	Zinc
HPLC-MS	EPA 6850	Perchlorate
Spectrometric	EPA 7196A	Hex. Chromium
IC	EPA 7199	Hex. Chromium
Cold-Vapor	EPA 7470A	Mercury
GC	EPA 8015B / 8015C / 8015D	GRO
GC	EPA 8015B / 8015C / 8015D	DRO
GC	EPA 8015B / 8015C / 8015D	ORO
GC	EPA 8015B / 8015C	Diethylene Glycol
GC	EPA 8015B / 8015C	Ethanol
GC	EPA 8015B / 8015C	Ethylene Glycol
GC	EPA 8015B / 8015C	Isopropanol
GC	EPA 8015B / 8015C / 8015D	JP4
GC	EPA 8015B / 8015C	Methanol
GC	EPA 8015B / 8015C	Propylene Glycol
GC	EPA 8015B / 8015C / 8015D	JP5
GC	EPA 8015B / 8015C	Triethylene Glycol
GC	EPA 8081A / 8081B	Aldrin
GC	EPA 8081A / 8081B	alpha-BHC
GC	EPA 8081A / 8081B	beta-BHC
GC	EPA 8081A / 8081B	delta-BHC
GC	EPA 8081A / 8081B	gamma-BHC (Lindane)
GC	EPA 8081A / 8081B	DDD (4,4)
GC	EPA 8081A / 8081B	DDE (4,4)
GC	EPA 8081A / 8081B	DDT (4,4)
GC	EPA 8081A / 8081B	Dieldrin
GC	EPA 8081A / 8081B	Endosulfan I
GC	EPA 8081A / 8081B	Endosulfan II
GC	EPA 8081A / 8081B	Endosulfan sulfate
GC	EPA 8081A / 8081B	Endrin
GC	EPA 8081A / 8081B	Endrin Aldehyde
GC	EPA 8081A / 8081B	Heptachlor
GC	EPA 8081A / 8081B	Heptachlor epoxide
GC	EPA 8081A / 8081B	Methoxychlor
GC	EPA 8081A / 8081B	alpha-Chlordane
GC	EPA 8081A / 8081B	gamma-Chlordane
GC	EPA 8081A / 8081B	Endrin Ketone
GC	EPA 8081A / 8081B	Toxaphene



Non-Potable Water		
Technology	Method	Analyte
GC	EPA 8081A / 8081B	Technical Chlordane
GC	EPA 8081A / 8081B	cis-Nonachlor
GC	EPA 8081A / 8081B	DDD (2,4)
GC	EPA 8081A / 8081B	DDE (2,4)
GC	EPA 8081A / 8081B	DDT (2,4)
GC	EPA 8081A / 8081B	Mirex
GC	EPA 8081A / 8081B	Oxychlordane
GC	EPA 8081A / 8081B	trans-Nonachlor
GC	EPA 8082 / 8082A	PCB1016
GC	EPA 8082 / 8082A	PCB1221
GC	EPA 8082 / 8082A	PCB1232
GC	EPA 8082 / 8082A	PCB1242
GC	EPA 8082 / 8082A	PCB1248
GC	EPA 8082 / 8082A	PCB1254
GC	EPA 8082 / 8082A	PCB1260
GC	EPA 8082 / 8082A	PCB1262
GC	EPA 8082 / 8082A	PCB1268
GC	EPA 8082 / 8082A	PCB 8
GC	EPA 8082 / 8082A	PCB 18
GC	EPA 8082 / 8082A	PCB 28
GC	EPA 8082 / 8082A	PCB 44
GC	EPA 8082 / 8082A	PCB 52
GC	EPA 8082 / 8082A	PCB 66
GC	EPA 8082 / 8082A	PCB 77
GC	EPA 8082 / 8082A	PCB 81
GC	EPA 8082 / 8082A	PCB 101
GC	EPA 8082 / 8082A	PCB 105
GC	EPA 8082 / 8082A	PCB 114
GC	EPA 8082 / 8082A	PCB 118
GC	EPA 8082 / 8082A	PCB 123
GC	EPA 8082 / 8082A	PCB 126
GC	EPA 8082 / 8082A	PCB 128
GC	EPA 8082 / 8082A	PCB 138
GC	EPA 8082 / 8082A	PCB 153
GC	EPA 8082 / 8082A	PCB 156
GC	EPA 8082 / 8082A	PCB 157
GC	EPA 8082 / 8082A	PCB 167
GC	EPA 8082 / 8082A	PCB 169



Non-Potable Water		
Technology	Method	Analyte
GC	EPA 8082 / 8082A	PCB 170
GC	EPA 8082 / 8082A	PCB 180
GC	EPA 8082 / 8082A	PCB 187
GC	EPA 8082 / 8082A	PCB 189
GC	EPA 8082 / 8082A	PCB 195
GC	EPA 8082 / 8082A	PCB 206
GC	EPA 8082 / 8082A	PCB 209
GC	EPA 8082 / 8082A	PCB 110
GC	EPA 8141A / 8141B	Azinphos-methyl
GC	EPA 8141A / 8141B	Bolstar
GC	EPA 8141A / 8141B	Chlorpyrifos
GC	EPA 8141A / 8141B	Coumaphos
GC	EPA 8141A / 8141B	Total Demeton
GC	EPA 8141A / 8141B	Diazinon
GC	EPA 8141A / 8141B	Dichlorvos
GC	EPA 8141A / 8141B	Disulfoton
GC	EPA 8141A / 8141B	Ethoprop
GC	EPA 8141A / 8141B	Fensulfothion
GC	EPA 8141A / 8141B	Fenthion
GC	EPA 8141A / 8141B	Merphos
GC	EPA 8141A / 8141B	Mevinphos
GC	EPA 8141A / 8141B	Naled
GC	EPA 8141A / 8141B	Methyl Parathion
GC	EPA 8141A / 8141B	Phorate
GC	EPA 8141A / 8141B	Ronnel
GC	EPA 8141A / 8141B	Stirophos
GC	EPA 8141A / 8141B	Tokuthion
GC	EPA 8141A / 8141B	Trichloronate
GC	EPA 8141A / 8141B	Dimethoate
GC	EPA 8141A / 8141B	EPN
GC	EPA 8141A / 8141B	Famphur
GC	EPA 8141A / 8141B	Malathion
GC	EPA 8141A / 8141B	Ethyl Parathion
GC	EPA 8141A / 8141B	O,O,O-Triethylphosphorothioate
GC	EPA 8141A / 8141B	Sulfotepp
GC	EPA 8141A / 8141B	Thionazin
GC	EPA 8141A / 8141B	Tributyl Phosphate
GC	EPA 8151A	Acifluorfen

Non-Potable Water		
Technology	Method	Analyte
GC	EPA 8151A	Bentazon
GC	EPA 8151A	Chloramben
GC	EPA 8151A	2,4-D
GC	EPA 8151A	2,4-DB
GC	EPA 8151A	Dacthal
GC	EPA 8151A	Dalapon
GC	EPA 8151A	Dicamba
GC	EPA 8151A	3,5-Dichlorobenzoic acid
GC	EPA 8151A	Dichlorprop
GC	EPA 8151A	Dinoseb
GC	EPA 8151A	MCPA
GC	EPA 8151A	MCPP
GC	EPA 8151A	4-Nitrophenol
GC	EPA 8151A	Pentachlorophenol
GC	EPA 8151A	Picloram
GC	EPA 8151A	Silvex
GC	EPA 8151A	2,4,5-T
GC-MS	EPA 8260B / 8260C	Acetone
GC-MS	EPA 8260B / 8260C	Acetonitrile
GC-MS	EPA 8260B / 8260C	Acrolein
GC-MS	EPA 8260B / 8260C	Acrylonitrile
GC-MS	EPA 8260B / 8260C	Benzene
GC-MS	EPA 8260B / 8260C	Bromobenzene
GC-MS	EPA 8260B / 8260C	Bromochloromethane
GC-MS	EPA 8260B / 8260C	Bromodichloromethane
GC-MS	EPA 8260B / 8260C	Bromoform
GC-MS	EPA 8260B / 8260C	Bromomethane
GC-MS	EPA 8260B / 8260C	tert-Butyl alcohol
GC-MS	EPA 8260B / 8260C	2-Butanone (MEK)
GC-MS	EPA 8260B / 8260C	n-Butylbenzene
GC-MS	EPA 8260B / 8260C	sec-Butylbenzene
GC-MS	EPA 8260B / 8260C	tert-Butylbenzene
GC-MS	EPA 8260B / 8260C	Carbon disulfide
GC-MS	EPA 8260B / 8260C	Carbon tetrachloride
GC-MS	EPA 8260B / 8260C	Chlorobenzene
GC-MS	EPA 8260B / 8260C	2-Chloroethyl vinyl ether
GC-MS	EPA 8260B / 8260C	Chloroethane
GC-MS	EPA 8260B / 8260C	Chloroform

Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C	1-Chlorohexane
GC-MS	EPA 8260B / 8260C	Chloromethane
GC-MS	EPA 8260B / 8260C	2-Chlorotoluene
GC-MS	EPA 8260B / 8260C	4-Chlorotoluene
GC-MS	EPA 8260B / 8260C	Isopropyl ether (DIPE)
GC-MS	EPA 8260B / 8260C	Dibromochloromethane
GC-MS	EPA 8260B / 8260C	1,2-Dibromo-3-chloropropane
GC-MS	EPA 8260B / 8260C	1,2-Dibromoethane
GC-MS	EPA 8260B / 8260C	Dibromomethane
GC-MS	EPA 8260B / 8260C	1,1-Dichloroethane
GC-MS	EPA 8260B / 8260C	1,2-Dichloroethane
GC-MS	EPA 8260B / 8260C	1,2-Dichlorobenzene
GC-MS	EPA 8260B / 8260C	1,3-Dichlorobenzene
GC-MS	EPA 8260B / 8260C	trans-1,4-Dichloro-2-Butene
GC-MS	EPA 8260B / 8260C	1,4-Dichlorobenzene
GC-MS	EPA 8260B / 8260C	Dichlorodifluoromethane
GC-MS	EPA 8260B / 8260C	1,1-Dichloroethene
GC-MS	EPA 8260B / 8260C	cis-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C	trans-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C	Dichlorofluoromethane
GC-MS	EPA 8260B / 8260C	1,1-Dichloropropene
GC-MS	EPA 8260B / 8260C	1,2-Dichloropropane
GC-MS	EPA 8260B / 8260C	1,3-Dichloropropane
GC-MS	EPA 8260B / 8260C	2,2-Dichloropropane
GC-MS	EPA 8260B / 8260C	cis-1,3-Dichloropropene
GC-MS	EPA 8260B / 8260C	trans-1,3-Dichloropropene
GC-MS	EPA 8260B / 8260C	tert-Butyl ethyl ether (ETBE)
GC-MS	EPA 8260B / 8260C	Ethyl Methacrylate
GC-MS	EPA 8260B / 8260C	Ethylbenzene
GC-MS	EPA 8260B / 8260C	2-Hexanone (MBK)
GC-MS	EPA 8260B / 8260C	Hexachlorobutadiene
GC-MS	EPA 8260B / 8260C	Iodomethane
GC-MS	EPA 8260B / 8260C	Isopropylbenzene
GC-MS	EPA 8260B / 8260C	p-Isopropyltoluene
GC-MS	EPA 8260B / 8260C	Methylene Chloride
GC-MS	EPA 8260B / 8260C	4-Methyl-2-pentanone (MIBK)
GC-MS	EPA 8260B / 8260C	tert-Butyl methyl ether
GC-MS	EPA 8260B / 8260C	Naphthalene



Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C	n-Propylbenzene
GC-MS	EPA 8260B / 8260C	Styrene
GC-MS	EPA 8260B / 8260C	tert-Amyl methyl ether (TAME)
GC-MS	EPA 8260B / 8260C	1,1,1,2-Tetrachloroethane
GC-MS	EPA 8260B / 8260C	1,1,2,2-Tetrachloroethane
GC-MS	EPA 8260B / 8260C	Tetrachloroethene
GC-MS	EPA 8260B / 8260C	Toluene
GC-MS	EPA 8260B / 8260C	1,1,1-Trichloroethane
GC-MS	EPA 8260B / 8260C	1,1,2-Trichloroethane
GC-MS	EPA 8260B / 8260C	1,2,3-Trichlorobenzene
GC-MS	EPA 8260B / 8260C	1,2,4-Trichlorobenzene
GC-MS	EPA 8260B / 8260C	Trichloroethene
GC-MS	EPA 8260B / 8260C	Trichlorofluoromethane
GC-MS	EPA 8260B / 8260C	1,2,3-Trichloropropane
GC-MS	EPA 8260B / 8260C	1,1,2-Trichloro 1,2,2-trifluoroethane
GC-MS	EPA 8260B / 8260C	1,2,4-Trimethylbenzene
GC-MS	EPA 8260B / 8260C	1,3,5-Trimethylbenzene
GC-MS	EPA 8260B / 8260C	Vinyl Acetate
GC-MS	EPA 8260B / 8260C	Vinyl Chloride
GC-MS	EPA 8260B / 8260C	m-Xylene & p-xylene
GC-MS	EPA 8260B / 8260C	o-Xylene
GC-MS	EPA 8260B / 8260C	Allyl Chloride
GC-MS	EPA 8260B / 8260C	Benzyl chloride
GC-MS	EPA 8260B / 8260C	Chloroprene
GC-MS	EPA 8260B / 8260C	Cyclohexane
GC-MS	EPA 8260B / 8260C	1,4-Dioxane
GC-MS	EPA 8260B / 8260C	2-Chloro-1,1,1-trifluoroethane
GC-MS	EPA 8260B / 8260C	Chlorotrifluoroethylene
GC-MS	EPA 8260B / 8260C	cis-1,4-Dichloro-2-butene
GC-MS	EPA 8260B / 8260C	Ethanol
GC-MS	EPA 8260B / 8260C	Ethyl Methacrylate
GC-MS	EPA 8260B / 8260C	Isobutyl Alcohol
GC-MS	EPA 8260B / 8260C	Methacrylonitrile
GC-MS	EPA 8260B / 8260C	Methyl Methacrylate
GC-MS	EPA 8260B / 8260C	Pentachloroethane
GC-MS	EPA 8260B / 8260C	Propionitrile
GC-MS	EPA 8260B / 8260C	Sec-Propyl alcohol



Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C	Tetrahydrofuran
GC-MS	EPA 8260B / 8260C	trans-1,4-Dichloro-2-butene
GC-MS	EPA 8260B / 8260C SIM	Benzene
GC-MS	EPA 8260B / 8260C SIM	Carbon tetrachloride
GC-MS	EPA 8260B / 8260C SIM	Chloroform
GC-MS	EPA 8260B / 8260C SIM	Chloromethane
GC-MS	EPA 8260B / 8260C SIM	1,2-Dibromo-3-chloropropane
GC-MS	EPA 8260B / 8260C SIM	1,2-Dibromoethane
GC-MS	EPA 8260B / 8260C SIM	1,2-Dichloroethane
GC-MS	EPA 8260B / 8260C SIM	1,1-Dichloroethene
GC-MS	EPA 8260B / 8260C SIM	cis-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C SIM	trans-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C SIM	1,1,2,2-Tetrachloroethane
GC-MS	EPA 8260B / 8260C SIM	Tetrachloroethene
GC-MS	EPA 8260B / 8260C SIM	1,1,1-Trichloroethane
GC-MS	EPA 8260B / 8260C SIM	1,1,2-Trichloroethane
GC-MS	EPA 8260B / 8260C SIM	Trichloroethene
GC-MS	EPA 8260B / 8260C SIM	1,2,3-Trichloropropane
GC-MS	EPA 8260B / 8260C SIM	Vinyl Chloride
GC-MS	EPA 8260B / 8260C SIM	1,4-Dioxane
GC-MS	EPA 8270C / 8270D	Acenaphthene
GC-MS	EPA 8270C / 8270D	Acenaphthylene
GC-MS	EPA 8270C / 8270D	Aniline
GC-MS	EPA 8270C / 8270D	Anthracene
GC-MS	EPA 8270C / 8270D	Azobenzene
GC-MS	EPA 8270C / 8270D	Benzidine
GC-MS	EPA 8270C / 8270D	Benzo(a)anthracene
GC-MS	EPA 8270C / 8270D	benzo(a)pyrene
GC-MS	EPA 8270C / 8270D	Benzo(b)fluoranthene
GC-MS	EPA 8270C / 8270D	Benzo(e)pyrene
GC-MS	EPA 8270C / 8270D	Benzo(g,h,i)perylene
GC-MS	EPA 8270C / 8270D	Benzo(k)fluoranthene
GC-MS	EPA 8270C / 8270D	Benzoic Acid
GC-MS	EPA 8270C / 8270D	Benzyl Alcohol
GC-MS	EPA 8270C / 8270D	Biphenyl
GC-MS	EPA 8270C / 8270D	bis(2-chloroethoxy)methane
GC-MS	EPA 8270C / 8270D	bis(2-chloroethyl)ether
GC-MS	EPA 8270C / 8270D	bis(2-chloroisopropyl)ether



Non-Potable Water

Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	bis(2-Ethylhexyl)adipate
GC-MS	EPA 8270C / 8270D	bis(2-Ethylhexyl)phthalate
GC-MS	EPA 8270C / 8270D	4-Bromophenyl-phenylether
GC-MS	EPA 8270C / 8270D	Butylbenzylphthalate
GC-MS	EPA 8270C / 8270D	Carbazole
GC-MS	EPA 8270C / 8270D	4-Chloro-3-methylphenol
GC-MS	EPA 8270C / 8270D	4-Chloroaniline
GC-MS	EPA 8270C / 8270D	2-Chloronaphthalene
GC-MS	EPA 8270C / 8270D	2-Chlorophenol
GC-MS	EPA 8270C / 8270D	4-Chlorophenyl-phenylether
GC-MS	EPA 8270C / 8270D	Chrysene
GC-MS	EPA 8270C / 8270D	Dibenzo(a,h)anthracene
GC-MS	EPA 8270C / 8270D	Dibenzofuran
GC-MS	EPA 8270C / 8270D	1,2-Dichlorobenzene
GC-MS	EPA 8270C / 8270D	1,3-Dichlorobenzene
GC-MS	EPA 8270C / 8270D	1,4-Dichlorobenzene
GC-MS	EPA 8270C / 8270D	3,3'-Dichlorobenzidine
GC-MS	EPA 8270C / 8270D	2,4-Dichlorophenol
GC-MS	EPA 8270C / 8270D	Diethylphthalate
GC-MS	EPA 8270C / 8270D	2,6-Dimethylnaphthalene
GC-MS	EPA 8270C / 8270D	2,4-Dimethylphenol
GC-MS	EPA 8270C / 8270D	Dimethylphthalate
GC-MS	EPA 8270C / 8270D	Di-n-butylphthalate
GC-MS	EPA 8270C / 8270D	4,6-Dinitro-2-methylphenol
GC-MS	EPA 8270C / 8270D	2,4-Dinitrophenol
GC-MS	EPA 8270C / 8270D	2,4-Dinitrotoluene
GC-MS	EPA 8270C / 8270D	2,6-Dinitrotoluene
GC-MS	EPA 8270C / 8270D	Di-n-octylphthalate
GC-MS	EPA 8270C / 8270D	Fluoranthene
GC-MS	EPA 8270C / 8270D	Fluorene
GC-MS	EPA 8270C / 8270D	Hexachlorobenzene
GC-MS	EPA 8270C / 8270D	Hexachlorobutadiene
GC-MS	EPA 8270C / 8270D	Hexachlorocyclopentadiene
GC-MS	EPA 8270C / 8270D	Hexachloroethane
GC-MS	EPA 8270C / 8270D	Indeno(1,2,3-cd)pyrene
GC-MS	EPA 8270C / 8270D	Isophorone
GC-MS	EPA 8270C / 8270D	1-Methylnaphthalene
GC-MS	EPA 8270C / 8270D	2-Methylnaphthalene



Non-Potable Water

Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	1-Methylphenanthrene
GC-MS	EPA 8270C / 8270D	2-Methylphenol
GC-MS	EPA 8270C / 8270D	3/4-Methylphenol
GC-MS	EPA 8270C / 8270D	Naphthalene
GC-MS	EPA 8270C / 8270D	2-Nitroaniline
GC-MS	EPA 8270C / 8270D	3-Nitroaniline
GC-MS	EPA 8270C / 8270D	4-Nitroaniline
GC-MS	EPA 8270C / 8270D	Nitrobenzene
GC-MS	EPA 8270C / 8270D	2-Nitrophenol
GC-MS	EPA 8270C / 8270D	4-Nitrophenol
GC-MS	EPA 8270C / 8270D	n-Nitrosodimethylamine
GC-MS	EPA 8270C / 8270D	n-Nitroso-di-n-propylamine
GC-MS	EPA 8270C / 8270D	n-Nitrosodiphenylamine
GC-MS	EPA 8270C / 8270D	Pentachlorophenol
GC-MS	EPA 8270C / 8270D	Perylene
GC-MS	EPA 8270C / 8270D	Phenanthrene
GC-MS	EPA 8270C / 8270D	Phenol
GC-MS	EPA 8270C / 8270D	Pyrene
GC-MS	EPA 8270C / 8270D	Pyridine
GC-MS	EPA 8270C / 8270D	2,3,4,6-Tetrachlorophenol
GC-MS	EPA 8270C / 8270D	1,2,4-Trichlorobenzene
GC-MS	EPA 8270C / 8270D	2,3,4-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,3,5-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,4,5-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,4,6-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,3,5-Trimethylnaphthalene
GC-MS	EPA 8270C / 8270D	1,2,4,5-Tetrachlorobenzene
GC-MS	EPA 8270C / 8270D	1,3,5-Trinitrobenzene
GC-MS	EPA 8270C / 8270D	1,3-Dinitrobenzene
GC-MS	EPA 8270C / 8270D	1,4-Dioxane
GC-MS	EPA 8270C / 8270D	1,4-Naphthoquinone
GC-MS	EPA 8270C / 8270D	1-Chloronaphthalene
GC-MS	EPA 8270C / 8270D	1-Naphthylamine
GC-MS	EPA 8270C / 8270D	2,6-Dichlorophenol
GC-MS	EPA 8270C / 8270D	2-acetylaminofluorene
GC-MS	EPA 8270C / 8270D	2-Naphthylamine
GC-MS	EPA 8270C / 8270D	2-Picoline
GC-MS	EPA 8270C / 8270D	3,3-Dimethylbenzidine



Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	3,4-Dimethylphenol
GC-MS	EPA 8270C / 8270D	3,5-Dimethylphenol
GC-MS	EPA 8270C / 8270D	3-Methylcholanthrene
GC-MS	EPA 8270C / 8270D	4-Aminobiphenyl
GC-MS	EPA 8270C / 8270D	4-Nitroquinoline-N-oxide
GC-MS	EPA 8270C / 8270D	5-Nitro-o-toluidine
GC-MS	EPA 8270C / 8270D	7,12-Dimethylbenz(a)anthracene
GC-MS	EPA 8270C / 8270D	a,a-dimethylphenethylamine
GC-MS	EPA 8270C / 8270D	Acetophenone
GC-MS	EPA 8270C / 8270D	Aramite
GC-MS	EPA 8270C / 8270D	Atrazine
GC-MS	EPA 8270C / 8270D	Biphenyl
GC-MS	EPA 8270C / 8270D	Chlorobenzilate
GC-MS	EPA 8270C / 8270D	Diallate
GC-MS	EPA 8270C / 8270D	Dibenzo(a,j)acridine
GC-MS	EPA 8270C / 8270D	Dimethoate
GC-MS	EPA 8270C / 8270D	Dinoseb
GC-MS	EPA 8270C / 8270D	Diphenyl ether
GC-MS	EPA 8270C / 8270D	Disulfoton
GC-MS	EPA 8270C / 8270D	Ethyl methacrylate
GC-MS	EPA 8270C / 8270D	Ethyl methanesulfonate
GC-MS	EPA 8270C / 8270D	Ethyl parathion
GC-MS	EPA 8270C / 8270D	Famphur
GC-MS	EPA 8270C / 8270D	Hexachlorophene
GC-MS	EPA 8270C / 8270D	Hexachloropropene
GC-MS	EPA 8270C / 8270D	Isodrin
GC-MS	EPA 8270C / 8270D	Isosafrole
GC-MS	EPA 8270C / 8270D	kepone
GC-MS	EPA 8270C / 8270D	Methapyrilene
GC-MS	EPA 8270C / 8270D	Methyl methanesulfonate
GC-MS	EPA 8270C / 8270D	Methyl parathion
GC-MS	EPA 8270C / 8270D	N-nitrosodiethylamine
GC-MS	EPA 8270C / 8270D	N-Nitrosodi-n-butylamine
GC-MS	EPA 8270C / 8270D	N-Nitrosomethylethylamine
GC-MS	EPA 8270C / 8270D	N-Nitrosomorpholine
GC-MS	EPA 8270C / 8270D	N-Nitrosopiperidine
GC-MS	EPA 8270C / 8270D	N-Nitrosopyrrolidine
GC-MS	EPA 8270C / 8270D	O,O,O-triethyl phosphorothi



Non-Potable Water

Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	o-toluidine
GC-MS	EPA 8270C / 8270D	p-Dimethylaminoazobenze
GC-MS	EPA 8270C / 8270D	Pentachlorobenzene
GC-MS	EPA 8270C / 8270D	Pentachloroethane
GC-MS	EPA 8270C / 8270D	Pentachloronitrobenzene
GC-MS	EPA 8270C / 8270D	Phenacetin
GC-MS	EPA 8270C / 8270D	Phorate
GC-MS	EPA 8270C / 8270D	p-phenylenediamine
GC-MS	EPA 8270C / 8270D	Pronamide
GC-MS	EPA 8270C / 8270D	Safrole
GC-MS	EPA 8270C / 8270D	Sulfotepp
GC-MS	EPA 8270C / 8270D	Thionazin
GC-MS	EPA 8270C / 8270D SIM	Acenaphthene
GC-MS	EPA 8270C / 8270D SIM	Acenaphthylene
GC-MS	EPA 8270C / 8270D SIM	Anthracene
GC-MS	EPA 8270C / 8270D SIM	Azobenzene
GC-MS	EPA 8270C / 8270D SIM	Benzo(a)anthracene
GC-MS	EPA 8270C / 8270D SIM	benzo(a)pyrene
GC-MS	EPA 8270C / 8270D SIM	Benzo(b)fluoranthene
GC-MS	EPA 8270C / 8270D SIM	Benzo(e)pyrene
GC-MS	EPA 8270C / 8270D SIM	Benzo(g,h,i)perylene
GC-MS	EPA 8270C / 8270D SIM	Benzo(k)fluoranthene
GC-MS	EPA 8270C / 8270D SIM	Biphenyl
GC-MS	EPA 8270C / 8270D SIM	bis(2-chloroethyl)ether
GC-MS	EPA 8270C / 8270D SIM	bis(2-Ethylhexyl)phthalate
GC-MS	EPA 8270C / 8270D SIM	Carbazole
GC-MS	EPA 8270C / 8270D SIM	4-Chloro-3-methylphenol
GC-MS	EPA 8270C / 8270D SIM	2-Chlorophenol
GC-MS	EPA 8270C / 8270D SIM	Chrysene
GC-MS	EPA 8270C / 8270D SIM	Dibenzo(a,h)anthracene
GC-MS	EPA 8270C / 8270D SIM	2,4-Dichlorophenol
GC-MS	EPA 8270C / 8270D SIM	2,6-Dimethylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	2,4-Dimethylphenol
GC-MS	EPA 8270C / 8270D SIM	Fluoranthene
GC-MS	EPA 8270C / 8270D SIM	Fluorene
GC-MS	EPA 8270C / 8270D SIM	Hexachlorobenzene
GC-MS	EPA 8270C / 8270D SIM	Indeno(1,2,3-cd)pyrene
GC-MS	EPA 8270C / 8270D SIM	1-Methylnaphthalene



Non-Potable Water		
Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D SIM	2-Methylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	1-Methylphenanthrene
GC-MS	EPA 8270C / 8270D SIM	Naphthalene
GC-MS	EPA 8270C / 8270D SIM	n-Nitrosodimethylamine
GC-MS	EPA 8270C / 8270D SIM	n-Nitroso-di-n-propylamine
GC-MS	EPA 8270C / 8270D SIM	Pentachlorophenol
GC-MS	EPA 8270C / 8270D SIM	Perylene
GC-MS	EPA 8270C / 8270D SIM	Phenanthrene
GC-MS	EPA 8270C / 8270D SIM	Phenol
GC-MS	EPA 8270C / 8270D SIM	Pyrene
GC-MS	EPA 8270C / 8270D SIM	2,4,5-Trichlorophenol
GC-MS	EPA 8270C / 8270D SIM	2,4,6-Trichlorophenol
GC-MS	EPA 8270C / 8270D SIM	2,3,5-Trimethylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	1,4-Dioxane
GC-MS	EPA 8270C / 8270D SIM	Butylbenzylphthalate
GC-MS	EPA 8270C / 8270D SIM	Diethylphthalate
GC-MS	EPA 8270C / 8270D SIM	Dimethylphthalate
GC-MS	EPA 8270C / 8270D SIM	Di-n-butylphthalate
GC-MS	EPA 8270C / 8270D SIM	Di-n-octylphthalate
HPLC	EPA 8310	Acenaphthene
HPLC	EPA 8310	Acenaphthylene
HPLC	EPA 8310	Anthracene
HPLC	EPA 8310	Benzo(a)anthracene
HPLC	EPA 8310	Benzo(a)pyrene
HPLC	EPA 8310	Benzo(b)fluoranthene
HPLC	EPA 8310	Benzo(g,h,i)perylene
HPLC	EPA 8310	Benzo(k)fluoranthene
HPLC	EPA 8310	Chrysene
HPLC	EPA 8310	Dibenzo(a,h)anthracene
HPLC	EPA 8310	Fluoranthene
HPLC	EPA 8310	Fluorene
HPLC	EPA 8310	Indeno(1,2,3-cd)pyrene
HPLC	EPA 8310	1-Methylnaphthalene
HPLC	EPA 8310	2-Methylnaphthalene
HPLC	EPA 8310	Naphthalene
HPLC	EPA 8310	Phenanthrene
HPLC	EPA 8310	Pyrene
HPLC	EPA 8330A / 8330 B	HMX



Non-Potable Water		
Technology	Method	Analyte
HPLC	EPA 8330A / 8330 B	RDX
HPLC	EPA 8330A / 8330 B	1,3,5-TNB
HPLC	EPA 8330A / 8330 B	1,3-DNB
HPLC	EPA 8330A / 8330 B	Tetryl
HPLC	EPA 8330A / 8330 B	Nitrobenzene
HPLC	EPA 8330A / 8330 B	2,4,6-TNT
HPLC	EPA 8330A / 8330 B	4-AM-2,6-DNT
HPLC	EPA 8330A / 8330 B	2-AM-4,6-DNT
HPLC	EPA 8330A / 8330 B	2,6-DNT
HPLC	EPA 8330A / 8330 B	2,4-DNT
HPLC	EPA 8330A / 8330 B	2-Nitrotoluene
HPLC	EPA 8330A / 8330 B	4-Nitrotoluene
HPLC	EPA 8330A / 8330 B	3-Nitrotoluene
HPLC	EPA 8330A	3,5-Dinitroaniline
HPLC	EPA 8330A	2,4-Diamino-6-nitrotoluene
HPLC	EPA 8330A	2,6-Diamino-4-nitrotoluene
HPLC	EPA 8330A	Picric Acid
HPLC	EPA 8332	Nitroglycerine
HPLC	EPA 8332	PETN
Spectrometric	EPA 9014	Cyanide
Electrode	EPA 9040B / 9040C	pH
IC	EPA 9056 / 9056A	Bromate
IC	EPA 9056 / 9056A	Bromide
IC	EPA 9056 / 9056A	Chloride
IC	EPA 9056 / 9056A	Fluoride
IC	EPA 9056 / 9056A	Nitrate
IC	EPA 9056 / 9056A	Nitrite
IC	EPA 9056 / 9056A	Phosphate
IC	EPA 9056 / 9056A	Sulfate
IC	EPA 9056 / 9056A	Chlorate
IC	EPA 9056 / 9056A	Nitrate - Nitrite
Combustion-IR	EPA 9060A	TOC
Spectrometric	EPA 9065	Phenols
Gravimetric	EPA 9070A	Oil & Grease
GC	RSK175	Methane
GC	RSK175	Acetylene
GC	RSK175	Ethylene
GC	RSK175	Ethane



Non-Potable Water		
Technology	Method	Analyte
GC	RSK175	Propane
GC	RSK175	Carbon dioxide
Spectrometric	SM 4500-NH ₃ C (18 th)	Ammonia
Spectrometric	SM 4500-NH ₃ F	Ammonia
Spectrometric	SM 4500-NOrgC NH ₃ F	TKN
Spectrometric	SM 4500-PE	Phosphorus
Turbidimetric	SM 2130B	Turbidity
Titrimetric	SM 2310B	Acidity
Titrimetric	SM 2320B	Alkalinity
Titrimetric	SM 2340C	Hardness
Platinum Electrode	SM 2510B	Specific Conductance
Electrical Conductivity	SM 2520B	Salinity
Gravimetric	SM 2540C	TDS
Gravimetric	SM 2540D	TSS
Gravimetric	SM 2540B	Total Residue
Gravimetric	SM 2540F	Settleable Residue
Spectrometric	SM 3500-FeB	Ferrous iron
IC	SM 4110B	Bromate
IC	SM 4110B	Bromide
IC	SM 4110B	Chloride
IC	SM 4110B	Fluoride
IC	SM 4110B	Nitrate
IC	SM 4110B	Nitrite
IC	SM 4110B	Phosphate
IC	SM 4110B	Sulfate
IC	SM 4110B	Chlorate
IC	SM 4110B	Nitrate – Nitrite
Titrimetric	SM 4500-Cl-B	Chloride
Titrimetric	SM 4500-Cl B	Total Residual Chlorine
Spectrometric	SM 4500-CN E	Cyanide
Electrode	SM 4500-FC	Fluoride
Electrode	SM 4500-HB	pH
Spectrometric	SM 4500-NO ₂ B	Nitrite-N
Spectrometric	SM 4500-NO ₃ E	Nitrate-N
Spectrometric	SM 4500-P E	Ortho-phosphate
Spectrometric	SM 4500-P E(PB ₅)	Phosphorus
Spectrometric	SM 4500-S ₂ D	Sulfide
Titrimetric	SM 4500-S ₂ F	Sulfide



Non-Potable Water		
Technology	Method	Analyte
Spectrometric	SM 4500-SiO ₂ C	Silica
Electrode	SM 5210B	BOD
Spectrometric	SM 5220D	COD
Combustion-IR	SM 5310B	TOC
Spectrometric	SM 5540C	Surfactants (MBAS)
Distillation	EPA 9010C	Cyanide
MicroDistillation	QuickChem 10-204-00-1-X	Cyanide
ICP/ICP-MS	SM 2340B	Hardness
GC	EPA 8011	DBCP
GC	EPA 8011	EDB
Platinum Electrode	EPA 9050A	Specific Conductance
Gravimetric	SM 5520B	Oil & Grease
Preparation	Method	Type
Purge & Trap	EPA 5030B / 5030C	Volatiles Prep
Acid Digestion	EPA 3005A / EPA 3010A / EPA 200.8 / EPA 200.7	Metals Prep
Continuous Liquid-Liquid	EPA 3520C	Organic Extraction
Waste Dilution	EPA 3580A	Organic Extraction
TCLP	EPA 1311	Leaching
SPLP	EPA 1312	Leaching

Drinking Water		
Technology	Method	Analyte
Colorimetric	EPA 110.2	Color
Platinum Electrode	EPA 120.1	Specific Conductance
Electrode	EPA 150.1	pH
Gravimetric	EPA 160.1	TDS
Gravimetric	EPA 160.2	TSS
Gravimetric	EPA 160.3	Total Residue
Turbidimetric	SM 2130B	Turbidity
ICP-MS	EPA 200.8	Aluminum
ICP-MS	EPA 200.8	Antimony
ICP-MS	EPA 200.8	Arsenic
ICP-MS	EPA 200.8	Barium
ICP-MS	EPA 200.8	Beryllium
ICP-MS	EPA 200.8	Boron



Drinking Water		
Technology	Method	Analyte
ICP-MS	EPA 200.8	Cadmium
ICP-MS	EPA 200.8	Calcium
ICP-MS	EPA 200.8	Chromium
ICP-MS	EPA 200.8	Cobalt
ICP-MS	EPA 200.8	Copper
ICP-MS	EPA 200.8	Iron
ICP-MS	EPA 200.8	Lithium
ICP-MS	EPA 200.8	Lead
ICP-MS	EPA 200.8	Magnesium
ICP-MS	EPA 200.8	Manganese
ICP-MS	EPA 200.8	Molybdenum
ICP-MS	EPA 200.8	Nickel
ICP-MS	EPA 200.8	Potassium
ICP-MS	EPA 200.8	Selenium
ICP-MS	EPA 200.8	Silver
ICP-MS	EPA 200.8	Sodium
ICP-MS	EPA 200.8	Strontium
ICP-MS	EPA 200.8	Thallium
ICP-MS	EPA 200.8	Tin
ICP-MS	EPA 200.8	Titanium
ICP-MS	EPA 200.8	Uranium
ICP-MS	EPA 200.8	Vanadium
ICP-MS	EPA 200.8	Zinc
IC	EPA 218.6	Hexavalent Chromium
Cold Vapor	EPA 245.1	Mercury
IC	EPA 300.0	Bromate
IC	EPA 300.0	Bromide
IC	EPA 300.0	Chloride
IC	EPA 300.0	Fluoride
IC	EPA 300.0	Nitrate
IC	EPA 300.0	Nitrite
IC	EPA 300.0	Phosphate
IC	EPA 300.0	Sulfate
IC	EPA 300.0	Chlorate
IC	EPA 300.0	Nitrate - Nitrite
IC	EPA 300M	Acetate

Drinking Water

Technology	Method	Analyte
IC	EPA 300M	Butyrate
IC	EPA 300M	Lactate
IC	EPA 300M	Propionate
IC	EPA 300M	Pyruvate
IC	EPA 314.0	Perchlorate
Spectrometric	EPA 335.2	Cyanide
Spectrometric	EPA 350.2	Ammonia
Spectrometric	EPA 351.3	TKN
Spectrometric	EPA 353.3	Nitrate-N
Spectrometric	EPA 354.1	Nitrite-N
Spectrometric	EPA 365.2	Ortho-phosphate
Spectrometric	EPA 365.2	Phosphorus
Spectrometric	EPA 370.1	Silica
Titrimetric	EPA 376.1	Sulfide
Spectrometric	EPA 376.2	Sulfide
Spectrometric	EPA 410.4	COD
Combustion-IR	EPA 415.1	TOC
Spectrometric	EPA 420.1	Phenols
Spectrometric	EPA 425.1	MBAS
GC	EPA 504.1	DBCP
GC	EPA 504.1	EDB
GC-MS	EPA 524.2	Acetone
GC-MS	EPA 524.2	Benzene
GC-MS	EPA 524.2	Bromobenzene
GC-MS	EPA 524.2	Bromochloromethane
GC-MS	EPA 524.2	Bromodichloromethane
GC-MS	EPA 524.2	Bromoform
GC-MS	EPA 524.2	Bromomethane
GC-MS	EPA 524.2	tert-Butyl alcohol
GC-MS	EPA 524.2	2-Butanone (MEK)
GC-MS	EPA 524.2	n-Butylbenzene
GC-MS	EPA 524.2	sec-Butylbenzene
GC-MS	EPA 524.2	tert-Butylbenzene
GC-MS	EPA 524.2	Carbon disulfide
GC-MS	EPA 524.2	Carbon tetrachloride
GC-MS	EPA 524.2	Chlorobenzene



Drinking Water

Technology	Method	Analyte
GC-MS	EPA 524.2	Chloroethane
GC-MS	EPA 524.2	Chloroform
GC-MS	EPA 524.2	Chloromethane
GC-MS	EPA 524.2	2-Chlorotoluene
GC-MS	EPA 524.2	4-Chlorotoluene
GC-MS	EPA 524.2	Dibromochloromethane
GC-MS	EPA 524.2	1,2-Dibromo-3-chloropropane
GC-MS	EPA 524.2	1,2-Dibromoethane
GC-MS	EPA 524.2	Dibromomethane
GC-MS	EPA 524.2	1,1-Dichloroethane
GC-MS	EPA 524.2	1,2-Dichloroethane
GC-MS	EPA 524.2	1,2-Dichlorobenzene
GC-MS	EPA 524.2	1,3-Dichlorobenzene
GC-MS	EPA 524.2	1,4-Dichlorobenzene
GC-MS	EPA 524.2	Dichlorodifluoromethane
GC-MS	EPA 524.2	1,1-Dichloroethene
GC-MS	EPA 524.2	cis-1,2-Dichloroethene
GC-MS	EPA 524.2	trans-1,2-Dichloroethene
GC-MS	EPA 524.2	1,1-Dichloropropene
GC-MS	EPA 524.2	1,2-Dichloropropane
GC-MS	EPA 524.2	1,3-Dichloropropane
GC-MS	EPA 524.2	2,2-Dichloropropane
GC-MS	EPA 524.2	cis-1,3-Dichloropropene
GC-MS	EPA 524.2	trans-1,3-Dichloropropene
GC-MS	EPA 524.2	tert-Butyl ethyl ether (ETBE)
GC-MS	EPA 524.2	Ethylbenzene
GC-MS	EPA 524.2	2-Hexanone (MBK)
GC-MS	EPA 524.2	Hexachlorobutadiene
GC-MS	EPA 524.2	Isopropyl ether (DIPE)
GC-MS	EPA 524.2	Isopropylbenzene
GC-MS	EPA 524.2	p-Isopropyltoluene
GC-MS	EPA 524.2	Methylene Chloride
GC-MS	EPA 524.2	4-Methyl-2-pentanone (MIBK)
GC-MS	EPA 524.2	tert-Butyl methyl ether
GC-MS	EPA 524.2	Naphthalene
GC-MS	EPA 524.2	n-Propylbenzene



Drinking Water

Technology	Method	Analyte
GC-MS	EPA 524.2	Styrene
GC-MS	EPA 524.2	tert-Amyl methyl ether (TAME)
GC-MS	EPA 524.2	1,1,1,2-Tetrachloroethane
GC-MS	EPA 524.2	1,1,2,2-Tetrachloroethane
GC-MS	EPA 524.2	Tetrachloroethene
GC-MS	EPA 524.2	Toluene
GC-MS	EPA 524.2	1,1,1-Trichloroethane
GC-MS	EPA 524.2	1,1,2-Trichloroethane
GC-MS	EPA 524.2	1,2,3-Trichlorobenzene
GC-MS	EPA 524.2	1,2,4-Trichlorobenzene
GC-MS	EPA 524.2	Trichloroethene
GC-MS	EPA 524.2	Trichlorofluoromethane
GC-MS	EPA 524.2	1,2,3-Trichloropropane
GC-MS	EPA 524.2	1,1,2-Trichloro 1,2,2-trifluoroethane
GC-MS	EPA 524.2	1,2,4-Trimethylbenzene
GC-MS	EPA 524.2	1,3,5-Trimethylbenzene
GC-MS	EPA 524.2	Vinyl Chloride
GC-MS	EPA 524.2	m-Xylene & p-xylene
GC-MS	EPA 524.2	o-Xylene
Titrimetric	SM 2320B	Alkalinity
HPLC-MS	EPA 6850	Perchlorate
Colorimetric	SM 2120B	Color
Threshold Odor Test	SM 2150B	Odor
Turbidimetric	SM 2130B	Turbidity
ICP/ICP-MS by Calculation	SM 2340B	Hardness
Titrimetric	SM 2340C	Hardness
Platinum Electrode	SM 2510B	Specific Conductance
Gravimetric	SM 2540B	Total Residue
Gravimetric	SM 2540C	TDS
Gravimetric	SM 2540D	TSS
Spectrometric	SM 3500-Fe B	Ferrous Iron
IC	SM 4110B	Bromate
IC	SM 4110B	Bromide
IC	SM 4110B	Chloride
IC	SM 4110B	Fluoride
IC	SM 4110B	Nitrate



Drinking Water

Technology	Method	Analyte
IC	SM 4110B	Nitrite
IC	SM 4110B	Nitrate - Nitrite
IC	SM 4110B	Phosphate
IC	SM 4110B	Sulfate
IC	SM 4110B	Chlorate
Titrimetric	SM 4500-Cl B	Chloride
Spectrometric	SM 4500-CN E	Cyanide
Electrode	SM 4500-HB	pH
Spectrometric	SM 4500-NH3 C (18 th)	Ammonia
Spectrometric	SM 4500-NH3 F	Ammonia
Spectrometric	SM 4500-NO2 B	Nitrite-N
Spectrometric	SM 4500-NO3 E	Nitrate-N
Spectrometric	SM 4500-NOrgC NH3F	TKN
Spectrometric	SM 4500-P E	Ortho-phosphate
Spectrometric	SM 4500-P E(PB5)	Phosphorus
Spectrometric	SM 4500-S2D	Sulfide
Titrimetric	SM 4500-S2 F	Sulfide
Spectrometric	SM 4500-SiO2 C	Silica
Spectrometric	SM 5220D	COD
Combustion-IR	SM 5310B	TOC
Spectrometric	SM 5540C	Surfactants
MicroDistillation	QuickChem 10-204-00-1-X	Cyanide

Solid and Chemical Materials

Technology	Method	Analyte
GC	AK101	GRO
GC	AK102	DRO
GC	AK103	RRO
GC	AZ8015	DRO (C10-C22)
GC	AZ8015	ORO (C22-C32)
GC	RSK175	Methane
GC	RSK175	Acetylene
GC	RSK175	Ethylene
GC	RSK175	Ethane
GC	RSK175	Propane



Solid and Chemical Materials		
Technology	Method	Analyte
GC	RSK175	Carbon dioxide
Visual	s.7.3 SW-846	Reactive Cyanide
Visual	s.7.3 SW-846	Reactive Sulfide
Spectrometric	SM 4500-NH3 C (18 th)	Ammonia
Spectrometric	SM 4500-NH3 F	Ammonia
Spectrometric	SM 4500-NOrgC NH3F	TKN
Spectrometric	SM 4500-NO2B	Nitrite-N
Spectrometric	SM 4500-NO3E	Nitrate-N
Spectrometric	SM 4500-P E	Ortho-phosphate
Spectrometric	SM 4500-P E(PB5)	Phosphorus
Titrimetric	Walkley Black	TOC
Electrode	EPA 9045C / 9045D	pH
Spectrometric	EPA 9065	Phenols
Pensky-Martens	EPA 1010/ 1010A	Ignitability
ICP	EPA 6010B / 6010C	Aluminum
ICP	EPA 6010B / 6010C	Antimony
ICP	EPA 6010B / 6010C	Arsenic
ICP	EPA 6010B / 6010C	Barium
ICP	EPA 6010B / 6010C	Beryllium
ICP	EPA 6010B / 6010C	Boron
ICP	EPA 6010B / 6010C	Cadmium
ICP	EPA 6010B / 6010C	Calcium
ICP	EPA 6010B / 6010C	Chromium
ICP	EPA 6010B / 6010C	Cobalt
ICP	EPA 6010B / 6010C	Copper
ICP	EPA 6010B / 6010C	Iron
ICP	EPA 6010B / 6010C	Lead
ICP	EPA 6010B / 6010C	Lithium
ICP	EPA 6010B / 6010C	Magnesium
ICP	EPA 6010B / 6010C	Manganese
ICP	EPA 6010B / 6010C	Molybdenum
ICP	EPA 6010B / 6010C	Nickel
ICP	EPA 6010B / 6010C	Potassium
ICP	EPA 6010B / 6010C	Selenium
ICP	EPA 6010B / 6010C	Silver
ICP	EPA 6010B / 6010C	Sodium
ICP	EPA 6010B / 6010C	Strontium
ICP	EPA 6010B / 6010C	Thallium



Solid and Chemical Materials		
Technology	Method	Analyte
ICP	EPA 6010B / 6010C	Tin
ICP	EPA 6010B / 6010C	Titanium
ICP	EPA 6010B / 6010C	Vanadium
ICP	EPA 6010B / 6010C	Zinc
ICP-MS	EPA 6020A	Aluminum
ICP-MS	EPA 6020A	Antimony
ICP-MS	EPA 6020A	Arsenic
ICP-MS	EPA 6020A	Barium
ICP-MS	EPA 6020A	Beryllium
ICP-MS	EPA 6020A	Boron
ICP-MS	EPA 6020A	Cadmium
ICP-MS	EPA 6020A	Calcium
ICP-MS	EPA 6020A	Chromium
ICP-MS	EPA 6020A	Cobalt
ICP-MS	EPA 6020A	Copper
ICP-MS	EPA 6020A	Iron
ICP-MS	EPA 6020A	Lead
ICP-MS	EPA 6020A	Lithium
ICP-MS	EPA 6020A	Magnesium
ICP-MS	EPA 6020A	Manganese
ICP-MS	EPA 6020A	Molybdenum
ICP-MS	EPA 6020A	Nickel
ICP-MS	EPA 6020A	Potassium
ICP-MS	EPA 6020A	Selenium
ICP-MS	EPA 6020A	Silver
ICP-MS	EPA 6020A	Sodium
ICP-MS	EPA 6020A	Strontium
ICP-MS	EPA 6020A	Thallium
ICP-MS	EPA 6020A	Tin
ICP-MS	EPA 6020A	Titanium
ICP-MS	EPA 6020A	Tungsten
ICP-MS	EPA 6020A	Uranium
ICP-MS	EPA 6020A	Vanadium
ICP-MS	EPA 6020A	Zinc
HPLC-MS	EPA 6850	Perchlorate
Spectrometric	EPA 7196A	Hex. Chromium
IC	EPA 7199	Hex. Chromium
Cold-Vapor	EPA 7471A / 7471B	Mercury



Solid and Chemical Materials		
Technology	Method	Analyte
GC	EPA 8011	DBCP
GC	EPA 8011	EDB
GC	EPA 8015B / 8015C / 8015D	GRO
GC	EPA 8015B / 8015C / 8015D	DRO
GC	EPA 8015B / 8015C / 8015D	ORO
GC	EPA 8015B / 8015C / 8015D	JP5
GC	EPA 8015B / 8015C	Ethanol
GC	EPA 8015B / 8015C	Isopropanol
GC	EPA 8015B / 8015C	Diethylene Glycol
GC	EPA 8015B / 8015C	Ethylene Glycol
GC	EPA 8015B / 8015C	Triethylene Glycol
GC	EPA 8015B / 8015C / 8015D	JP4
GC	EPA 8015B / 8015C	Methanol
GC	EPA 8015B / 8015C	Propylene Glycol
GC	EPA 8081A / 8081B	Aldrin
GC	EPA 8081A / 8081B	alpha-BHC
GC	EPA 8081A / 8081B	beta-BHC
GC	EPA 8081A / 8081B	delta-BHC
GC	EPA 8081A / 8081B	gamma-BHC (Lindane)
GC	EPA 8081A / 8081B	DDD (4,4)
GC	EPA 8081A / 8081B	DDE (4,4)
GC	EPA 8081A / 8081B	DDT (4,4)
GC	EPA 8081A / 8081B	Dieldrin
GC	EPA 8081A / 8081B	Endosulfan I
GC	EPA 8081A / 8081B	Endosulfan II
GC	EPA 8081A / 8081B	Endosulfan sulfate
GC	EPA 8081A / 8081B	Endrin
GC	EPA 8081A / 8081B	Endrin Aldehyde
GC	EPA 8081A / 8081B	Heptachlor
GC	EPA 8081A / 8081B	Heptachlor epoxide
GC	EPA 8081A / 8081B	Methoxychlor
GC	EPA 8081A / 8081B	alpha-Chlordane
GC	EPA 8081A / 8081B	gamma-Chlordane
GC	EPA 8081A / 8081B	Endrin Ketone
GC	EPA 8081A / 8081B	Toxaphene
GC	EPA 8081A / 8081B	Technical Chlordane
GC	EPA 8081A / 8081B	cis-Nonachlor
GC	EPA 8081A / 8081B	DDD (2,4)



Solid and Chemical Materials

Technology	Method	Analyte
GC	EPA 8081A / 8081B	DDE (2,4)
GC	EPA 8081A / 8081B	DDT (2,4)
GC	EPA 8081A / 8081B	Mirex
GC	EPA 8081A / 8081B	Oxychlorane
GC	EPA 8081A / 8081B	trans-Nonachlor
GC	EPA 8082 / 8082A	PCB1016
GC	EPA 8082 / 8082A	PCB1221
GC	EPA 8082 / 8082A	PCB1232
GC	EPA 8082 / 8082A	PCB1242
GC	EPA 8082 / 8082A	PCB1248
GC	EPA 8082 / 8082A	PCB1254
GC	EPA 8082 / 8082A	PCB1260
GC	EPA 8082 / 8082A	PCB1262
GC	EPA 8082 / 8082A	PCB1268
GC	EPA 8082 / 8082A	PCB 8
GC	EPA 8082 / 8082A	PCB 18
GC	EPA 8082 / 8082A	PCB 28
GC	EPA 8082 / 8082A	PCB 44
GC	EPA 8082 / 8082A	PCB 52
GC	EPA 8082 / 8082A	PCB 66
GC	EPA 8082 / 8082A	PCB 77
GC	EPA 8082 / 8082A	PCB 81
GC	EPA 8082 / 8082A	PCB 101
GC	EPA 8082 / 8082A	PCB 105
GC	EPA 8082 / 8082A	PCB 110
GC	EPA 8082 / 8082A	PCB 114
GC	EPA 8082 / 8082A	PCB 118
GC	EPA 8082 / 8082A	PCB 123
GC	EPA 8082 / 8082A	PCB 126
GC	EPA 8082 / 8082A	PCB 128
GC	EPA 8082 / 8082A	PCB 138
GC	EPA 8082 / 8082A	PCB 153
GC	EPA 8082 / 8082A	PCB 156
GC	EPA 8082 / 8082A	PCB 157
GC	EPA 8082 / 8082A	PCB 167
GC	EPA 8082 / 8082A	PCB 169
GC	EPA 8082 / 8082A	PCB 170
GC	EPA 8082 / 8082A	PCB 180



Solid and Chemical Materials		
Technology	Method	Analyte
GC	EPA 8082 / 8082A	PCB 187
GC	EPA 8082 / 8082A	PCB 189
GC	EPA 8082 / 8082A	PCB 195
GC	EPA 8082 / 8082A	PCB 206
GC	EPA 8082 / 8082A	PCB 209
GC	EPA 8141A / 8141B	Azinphos-methyl
GC	EPA 8141A / 8141B	Bolstar
GC	EPA 8141A / 8141B	Chlorpyrifos
GC	EPA 8141A / 8141B	Coumaphos
GC	EPA 8141A / 8141B	Total Demeton
GC	EPA 8141A / 8141B	Diazinon
GC	EPA 8141A / 8141B	Dichlorvos
GC	EPA 8141A / 8141B	Disulfoton
GC	EPA 8141A / 8141B	Ethoprop
GC	EPA 8141A / 8141B	Fensulfothion
GC	EPA 8141A / 8141B	Fenthion
GC	EPA 8141A / 8141B	Merphos
GC	EPA 8141A / 8141B	Mevinphos
GC	EPA 8141A / 8141B	Naled
GC	EPA 8141A / 8141B	Methyl Parathion
GC	EPA 8141A / 8141B	Phorate
GC	EPA 8141A / 8141B	Ronnel
GC	EPA 8141A / 8141B	Stirophos
GC	EPA 8141A / 8141B	Tokuthion
GC	EPA 8141A / 8141B	Trichloronate
GC	EPA 8141A / 8141B	Dimethoate
GC	EPA 8141A / 8141B	EPN
GC	EPA 8141A / 8141B	Famphur
GC	EPA 8141A / 8141B	Malathion
GC	EPA 8141A / 8141B	Ethyl Parathion
GC	EPA 8141A / 8141B	O,O,O-Triethylphosphorothioate
GC	EPA 8141A / 8141B	Sulfotepp
GC	EPA 8141A / 8141B	Thionazin
GC	EPA 8141A / 8141B	Tributyl Phosphate
GC-MS	EPA 8260B / 8260C	Acetone
GC-MS	EPA 8260B / 8260C	Acrolein
GC-MS	EPA 8260B / 8260C	Acrylonitrile
GC-MS	EPA 8260B / 8260C	Benzene



Solid and Chemical Materials

Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C	Bromobenzene
GC-MS	EPA 8260B / 8260C	Bromochloromethane
GC-MS	EPA 8260B / 8260C	Bromodichloromethane
GC-MS	EPA 8260B / 8260C	Bromoform
GC-MS	EPA 8260B / 8260C	Bromomethane
GC-MS	EPA 8260B / 8260C	tert-Butyl alcohol
GC-MS	EPA 8260B / 8260C	2-Butanone (MEK)
GC-MS	EPA 8260B / 8260C	n-Butylbenzene
GC-MS	EPA 8260B / 8260C	sec-Butylbenzene
GC-MS	EPA 8260B / 8260C	tert-Butylbenzene
GC-MS	EPA 8260B / 8260C	Carbon disulfide
GC-MS	EPA 8260B / 8260C	Carbon tetrachloride
GC-MS	EPA 8260B / 8260C	Chlorobenzene
GC-MS	EPA 8260B / 8260C	2-Chloroethyl vinyl ether
GC-MS	EPA 8260B / 8260C	Chloroethane
GC-MS	EPA 8260B / 8260C	Chloroform
GC-MS	EPA 8260B / 8260C	1-Chlorohexane
GC-MS	EPA 8260B / 8260C	Chloromethane
GC-MS	EPA 8260B / 8260C	2-Chlorotoluene
GC-MS	EPA 8260B / 8260C	4-Chlorotoluene
GC-MS	EPA 8260B / 8260C	Isopropyl ether (DIPE)
GC-MS	EPA 8260B / 8260C	Dibromochloromethane
GC-MS	EPA 8260B / 8260C	1,2-Dibromo-3-chloropropane
GC-MS	EPA 8260B / 8260C	1,2-Dibromoethane
GC-MS	EPA 8260B / 8260C	Dibromomethane
GC-MS	EPA 8260B / 8260C	1,1-Dichloroethane
GC-MS	EPA 8260B / 8260C	1,2-Dichloroethane
GC-MS	EPA 8260B / 8260C	1,2-Dichlorobenzene
GC-MS	EPA 8260B / 8260C	1,3-Dichlorobenzene
GC-MS	EPA 8260B / 8260C	trans-1,4-Dichloro-2-Butene
GC-MS	EPA 8260B / 8260C	1,4-Dichlorobenzene
GC-MS	EPA 8260B / 8260C	Dichlorodifluoromethane
GC-MS	EPA 8260B / 8260C	1,1-Dichloroethene
GC-MS	EPA 8260B / 8260C	cis-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C	trans-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C	Dichlorofluoromethane
GC-MS	EPA 8260B / 8260C	1,1-Dichloropropene
GC-MS	EPA 8260B / 8260C	1,2-Dichloropropane



Solid and Chemical Materials		
Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C	1,3-Dichloropropane
GC-MS	EPA 8260B / 8260C	2,2-Dichloropropane
GC-MS	EPA 8260B / 8260C	cis-1,3-Dichloropropene
GC-MS	EPA 8260B / 8260C	trans-1,3-Dichloropropene
GC-MS	EPA 8260B / 8260C	tert-Butyl ethyl ether (ETBE)
GC-MS	EPA 8260B / 8260C	Ethyl Methacrylate
GC-MS	EPA 8260B / 8260C	Ethylbenzene
GC-MS	EPA 8260B / 8260C	2-Hexanone (MBK)
GC-MS	EPA 8260B / 8260C	Hexachlorobutadiene
GC-MS	EPA 8260B / 8260C	Iodomethane
GC-MS	EPA 8260B / 8260C	Isopropylbenzene
GC-MS	EPA 8260B / 8260C	p-Isopropyltoluene
GC-MS	EPA 8260B / 8260C	Methylene Chloride
GC-MS	EPA 8260B / 8260C	4-Methyl-2-pentanone (MIBK)
GC-MS	EPA 8260B / 8260C	tert-Butyl methyl ether
GC-MS	EPA 8260B / 8260C	Naphthalene
GC-MS	EPA 8260B / 8260C	n-Propylbenzene
GC-MS	EPA 8260B / 8260C	Styrene
GC-MS	EPA 8260B / 8260C	tert-Amyl methyl ether (TAME)
GC-MS	EPA 8260B / 8260C	1,1,1,2-Tetrachloroethane
GC-MS	EPA 8260B / 8260C	1,1,2,2-Tetrachloroethane
GC-MS	EPA 8260B / 8260C	Tetrachloroethene
GC-MS	EPA 8260B / 8260C	Toluene
GC-MS	EPA 8260B / 8260C	1,1,1-Trichloroethane
GC-MS	EPA 8260B / 8260C	1,1,2-Trichloroethane
GC-MS	EPA 8260B / 8260C	1,2,3-Trichlorobenzene
GC-MS	EPA 8260B / 8260C	1,2,4-Trichlorobenzene
GC-MS	EPA 8260B / 8260C	Trichloroethene
GC-MS	EPA 8260B / 8260C	Trichlorofluoromethane
GC-MS	EPA 8260B / 8260C	1,2,3-Trichloropropane
GC-MS	EPA 8260B / 8260C	1,1,2-Trichloro 1,2,2-trifluoroethane
GC-MS	EPA 8260B / 8260C	1,2,4-Trimethylbenzene
GC-MS	EPA 8260B / 8260C	1,3,5-Trimethylbenzene
GC-MS	EPA 8260B / 8260C	Vinyl Acetate
GC-MS	EPA 8260B / 8260C	Vinyl Chloride
GC-MS	EPA 8260B / 8260C	m-Xylene & p-xylene
GC-MS	EPA 8260B / 8260C	o-Xylene



Solid and Chemical Materials		
Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C	2-Butanol
GC-MS	EPA 8260B / 8260C	Cyclohexane
GC-MS	EPA 8260B / 8260C	1,4-Dioxane
GC-MS	EPA 8260B / 8260C	2-Chloro-1,1,1-trifluoroethane
GC-MS	EPA 8260B / 8260C	Chlorotrifluoroethylene
GC-MS	EPA 8260B / 8260C	cis-1,4-Dichloro-2-butene
GC-MS	EPA 8260B / 8260C	Ethanol
GC-MS	EPA 8260B / 8260C	Ethyl Methacrylate
GC-MS	EPA 8260B / 8260C	Isobutyl Alcohol
GC-MS	EPA 8260B / 8260C	Methacrylonitrile
GC-MS	EPA 8260B / 8260C	Methyl Methacrylate
GC-MS	EPA 8260B / 8260C	Pentachloroethane
GC-MS	EPA 8260B / 8260C	Propionitrile
GC-MS	EPA 8260B / 8260C	Sec-Propyl alcohol
GC-MS	EPA 8260B / 8260C	Tetrahydrofuran
GC-MS	EPA 8260B / 8260C	trans-1,4-Dichloro-2-butene
GC-MS	EPA 8260B / 8260C	Allyl Chloride
GC-MS	EPA 8260B / 8260C	Benzyl chloride
GC-MS	EPA 8260B / 8260C	Chloroprene
GC-MS	EPA 8260B / 8260C	Methyl Acetate
GC-MS	EPA 8260B / 8260C	Methyleyclohexane
GC-MS	EPA 8260B / 8260C SIM	Benzene
GC-MS	EPA 8260B / 8260C SIM	Carbon tetrachloride
GC-MS	EPA 8260B / 8260C SIM	Chloroform
GC-MS	EPA 8260B / 8260C SIM	Chloromethane
GC-MS	EPA 8260B / 8260C SIM	1,2-Dibromo-3-chloropropane
GC-MS	EPA 8260B / 8260C SIM	1,2-Dibromoethane
GC-MS	EPA 8260B / 8260C SIM	1,2-Dichloroethane
GC-MS	EPA 8260B / 8260C SIM	1,1-Dichloroethene
GC-MS	EPA 8260B / 8260C SIM	cis-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C SIM	trans-1,2-Dichloroethene
GC-MS	EPA 8260B / 8260C SIM	1,1,2,2-Tetrachloroethane
GC-MS	EPA 8260B / 8260C SIM	Tetrachloroethene
GC-MS	EPA 8260B / 8260C SIM	1,1,1-Trichloroethane
GC-MS	EPA 8260B / 8260C SIM	1,1,2-Trichloroethane
GC-MS	EPA 8260B / 8260C SIM	Trichloroethene
GC-MS	EPA 8260B / 8260C SIM	1,2,3-Trichloropropane
GC-MS	EPA 8260B / 8260C SIM	Vinyl Chloride



Solid and Chemical Materials

Technology	Method	Analyte
GC-MS	EPA 8260B / 8260C SIM	1,4-Dioxane
GC-MS	EPA 8270C / 8270D	Acenaphthene
GC-MS	EPA 8270C / 8270D	Acenaphthylene
GC-MS	EPA 8270C / 8270D	Aniline
GC-MS	EPA 8270C / 8270D	Anthracene
GC-MS	EPA 8270C / 8270D	Azobenzene
GC-MS	EPA 8270C / 8270D	Benzidine
GC-MS	EPA 8270C / 8270D	Benzo(a)anthracene
GC-MS	EPA 8270C / 8270D	benzo(a)pyrene
GC-MS	EPA 8270C / 8270D	Benzo(b)fluoranthene
GC-MS	EPA 8270C / 8270D	Benzo(e)pyrene
GC-MS	EPA 8270C / 8270D	Benzo(g,h,i)perylene
GC-MS	EPA 8270C / 8270D	Benzo(k)fluoranthene
GC-MS	EPA 8270C / 8270D	Benzoic Acid
GC-MS	EPA 8270C / 8270D	Benzyl Alcohol
GC-MS	EPA 8270C / 8270D	Biphenyl
GC-MS	EPA 8270C / 8270D	bis(2-chloroethoxy)methane
GC-MS	EPA 8270C / 8270D	bis(2-chloroethyl)ether
GC-MS	EPA 8270C / 8270D	bis(2-chloroisopropyl)ether
GC-MS	EPA 8270C / 8270D	bis(2-Ethylhexyl)adipate
GC-MS	EPA 8270C / 8270D	bis(2-Ethylhexyl)phthalate
GC-MS	EPA 8270C / 8270D	4-Bromophenyl-phenylether
GC-MS	EPA 8270C / 8270D	Butylbenzylphthalate
GC-MS	EPA 8270C / 8270D	Carbazole
GC-MS	EPA 8270C / 8270D	4-Chloro-3-methylphenol
GC-MS	EPA 8270C / 8270D	4-Chloroaniline
GC-MS	EPA 8270C / 8270D	2-Chloronaphthalene
GC-MS	EPA 8270C / 8270D	2-Chlorophenol
GC-MS	EPA 8270C / 8270D	4-Chlorophenyl-phenylether
GC-MS	EPA 8270C / 8270D	Chrysene
GC-MS	EPA 8270C / 8270D	Dibenzo(a,h)anthracene
GC-MS	EPA 8270C / 8270D	Dibenzofuran
GC-MS	EPA 8270C / 8270D	1,2-Dichlorobenzene
GC-MS	EPA 8270C / 8270D	1,3-Dichlorobenzene
GC-MS	EPA 8270C / 8270D	1,4-Dichlorobenzene
GC-MS	EPA 8270C / 8270D	3,3'-Dichlorobenzidine
GC-MS	EPA 8270C / 8270D	2,4-Dichlorophenol
GC-MS	EPA 8270C / 8270D	Diethylphthalate



Solid and Chemical Materials

Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	2,6-Dimethylnaphthalene
GC-MS	EPA 8270C / 8270D	2,4-Dimethylphenol
GC-MS	EPA 8270C / 8270D	Dimethylphthalate
GC-MS	EPA 8270C / 8270D	Di-n-butylphthalate
GC-MS	EPA 8270C / 8270D	4,6-Dinitro-2-methylphenol
GC-MS	EPA 8270C / 8270D	2,4-Dinitrophenol
GC-MS	EPA 8270C / 8270D	2,4-Dinitrotoluene
GC-MS	EPA 8270C / 8270D	2,6-Dinitrotoluene
GC-MS	EPA 8270C / 8270D	Di-n-octylphthalate
GC-MS	EPA 8270C / 8270D	Fluoranthene
GC-MS	EPA 8270C / 8270D	Fluorene
GC-MS	EPA 8270C / 8270D	Hexachlorobenzene
GC-MS	EPA 8270C / 8270D	Hexachlorobutadiene
GC-MS	EPA 8270C / 8270D	Hexachlorocyclopentadiene
GC-MS	EPA 8270C / 8270D	Hexachloroethane
GC-MS	EPA 8270C / 8270D	Indeno(1,2,3-cd)pyrene
GC-MS	EPA 8270C / 8270D	Isophorone
GC-MS	EPA 8270C / 8270D	1-Methylnaphthalene
GC-MS	EPA 8270C / 8270D	2-Methylnaphthalene
GC-MS	EPA 8270C / 8270D	1-Methylphenanthrene
GC-MS	EPA 8270C / 8270D	2-Methylphenol
GC-MS	EPA 8270C / 8270D	3/4-Methylphenol
GC-MS	EPA 8270C / 8270D	Naphthalene
GC-MS	EPA 8270C / 8270D	2-Nitroaniline
GC-MS	EPA 8270C / 8270D	3-Nitroaniline
GC-MS	EPA 8270C / 8270D	4-Nitroaniline
GC-MS	EPA 8270C / 8270D	Nitrobenzene
GC-MS	EPA 8270C / 8270D	2-Nitrophenol
GC-MS	EPA 8270C / 8270D	4-Nitrophenol
GC-MS	EPA 8270C / 8270D	n-Nitrosodimethylamine
GC-MS	EPA 8270C / 8270D	n-Nitroso-di-n-propylamine
GC-MS	EPA 8270C / 8270D	n-Nitrosodiphenylamine
GC-MS	EPA 8270C / 8270D	Pentachlorophenol
GC-MS	EPA 8270C / 8270D	Perylene
GC-MS	EPA 8270C / 8270D	Phenanthrene
GC-MS	EPA 8270C / 8270D	Phenol
GC-MS	EPA 8270C / 8270D	Pyrene
GC-MS	EPA 8270C / 8270D	Pyridine



Solid and Chemical Materials

Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	2,3,4,6-Tetrachlorophenol
GC-MS	EPA 8270C / 8270D	1,2,4-Trichlorobenzene
GC-MS	EPA 8270C / 8270D	2,3,4-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,3,5-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,4,5-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,4,6-Trichlorophenol
GC-MS	EPA 8270C / 8270D	2,3,5-Trimethylnaphthalene
GC-MS	EPA 8270C / 8270D	1,2,4,5-Tetrachlorobenzene
GC-MS	EPA 8270C / 8270D	1,3,5-Trinitrobenzene
GC-MS	EPA 8270C / 8270D	1,3-Dinitrobenzene
GC-MS	EPA 8270C / 8270D	1,4-Dioxane
GC-MS	EPA 8270C / 8270D	1,4-Naphthoquinone
GC-MS	EPA 8270C / 8270D	1-Chloronaphthalene
GC-MS	EPA 8270C / 8270D	1-Naphthylamine
GC-MS	EPA 8270C / 8270D	2,6-Dichlorophenol
GC-MS	EPA 8270C / 8270D	2-acetylaminofluorene
GC-MS	EPA 8270C / 8270D	2-Naphthylamine
GC-MS	EPA 8270C / 8270D	2-Picoline
GC-MS	EPA 8270C / 8270D	3,3-Dimethylbenzidine
GC-MS	EPA 8270C / 8270D	3,4-Dimethylphenol
GC-MS	EPA 8270C / 8270D	3,5-Dimethylphenol
GC-MS	EPA 8270C / 8270D	3-Methylcholanthrene
GC-MS	EPA 8270C / 8270D	4-Aminobiphenyl
GC-MS	EPA 8270C / 8270D	4-Nitroquinoline-N-oxide
GC-MS	EPA 8270C / 8270D	5-Nitro-o-toluidine
GC-MS	EPA 8270C / 8270D	7,12-Dimethylbenz(a)anthracene
GC-MS	EPA 8270C / 8270D	Acetophenone
GC-MS	EPA 8270C / 8270D	Aramite
GC-MS	EPA 8270C / 8270D	Atrazine
GC-MS	EPA 8270C / 8270D	Biphenyl
GC-MS	EPA 8270C / 8270D	Chlorobenzilate
GC-MS	EPA 8270C / 8270D	Diallate
GC-MS	EPA 8270C / 8270D	Dibenzo(a,j)acridine
GC-MS	EPA 8270C / 8270D	Dimethoate
GC-MS	EPA 8270C / 8270D	Dinoseb
GC-MS	EPA 8270C / 8270D	Diphenyl ether
GC-MS	EPA 8270C / 8270D	Disulfoton
GC-MS	EPA 8270C / 8270D	Ethyl methacrylate



Solid and Chemical Materials		
Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D	Ethyl methanesulfonate
GC-MS	EPA 8270C / 8270D	Ethyl parathion
GC-MS	EPA 8270C / 8270D	Famphur
GC-MS	EPA 8270C / 8270D	Hexachlorophene
GC-MS	EPA 8270C / 8270D	Hexachloropropene
GC-MS	EPA 8270C / 8270D	Isodrin
GC-MS	EPA 8270C / 8270D	Isosafrole
GC-MS	EPA 8270C / 8270D	kepone
GC-MS	EPA 8270C / 8270D	Methapyrilene
GC-MS	EPA 8270C / 8270D	Methyl methanesulfonate
GC-MS	EPA 8270C / 8270D	Methyl parathion
GC-MS	EPA 8270C / 8270D	N-nitrosodiethylamine
GC-MS	EPA 8270C / 8270D	N-Nitrosodi-n-butylamine
GC-MS	EPA 8270C / 8270D	N-Nitrosomethylethylamine
GC-MS	EPA 8270C / 8270D	N-Nitrosomorpholine
GC-MS	EPA 8270C / 8270D	N-Nitrosopiperdine
GC-MS	EPA 8270C / 8270D	N-Nitrosopyrrolidine
GC-MS	EPA 8270C / 8270D	O,O,O-triethyl phosphorothi
GC-MS	EPA 8270C / 8270D	o-toluidine
GC-MS	EPA 8270C / 8270D	p-Dimethylaminoazobenze
GC-MS	EPA 8270C / 8270D	Pentachlorobenzene
GC-MS	EPA 8270C / 8270D	Pentachloroethane
GC-MS	EPA 8270C / 8270D	Pentachloronitrobenzene
GC-MS	EPA 8270C / 8270D	Phenacetin
GC-MS	EPA 8270C / 8270D	Phorate
GC-MS	EPA 8270C / 8270D	p-phenylenediamine
GC-MS	EPA 8270C / 8270D	Pronamide
GC-MS	EPA 8270C / 8270D	Safrole
GC-MS	EPA 8270C / 8270D	Sulfotepp
GC-MS	EPA 8270C / 8270D	Thionazin
GC-MS	EPA 8270C / 8270D SIM	Acenaphthene
GC-MS	EPA 8270C / 8270D SIM	Acenaphthylene
GC-MS	EPA 8270C / 8270D SIM	Anthracene
GC-MS	EPA 8270C / 8270D SIM	Azobenzene
GC-MS	EPA 8270C / 8270D SIM	Benzo(a)anthracene
GC-MS	EPA 8270C / 8270D SIM	benzo(a)pyrene
GC-MS	EPA 8270C / 8270D SIM	Benzo(b)fluoranthene
GC-MS	EPA 8270C / 8270D SIM	Benzo(e)pyrene



Solid and Chemical Materials		
Technology	Method	Analyte
GC-MS	EPA 8270C / 8270D SIM	Benzo(g,h,i)perylene
GC-MS	EPA 8270C / 8270D SIM	Benzo(k)fluoranthene
GC-MS	EPA 8270C / 8270D SIM	Biphenyl
GC-MS	EPA 8270C / 8270D SIM	bis(2-chloroethyl)ether
GC-MS	EPA 8270C / 8270D SIM	bis(2-Ethylhexyl)phthalate
GC-MS	EPA 8270C / 8270D SIM	Carbazole
GC-MS	EPA 8270C / 8270D SIM	4-Chloro-3-methylphenol
GC-MS	EPA 8270C / 8270D SIM	2-Chlorophenol
GC-MS	EPA 8270C / 8270D SIM	Chrysene
GC-MS	EPA 8270C / 8270D SIM	Dibenzo(a,h)anthracene
GC-MS	EPA 8270C / 8270D SIM	2,4-Dichlorophenol
GC-MS	EPA 8270C / 8270D SIM	2,6-Dimethylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	2,4-Dimethylphenol
GC-MS	EPA 8270C / 8270D SIM	Fluoranthene
GC-MS	EPA 8270C / 8270D SIM	Fluorene
GC-MS	EPA 8270C / 8270D SIM	Hexachlorobenzene
GC-MS	EPA 8270C / 8270D SIM	Indeno(1,2,3-cd)pyrene
GC-MS	EPA 8270C / 8270D SIM	1-Methylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	2-Methylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	1-Methylphenanthrene
GC-MS	EPA 8270C / 8270D SIM	Naphthalene
GC-MS	EPA 8270C / 8270D SIM	n-Nitrosodimethylamine
GC-MS	EPA 8270C / 8270D SIM	n-Nitroso-di-n-propylamine
GC-MS	EPA 8270C / 8270D SIM	Pentachlorophenol
GC-MS	EPA 8270C / 8270D SIM	Perylene
GC-MS	EPA 8270C / 8270D SIM	Phenanthrene
GC-MS	EPA 8270C / 8270D SIM	Phenol
GC-MS	EPA 8270C / 8270D SIM	Pyrene
GC-MS	EPA 8270C / 8270D SIM	2,4,5-Trichlorophenol
GC-MS	EPA 8270C / 8270D SIM	2,4,6-Trichlorophenol
GC-MS	EPA 8270C / 8270D SIM	2,3,5-Trimethylnaphthalene
GC-MS	EPA 8270C / 8270D SIM	1,4-Dioxane
GC-MS	EPA 8270C / 8270D SIM	Butylbenzylphthalate
GC-MS	EPA 8270C / 8270D SIM	Diethylphthalate
GC-MS	EPA 8270C / 8270D SIM	Dimethylphthalate
GC-MS	EPA 8270C / 8270D SIM	Di-n-butylphthalate
GC-MS	EPA 8270C / 8270D SIM	Di-n-octylphthalate
HPLC	EPA 8310	Acenaphthene



Solid and Chemical Materials		
Technology	Method	Analyte
HPLC	EPA 8310	Acenaphthylene
HPLC	EPA 8310	Anthracene
HPLC	EPA 8310	Benzo(a)anthracene
HPLC	EPA 8310	Benzo(a)pyrene
HPLC	EPA 8310	Benzo(b)fluoranthene
HPLC	EPA 8310	Benzo(g,h,i)perylene
HPLC	EPA 8310	Benzo(k)fluoranthene
HPLC	EPA 8310	Chrysene
HPLC	EPA 8310	Dibenzo(a,h)anthracene
HPLC	EPA 8310	Fluoranthene
HPLC	EPA 8310	Fluorene
HPLC	EPA 8310	Indeno(1,2,3-cd)pyrene
HPLC	EPA 8310	1-Methylnaphthalene
HPLC	EPA 8310	2-Methylnaphthalene
HPLC	EPA 8310	Naphthalene
HPLC	EPA 8310	Phenanthrene
HPLC	EPA 8310	Pyrene
HPLC	EPA 8330A	HMX
HPLC	EPA 8330A	RDX
HPLC	EPA 8330A	1,3,5-TNB
HPLC	EPA 8330A	1,3-DNB
HPLC	EPA 8330A	Tetryl
HPLC	EPA 8330A	Nitrobenzene
HPLC	EPA 8330A	2,4,6-TNT
HPLC	EPA 8330A	4-AM-2,6-DNT
HPLC	EPA 8330A	2-AM-4,6-DNT
HPLC	EPA 8330A	2,6-DNT
HPLC	EPA 8330A	2,4-DNT
HPLC	EPA 8330A	2-Nitrotoluene
HPLC	EPA 8330A	4-Nitrotoluene
HPLC	EPA 8330A	3-Nitrotoluene
HPLC	EPA 8330A	3,5-Dinitroaniline
HPLC	EPA 8330A	2,4-Diamino-6-nitrotoluene
HPLC	EPA 8330A	2,6-Diamino-4-nitrotoluene
HPLC	EPA 8330A	Picric Acid
HPLC	EPA 8332	Nitroglycerine



Solid and Chemical Materials		
Technology	Method	Analyte
HPLC	EPA 8332	PETN
IC	EPA 9056 / 9056A	Bromate
IC	EPA 9056 / 9056A	Bromide
IC	EPA 9056 / 9056A	Chloride
IC	EPA 9056 / 9056A	Fluoride
IC	EPA 9056 / 9056A	Nitrate
IC	EPA 9056 / 9056A	Nitrite
IC	EPA 9056 / 9056A	Phosphate
IC	EPA 9056 / 9056A	Sulfate
IC	EPA 9056 / 9056A	Chlorate
GC	EPA 8151A	Acifluorfen
GC	EPA 8151A	Bentazon
GC	EPA 8151A	Chloramben
GC	EPA 8151A	2,4-D
GC	EPA 8151A	2,4-DB
GC	EPA 8151A	Dacthal
GC	EPA 8151A	Dalapon
GC	EPA 8151A	Dicamba
GC	EPA 8151A	3,5-Dichlorobenzoic acid
GC	EPA 8151A	Dichlorprop
GC	EPA 8151A	Dinoseb
GC	EPA 8151A	MCPA
GC	EPA 8151A	MCPP
GC	EPA 8151A	Pentachlorophenol
GC	EPA 8151A	Picloram
GC	EPA 8151A	Silvex
GC	EPA 8151A	2,4,5-T
Spectrometric	EPA 9014	Cyanide
Spectrometric	EPA 9014	Amenable Cyanide
Gravimetric	EPA 9071B	Oil & Grease
GFAA	CA 939M	Organo Lead
Preparation	Method	Type
Purge & Trap	EPA 5030B / EPA 5035	Volatiles Prep
Acid Digestion	EPA 3050B	Metals Prep
Alkaline Digestion	EPA 3060A	Hexavalent Chrom
Soxhlet	EPA 3540C	Organic Extraction



Solid and Chemical Materials

Technology	Method	Analyte
Sonication	EPA 3550C	Organic Extraction
Waste Dilution	EPA 3580A	Organic Extraction
Microwave	EPA 3546	Organic Extraction
TCLP	EPA 1311	Leaching
SPLP	EPA 1312	Leaching
Floridil Clean-up	EPA 3620C	Extract Clean-Up
GPC Clean-up	EPA 3640A	Extract Clean-Up
Sulfur Clean-up	EPA 3660B	Extract Clean-Up
Acid/Permanganate Clean-up	EPA 3665A	Extract Clean-Up

Air and Emissions

Technology	Method	Analyte
GC-MS	TO-15	1,1,1-trichloroethane
GC-MS	TO-15	1,1,2,2-tetrachloroethane
GC-MS	TO-15	1,1,2-Trichloro1,2,2-trifluoroethane
GC-MS	TO-15	1,1,2-trichloroethane
GC-MS	TO-15	1,1-dichloroethane
GC-MS	TO-15	1,1-Dichloroethene
GC-MS	TO-15	1,2,4-trichlorobenzene
GC-MS	TO-15	1,2,4-trimethylbenzene
GC-MS	TO-15	1,2-dibromoethane
GC-MS	TO-15	1,2-dichloroethane
GC-MS	TO-15	1,2-dichloroethene
GC-MS	TO-15	1,2-dichloropropane
GC-MS	TO-15	1,3,5-trimethylbenzene
GC-MS	TO-15	1,3-Butadiene
GC-MS	TO-15	1,3-Butadiene, 1,1,2,3,4,Hexachloro
GC-MS	TO-15	1,3-dichlorobenzene
GC-MS	TO-15	1,4-dichlorobenzene
GC-MS	TO-15	1,4-Dioxane
GC-MS	TO-15	2,2,4-Trimethylpentane
GC-MS	TO-15	4-Ethyltoluene
GC-MS	TO-15	Acetone



Air and Emissions		
Technology	Method	Analyte
GC-MS	TO-15	Acrylonitrile
GC-MS	TO-15	Allyl Chloride
GC-MS	TO-15	Benzene
GC-MS	TO-15	Benzyl Chloride
GC-MS	TO-15	Bromodichloromethane
GC-MS	TO-15	Bromoform
GC-MS	TO-15	Bromomethane
GC-MS	TO-15	Carbon Disulfide
GC-MS	TO-15	Carbon Tetrachloride
GC-MS	TO-15	Chlorobenzene
GC-MS	TO-15	Chloroethane
GC-MS	TO-15	Chloroethene
GC-MS	TO-15	Chloroform
GC-MS	TO-15	Chloromethane
GC-MS	TO-15	cis-1,3-Dichloropropene
GC-MS	TO-15	Cyclohexane
GC-MS	TO-15	Dibromochloromethane
GC-MS	TO-15	Dichlorodifluoromethane
GC-MS	TO-15	Dichlorotetrafluoroethane
GC-MS	TO-15	Ethyl Acetate
GC-MS	TO-15	Ethylbenzene
GC-MS	TO-15	Isopropyl Alcohol
GC-MS	TO-15	m+p-Xylene
GC-MS	TO-15	Methyl butyl Ketone
GC-MS	TO-15	Methyl Ethyl Ketone
GC-MS	TO-15	Methyl Isobutyl Ketone
GC-MS	TO-15	Methyl Tert-Butyl Ether
GC-MS	TO-15	Methylene Chloride
GC-MS	TO-15	n-Heptane
GC-MS	TO-15	n-Hexane
GC-MS	TO-15	o-Xylene
GC-MS	TO-15	Styrene
GC-MS	TO-15	Tetrachloroethylene
GC-MS	TO-15	Tetrahydrofuran
GC-MS	TO-15	Toluene
GC-MS	TO-15	Trans-1,2-Dichloroethene



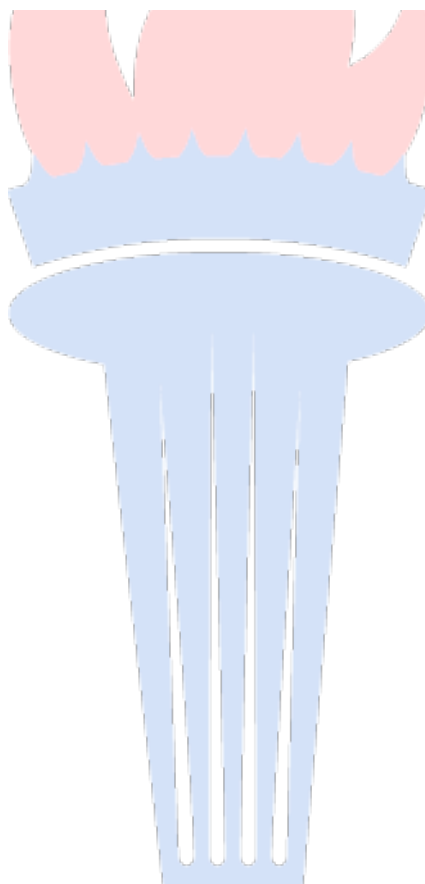
Air and Emissions		
Technology	Method	Analyte
GC-MS	TO-15	trans-1,3-Dichloropropene
GC-MS	TO-15	Trichloroethylene
GC-MS	TO-15	Trichloromonofluoromethan
GC-MS	TO-15	Vinyl Acetate
GC-MS	TO-15	Vinyl Bromide

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. L2278



Vice President





THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

**Department of Environmental
Conservation**

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

555 Cordova Street
Anchorage, Alaska 99501
Main: 907.465.5390
Fax: 907.269.7649
cs.lab.cert@alaska.gov

May 2, 2018

Caspar Pang
EMAX Laboratories, Inc.
1835 W. 205th Street
Torrance, CA 90501

RE: Contaminated Sites Laboratory Approval **18-004**

Dear Mr. Pang,

Thank you for submitting an application to the Alaska Department of Environmental Conservation's Contaminated Sites Laboratory Approval Program (CS-LAP), on March 2, 2018. Based on your lab's Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP) approval through the ANSI-ASQ National Accreditation Board (ANAB), EMAX Laboratories, Inc., 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 expires on ***January 20, 2020***.

Be aware that **any** changes in your DoD-ELAP approval status must be reported to the CS program within 3 business days. Failure to do so will result in revocation of **all** CS-LAP approvals 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.

To report any changes in your lab's contact information (i.e. lab director, business name, location, etc.), please complete the form found at <http://dec.alaska.gov/spar/csp/LabApproval/ApplyForApproval.htm> and submit to cs.submittals@alaska.gov.

To apply for renewal of your approval, please complete the application found at <http://dec.alaska.gov/spar/csp/LabApproval/ApplyForApproval.htm> and submit to cs.submittals@alaska.gov. The required documentation must be submitted for renewal no later than 30 days before your date of expiration.

Please remember to include the laboratory's ID number, listed above, on all correspondence concerning the laboratory.

If you have any questions, please contact the CS-LAP at (907) 465-5390, 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,

A handwritten signature in blue ink that reads "Brian Englund". The signature is written in a cursive, flowing style.

Brian Englund
Alaska CS Lab Approval Officer

Attachment: Scope of Approval

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
83-32-9	Water	Acenaphthene	625	ANAB
83-32-9	Soil	Acenaphthene	8310	ANAB
83-32-9	Water	Acenaphthene	8310	ANAB
83-32-9	Soil	Acenaphthene	8270C	ANAB
83-32-9	Water	Acenaphthene	8270C	ANAB
83-32-9	Soil	Acenaphthene	8270C-SIM	ANAB
83-32-9	Water	Acenaphthene	8270C-SIM	ANAB
83-32-9	Soil	Acenaphthene	8270D	ANAB
83-32-9	Water	Acenaphthene	8270D	ANAB
83-32-9	Soil	Acenaphthene	8270D-SIM	ANAB
83-32-9	Water	Acenaphthene	8270D-SIM	ANAB
208-96-8	Water	Acenaphthylene	625	ANAB
208-96-8	Soil	Acenaphthylene	8310	ANAB
208-96-8	Water	Acenaphthylene	8310	ANAB
208-96-8	Soil	Acenaphthylene	8270C	ANAB
208-96-8	Water	Acenaphthylene	8270C	ANAB
208-96-8	Soil	Acenaphthylene	8270C-SIM	ANAB
208-96-8	Water	Acenaphthylene	8270C-SIM	ANAB
208-96-8	Soil	Acenaphthylene	8270D	ANAB
208-96-8	Water	Acenaphthylene	8270D	ANAB
208-96-8	Soil	Acenaphthylene	8270D-SIM	ANAB
208-96-8	Water	Acenaphthylene	8270D-SIM	ANAB
67-64-1	Soil	Acetone	8260B	ANAB
67-64-1	Water	Acetone	8260B	ANAB
67-64-1	Soil	Acetone	8260C	ANAB
67-64-1	Water	Acetone	8260C	ANAB
67-64-1	Air	Acetone	TO-15	ANAB
309-00-2	Water	Aldrin	608	ANAB
309-00-2	Soil	Aldrin	8081A	ANAB
309-00-2	Water	Aldrin	8081A	ANAB
309-00-2	Soil	Aldrin	8081B	ANAB
309-00-2	Water	Aldrin	8081B	ANAB
120-12-7	Water	Anthracene	625	ANAB

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
120-12-7	Soil	Anthracene	8310	ANAB
120-12-7	Water	Anthracene	8310	ANAB
120-12-7	Soil	Anthracene	8270C	ANAB
120-12-7	Water	Anthracene	8270C	ANAB
120-12-7	Soil	Anthracene	8270C-SIM	ANAB
120-12-7	Water	Anthracene	8270C-SIM	ANAB
120-12-7	Soil	Anthracene	8270D	ANAB
120-12-7	Water	Anthracene	8270D	ANAB
120-12-7	Soil	Anthracene	8270D-SIM	ANAB
120-12-7	Water	Anthracene	8270D-SIM	ANAB
7440-36-0	Water	Antimony (metallic)	200.7	ANAB
7440-36-0	Water	Antimony (metallic)	200.8	ANAB
7440-36-0	Soil	Antimony (metallic)	6010B	ANAB
7440-36-0	Water	Antimony (metallic)	6010B	ANAB
7440-36-0	Soil	Antimony (metallic)	6010C	ANAB
7440-36-0	Water	Antimony (metallic)	6010C	ANAB
7440-36-0	Soil	Antimony (metallic)	6020A	ANAB
7440-36-0	Water	Antimony (metallic)	6020A	ANAB
7440-36-0	Water	Antimony (metallic)	6020B	ANAB
7440-38-2	Water	Arsenic, Inorganic	200.7	ANAB
7440-38-2	Water	Arsenic, Inorganic	200.8	ANAB
7440-38-2	Soil	Arsenic, Inorganic	6010B	ANAB
7440-38-2	Water	Arsenic, Inorganic	6010B	ANAB
7440-38-2	Soil	Arsenic, Inorganic	6010C	ANAB
7440-38-2	Water	Arsenic, Inorganic	6010C	ANAB
7440-38-2	Soil	Arsenic, Inorganic	6020A	ANAB
7440-38-2	Water	Arsenic, Inorganic	6020A	ANAB
7440-38-2	Water	Arsenic, Inorganic	6020B	ANAB
7440-39-3	Water	Barium	200.7	ANAB
7440-39-3	Water	Barium	200.8	ANAB
7440-39-3	Soil	Barium	6010B	ANAB
7440-39-3	Water	Barium	6010B	ANAB
7440-39-3	Soil	Barium	6010C	ANAB

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
7440-39-3	Water	Barium	6010C	ANAB
7440-39-3	Soil	Barium	6020A	ANAB
7440-39-3	Water	Barium	6020A	ANAB
7440-39-3	Water	Barium	6020B	ANAB
56-55-3	Water	Benz[a]anthracene	625	ANAB
56-55-3	Soil	Benz[a]anthracene	8310	ANAB
56-55-3	Water	Benz[a]anthracene	8310	ANAB
56-55-3	Soil	Benz[a]anthracene	8270C	ANAB
56-55-3	Water	Benz[a]anthracene	8270C	ANAB
56-55-3	Soil	Benz[a]anthracene	8270C-SIM	ANAB
56-55-3	Water	Benz[a]anthracene	8270C-SIM	ANAB
56-55-3	Soil	Benz[a]anthracene	8270D	ANAB
56-55-3	Water	Benz[a]anthracene	8270D	ANAB
56-55-3	Soil	Benz[a]anthracene	8270D-SIM	ANAB
56-55-3	Water	Benz[a]anthracene	8270D-SIM	ANAB
71-43-2	Water	Benzene	524.2	ANAB
71-43-2	Water	Benzene	624	ANAB
71-43-2	Soil	Benzene	8260B	ANAB
71-43-2	Water	Benzene	8260B	ANAB
71-43-2	Soil	Benzene	8260C	ANAB
71-43-2	Water	Benzene	8260C	ANAB
71-43-2	Air	Benzene	TO-15	ANAB
50-32-8	Water	Benzo[a]pyrene	625	ANAB
50-32-8	Soil	Benzo[a]pyrene	8310	ANAB
50-32-8	Water	Benzo[a]pyrene	8310	ANAB
50-32-8	Soil	Benzo[a]pyrene	8270C	ANAB
50-32-8	Water	Benzo[a]pyrene	8270C	ANAB
50-32-8	Soil	Benzo[a]pyrene	8270C-SIM	ANAB
50-32-8	Water	Benzo[a]pyrene	8270C-SIM	ANAB
50-32-8	Soil	Benzo[a]pyrene	8270D	ANAB
50-32-8	Water	Benzo[a]pyrene	8270D	ANAB
50-32-8	Soil	Benzo[a]pyrene	8270D-SIM	ANAB
50-32-8	Water	Benzo[a]pyrene	8270D-SIM	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
205-99-2	Water	Benzo[b]fluoranthene	625	ANAB
205-99-2	Soil	Benzo[b]fluoranthene	8310	ANAB
205-99-2	Water	Benzo[b]fluoranthene	8310	ANAB
205-99-2	Soil	Benzo[b]fluoranthene	8270C	ANAB
205-99-2	Water	Benzo[b]fluoranthene	8270C	ANAB
205-99-2	Soil	Benzo[b]fluoranthene	8270C-SIM	ANAB
205-99-2	Water	Benzo[b]fluoranthene	8270C-SIM	ANAB
205-99-2	Soil	Benzo[b]fluoranthene	8270D	ANAB
205-99-2	Water	Benzo[b]fluoranthene	8270D	ANAB
205-99-2	Soil	Benzo[b]fluoranthene	8270D-SIM	ANAB
205-99-2	Water	Benzo[b]fluoranthene	8270D-SIM	ANAB
191-24-2	Water	Benzo[g,h,i]perylene	625	ANAB
191-24-2	Soil	Benzo[g,h,i]perylene	8310	ANAB
191-24-2	Water	Benzo[g,h,i]perylene	8310	ANAB
191-24-2	Soil	Benzo[g,h,i]perylene	8270C	ANAB
191-24-2	Water	Benzo[g,h,i]perylene	8270C	ANAB
191-24-2	Soil	Benzo[g,h,i]perylene	8270C-SIM	ANAB
191-24-2	Water	Benzo[g,h,i]perylene	8270C-SIM	ANAB
191-24-2	Soil	Benzo[g,h,i]perylene	8270D	ANAB
191-24-2	Water	Benzo[g,h,i]perylene	8270D	ANAB
191-24-2	Soil	Benzo[g,h,i]perylene	8270D-SIM	ANAB
191-24-2	Water	Benzo[g,h,i]perylene	8270D-SIM	ANAB
207-08-9	Water	Benzo[k]fluoranthene	625	ANAB
207-08-9	Soil	Benzo[k]fluoranthene	8310	ANAB
207-08-9	Water	Benzo[k]fluoranthene	8310	ANAB
207-08-9	Soil	Benzo[k]fluoranthene	8270C	ANAB
207-08-9	Water	Benzo[k]fluoranthene	8270C	ANAB
207-08-9	Soil	Benzo[k]fluoranthene	8270C-SIM	ANAB
207-08-9	Water	Benzo[k]fluoranthene	8270C-SIM	ANAB
207-08-9	Soil	Benzo[k]fluoranthene	8270D	ANAB
207-08-9	Water	Benzo[k]fluoranthene	8270D	ANAB
207-08-9	Soil	Benzo[k]fluoranthene	8270D-SIM	ANAB
207-08-9	Water	Benzo[k]fluoranthene	8270D-SIM	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
65-85-0	Soil	Benzoic Acid	8270C	ANAB
65-85-0	Water	Benzoic Acid	8270C	ANAB
65-85-0	Soil	Benzoic Acid	8270D	ANAB
65-85-0	Water	Benzoic Acid	8270D	ANAB
100-51-6	Soil	Benzyl Alcohol	8270C	ANAB
100-51-6	Water	Benzyl Alcohol	8270C	ANAB
100-51-6	Soil	Benzyl Alcohol	8270D	ANAB
100-51-6	Water	Benzyl Alcohol	8270D	ANAB
7440-41-7	Water	Beryllium and compounds	200.7	ANAB
7440-41-7	Water	Beryllium and compounds	200.8	ANAB
7440-41-7	Soil	Beryllium and compounds	6010B	ANAB
7440-41-7	Water	Beryllium and compounds	6010B	ANAB
7440-41-7	Soil	Beryllium and compounds	6010C	ANAB
7440-41-7	Water	Beryllium and compounds	6010C	ANAB
7440-41-7	Soil	Beryllium and compounds	6020A	ANAB
7440-41-7	Water	Beryllium and compounds	6020A	ANAB
7440-41-7	Water	Beryllium and compounds	6020B	ANAB
111-44-4	Soil	Bis(2-chloroethyl)ether	8270C	ANAB
111-44-4	Water	Bis(2-chloroethyl)ether	8270C	ANAB
111-44-4	Soil	Bis(2-chloroethyl)ether	8270C-SIM	ANAB
111-44-4	Water	Bis(2-chloroethyl)ether	8270C-SIM	ANAB
111-44-4	Soil	Bis(2-chloroethyl)ether	8270D	ANAB
111-44-4	Water	Bis(2-chloroethyl)ether	8270D	ANAB
111-44-4	Soil	Bis(2-chloroethyl)ether	8270D-SIM	ANAB
111-44-4	Water	Bis(2-chloroethyl)ether	8270D-SIM	ANAB
117-81-7	Soil	Bis(2-ethylhexyl)phthalate (DEHP)	8270C	ANAB
117-81-7	Water	Bis(2-ethylhexyl)phthalate (DEHP)	8270C	ANAB
117-81-7	Soil	Bis(2-ethylhexyl)phthalate (DEHP)	8270C-SIM	ANAB
117-81-7	Water	Bis(2-ethylhexyl)phthalate (DEHP)	8270C-SIM	ANAB
117-81-7	Soil	Bis(2-ethylhexyl)phthalate (DEHP)	8270D	ANAB
117-81-7	Water	Bis(2-ethylhexyl)phthalate (DEHP)	8270D	ANAB
117-81-7	Soil	Bis(2-ethylhexyl)phthalate (DEHP)	8270D-SIM	ANAB
117-81-7	Water	Bis(2-ethylhexyl)phthalate (DEHP)	8270D-SIM	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
108-86-1	Water	Bromobenzene	524.2	ANAB
108-86-1	Soil	Bromobenzene	8260B	ANAB
108-86-1	Water	Bromobenzene	8260B	ANAB
108-86-1	Soil	Bromobenzene	8260C	ANAB
108-86-1	Water	Bromobenzene	8260C	ANAB
75-27-4	Water	Bromodichloromethane	524.2	ANAB
75-27-4	Water	Bromodichloromethane	624	ANAB
75-27-4	Soil	Bromodichloromethane	8260B	ANAB
75-27-4	Water	Bromodichloromethane	8260B	ANAB
75-27-4	Soil	Bromodichloromethane	8260C	ANAB
75-27-4	Water	Bromodichloromethane	8260C	ANAB
75-27-4	Air	Bromodichloromethane	TO-15	ANAB
75-25-2	Water	Bromoform	524.2	ANAB
75-25-2	Water	Bromoform	624	ANAB
75-25-2	Soil	Bromoform	8260B	ANAB
75-25-2	Water	Bromoform	8260B	ANAB
75-25-2	Soil	Bromoform	8260C	ANAB
75-25-2	Water	Bromoform	8260C	ANAB
75-25-2	Air	Bromoform	TO-15	ANAB
74-83-9	Water	Bromomethane	524.2	ANAB
74-83-9	Water	Bromomethane	624	ANAB
74-83-9	Soil	Bromomethane	8260B	ANAB
74-83-9	Water	Bromomethane	8260B	ANAB
74-83-9	Soil	Bromomethane	8260C	ANAB
74-83-9	Water	Bromomethane	8260C	ANAB
74-83-9	Air	Bromomethane	TO-15	ANAB
106-99-0	Air	Butadiene, 1,3-	TO-15	ANAB
85-68-7	Soil	Butyl Benzyl Phthalate	8270C	ANAB
85-68-7	Water	Butyl Benzyl Phthalate	8270C	ANAB
85-68-7	Soil	Butyl Benzyl Phthalate	8270C-SIM	ANAB
85-68-7	Water	Butyl Benzyl Phthalate	8270C-SIM	ANAB
85-68-7	Soil	Butyl Benzyl Phthalate	8270D	ANAB
85-68-7	Water	Butyl Benzyl Phthalate	8270D	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
85-68-7	Soil	Butyl Benzyl Phthalate	8270D-SIM	ANAB
85-68-7	Water	Butyl Benzyl Phthalate	8270D-SIM	ANAB
104-51-8	Water	Butylbenzene, n-	524.2	ANAB
104-51-8	Soil	Butylbenzene, n-	8260B	ANAB
104-51-8	Water	Butylbenzene, n-	8260B	ANAB
104-51-8	Soil	Butylbenzene, n-	8260C	ANAB
104-51-8	Water	Butylbenzene, n-	8260C	ANAB
135-98-8	Water	Butylbenzene, sec-	524.2	ANAB
135-98-8	Soil	Butylbenzene, sec-	8260B	ANAB
135-98-8	Water	Butylbenzene, sec-	8260B	ANAB
135-98-8	Soil	Butylbenzene, sec-	8260C	ANAB
135-98-8	Water	Butylbenzene, sec-	8260C	ANAB
98-06-6	Water	Butylbenzene, tert-	524.2	ANAB
98-06-6	Soil	Butylbenzene, tert-	8260B	ANAB
98-06-6	Water	Butylbenzene, tert-	8260B	ANAB
98-06-6	Soil	Butylbenzene, tert-	8260C	ANAB
98-06-6	Water	Butylbenzene, tert-	8260C	ANAB
7440-43-9	Water	Cadmium	200.7	ANAB
7440-43-9	Water	Cadmium	200.8	ANAB
7440-43-9	Soil	Cadmium	6010B	ANAB
7440-43-9	Water	Cadmium	6010B	ANAB
7440-43-9	Soil	Cadmium	6010C	ANAB
7440-43-9	Water	Cadmium	6010C	ANAB
7440-43-9	Soil	Cadmium	6020A	ANAB
7440-43-9	Water	Cadmium	6020A	ANAB
7440-43-9	Water	Cadmium	6020B	ANAB
75-15-0	Soil	Carbon Disulfide	8260B	ANAB
75-15-0	Water	Carbon Disulfide	8260B	ANAB
75-15-0	Soil	Carbon Disulfide	8260C	ANAB
75-15-0	Water	Carbon Disulfide	8260C	ANAB
75-15-0	Air	Carbon Disulfide	TO-15	ANAB
56-23-5	Water	Carbon Tetrachloride	524.2	ANAB
56-23-5	Water	Carbon Tetrachloride	624	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
56-23-5	Soil	Carbon Tetrachloride	8260B	ANAB
56-23-5	Water	Carbon Tetrachloride	8260B	ANAB
56-23-5	Soil	Carbon Tetrachloride	8260C	ANAB
56-23-5	Water	Carbon Tetrachloride	8260C	ANAB
56-23-5	Air	Carbon Tetrachloride	TO-15	ANAB
5103-71-9	Water	Chlordane, α -	608	ANAB
5103-74-2	Water	Chlordane, γ -	608	ANAB
12789-03-6	Water	Chlordane, Total	608	ANAB
12789-03-6	Soil	Chlordane, Total	8081A	ANAB
12789-03-6	Water	Chlordane, Total	8081A	ANAB
12789-03-6	Soil	Chlordane, Total	8081B	ANAB
12789-03-6	Water	Chlordane, Total	8081B	ANAB
143-50-0	Soil	Chlordecone (Kepone)	8081A	ANAB
143-50-0	Water	Chlordecone (Kepone)	8081A	ANAB
143-50-0	Soil	Chlordecone (Kepone)	8081B	ANAB
143-50-0	Water	Chlordecone (Kepone)	8081B	ANAB
106-47-8	Soil	Chloroaniline, p-	8270C	ANAB
106-47-8	Water	Chloroaniline, p-	8270C	ANAB
106-47-8	Soil	Chloroaniline, p-	8270D	ANAB
106-47-8	Water	Chloroaniline, p-	8270D	ANAB
108-90-7	Water	Chlorobenzene	524.2	ANAB
108-90-7	Water	Chlorobenzene	624	ANAB
108-90-7	Soil	Chlorobenzene	8260B	ANAB
108-90-7	Water	Chlorobenzene	8260B	ANAB
108-90-7	Soil	Chlorobenzene	8260C	ANAB
108-90-7	Water	Chlorobenzene	8260C	ANAB
108-90-7	Air	Chlorobenzene	TO-15	ANAB
67-66-3	Water	Chloroform	524.2	ANAB
67-66-3	Water	Chloroform	624	ANAB
67-66-3	Soil	Chloroform	8260B	ANAB
67-66-3	Water	Chloroform	8260B	ANAB
67-66-3	Soil	Chloroform	8260C	ANAB
67-66-3	Water	Chloroform	8260C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
67-66-3	Air	Chloroform	TO-15	ANAB
74-87-3	Water	Chloromethane	524.2	ANAB
74-87-3	Water	Chloromethane	624	ANAB
74-87-3	Soil	Chloromethane	8260B	ANAB
74-87-3	Water	Chloromethane	8260B	ANAB
74-87-3	Soil	Chloromethane	8260C	ANAB
74-87-3	Water	Chloromethane	8260C	ANAB
74-87-3	Air	Chloromethane	TO-15	ANAB
91-58-7	Soil	Chloronaphthalene, Beta-	8270C	ANAB
91-58-7	Water	Chloronaphthalene, Beta-	8270C	ANAB
91-58-7	Soil	Chloronaphthalene, Beta-	8270D	ANAB
91-58-7	Water	Chloronaphthalene, Beta-	8270D	ANAB
91-58-7	Water	Chlorophenol, 2-	625	ANAB
95-57-8	Soil	Chlorophenol, 2-	8270C	ANAB
95-57-8	Water	Chlorophenol, 2-	8270C	ANAB
95-57-8	Soil	Chlorophenol, 2-	8270C-SIM	ANAB
95-57-8	Water	Chlorophenol, 2-	8270C-SIM	ANAB
95-57-8	Soil	Chlorophenol, 2-	8270D	ANAB
95-57-8	Water	Chlorophenol, 2-	8270D	ANAB
95-57-8	Soil	Chlorophenol, 2-	8270D-SIM	ANAB
95-57-8	Water	Chlorophenol, 2-	8270D-SIM	ANAB
7440-47-3	Water	Chromium (Total)	200.7	ANAB
7440-47-3	Water	Chromium (Total)	200.8	ANAB
7440-47-3	Soil	Chromium (Total)	6010B	ANAB
7440-47-3	Water	Chromium (Total)	6010B	ANAB
7440-47-3	Soil	Chromium (Total)	6010C	ANAB
7440-47-3	Water	Chromium (Total)	6010C	ANAB
7440-47-3	Soil	Chromium (Total)	6020A	ANAB
7440-47-3	Water	Chromium (Total)	6020A	ANAB
7440-47-3	Water	Chromium (Total)	6020B	ANAB
18540-29-9	Soil	Chromium (VI)	7196	ANAB
18540-29-9	Water	Chromium (VI)	7196	ANAB
18540-29-9	Soil	Chromium (VI)	7199	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
18540-29-9	Water	Chromium (VI)	7199	ANAB
218-01-9	Water	Chrysene	625	ANAB
218-01-9	Soil	Chrysene	8310	ANAB
218-01-9	Water	Chrysene	8310	ANAB
218-01-9	Soil	Chrysene	8270C	ANAB
218-01-9	Water	Chrysene	8270C	ANAB
218-01-9	Soil	Chrysene	8270C-SIM	ANAB
218-01-9	Water	Chrysene	8270C-SIM	ANAB
218-01-9	Soil	Chrysene	8270D	ANAB
218-01-9	Water	Chrysene	8270D	ANAB
218-01-9	Soil	Chrysene	8270D-SIM	ANAB
218-01-9	Water	Chrysene	8270D-SIM	ANAB
7440-50-8	Water	Copper	200.7	ANAB
7440-50-8	Water	Copper	200.8	ANAB
7440-50-8	Soil	Copper	6010B	ANAB
7440-50-8	Water	Copper	6010B	ANAB
7440-50-8	Soil	Copper	6010C	ANAB
7440-50-8	Water	Copper	6010C	ANAB
7440-50-8	Soil	Copper	6020A	ANAB
7440-50-8	Water	Copper	6020A	ANAB
7440-50-8	Water	Copper	6020B	ANAB
108-39-4	Soil	Cresol, m- (3-Methylphenol)	8270C	ANAB
108-39-4	Water	Cresol, m- (3-Methylphenol)	8270C	ANAB
108-39-4	Soil	Cresol, m- (3-Methylphenol)	8270D	ANAB
108-39-4	Water	Cresol, m- (3-Methylphenol)	8270D	ANAB
95-48-7	Water	Cresol, o- (2-Methylphenol)	625	ANAB
95-48-7	Soil	Cresol, o- (2-Methylphenol)	8270C	ANAB
95-48-7	Water	Cresol, o- (2-Methylphenol)	8270C	ANAB
95-48-7	Soil	Cresol, o- (2-Methylphenol)	8270D	ANAB
95-48-7	Water	Cresol, o- (2-Methylphenol)	8270D	ANAB
106-44-5	Water	Cresol, p- (4-Methylphenol)	625	ANAB
106-44-5	Soil	Cresol, p- (4-Methylphenol)	8270C	ANAB
106-44-5	Water	Cresol, p- (4-Methylphenol)	8270C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
106-44-5	Soil	Cresol, p- (4-Methylphenol)	8270D	ANAB
106-44-5	Water	Cresol, p- (4-Methylphenol)	8270D	ANAB
98-82-8	Soil	Cumene (Isopropylbenzene)	8260B	ANAB
98-82-8	Water	Cumene (Isopropylbenzene)	8260B	ANAB
98-82-8	Soil	Cumene (Isopropylbenzene)	8260C	ANAB
98-82-8	Water	Cumene (Isopropylbenzene)	8260C	ANAB
57-12-5	Soil	Cyanide (CN-)	9010/9014	ANAB
57-12-5	Water	Cyanide (CN-)	9010/9014	ANAB
110-82-7	Soil	Cyclohexane	8260B	ANAB
110-82-7	Water	Cyclohexane	8260B	ANAB
110-82-7	Soil	Cyclohexane	8260C	ANAB
110-82-7	Water	Cyclohexane	8260C	ANAB
110-82-7	Air	Cyclohexane	TO-15	ANAB
72-54-8	Water	DDD, 4,4'-	608	ANAB
72-54-8	Soil	DDD, 4,4'-	8081A	ANAB
72-54-8	Water	DDD, 4,4'-	8081A	ANAB
72-54-8	Soil	DDD, 4,4'-	8081B	ANAB
72-54-8	Water	DDD, 4,4'-	8081B	ANAB
72-55-9	Water	DDE, 4,4'-	608	ANAB
72-55-9	Soil	DDE, 4,4'-	8081A	ANAB
72-55-9	Water	DDE, 4,4'-	8081A	ANAB
72-55-9	Soil	DDE, 4,4'-	8081B	ANAB
72-55-9	Water	DDE, 4,4'-	8081B	ANAB
50-29-3	Water	DDT, 4,4'-	608	ANAB
50-29-3	Soil	DDT, 4,4'-	8081A	ANAB
50-29-3	Water	DDT, 4,4'-	8081A	ANAB
50-29-3	Soil	DDT, 4,4'-	8081B	ANAB
50-29-3	Water	DDT, 4,4'-	8081B	ANAB
53-70-3	Water	Dibenz[a,h]anthracene	625	ANAB
53-70-3	Soil	Dibenz[a,h]anthracene	8310	ANAB
53-70-3	Water	Dibenz[a,h]anthracene	8310	ANAB
53-70-3	Soil	Dibenz[a,h]anthracene	8270C	ANAB
53-70-3	Water	Dibenz[a,h]anthracene	8270C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
53-70-3	Soil	Dibenz[a,h]anthracene	8270C-SIM	ANAB
53-70-3	Water	Dibenz[a,h]anthracene	8270C-SIM	ANAB
53-70-3	Soil	Dibenz[a,h]anthracene	8270D	ANAB
53-70-3	Water	Dibenz[a,h]anthracene	8270D	ANAB
53-70-3	Soil	Dibenz[a,h]anthracene	8270D-SIM	ANAB
53-70-3	Water	Dibenz[a,h]anthracene	8270D-SIM	ANAB
132-64-9	Soil	Dibenzofuran	8270C	ANAB
132-64-9	Water	Dibenzofuran	8270C	ANAB
132-64-9	Soil	Dibenzofuran	8270D	ANAB
132-64-9	Water	Dibenzofuran	8270D	ANAB
124-48-1	Water	Dibromochloromethane	524.2	ANAB
124-48-1	Water	Dibromochloromethane	624	ANAB
124-48-1	Soil	Dibromochloromethane	8260B	ANAB
124-48-1	Water	Dibromochloromethane	8260B	ANAB
124-48-1	Soil	Dibromochloromethane	8260C	ANAB
124-48-1	Water	Dibromochloromethane	8260C	ANAB
124-48-1	Air	Dibromochloromethane	TO-15	ANAB
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8011	ANAB
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8011	ANAB
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8260B	ANAB
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8260B	ANAB
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8260C	ANAB
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8260C	ANAB
106-93-4	Air	Dibromoethane, 1,2- (Ethylene Dibromide)	TO-15	ANAB
74-95-3	Water	Dibromomethane (Methylene Bromide)	524.2	ANAB
74-95-3	Soil	Dibromomethane (Methylene Bromide)	8260B	ANAB
74-95-3	Water	Dibromomethane (Methylene Bromide)	8260B	ANAB
74-95-3	Soil	Dibromomethane (Methylene Bromide)	8260C	ANAB
74-95-3	Water	Dibromomethane (Methylene Bromide)	8260C	ANAB
84-74-2	Soil	Dibutyl Phthalate	8270C	ANAB
84-74-2	Water	Dibutyl Phthalate	8270C	ANAB
84-74-2	Soil	Dibutyl Phthalate	8270C-SIM	ANAB
84-74-2	Water	Dibutyl Phthalate	8270C-SIM	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
84-74-2	Soil	Dibutyl Phthalate	8270D	ANAB
84-74-2	Water	Dibutyl Phthalate	8270D	ANAB
84-74-2	Soil	Dibutyl Phthalate	8270D-SIM	ANAB
84-74-2	Water	Dibutyl Phthalate	8270D-SIM	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	524.2	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	624	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	625	ANAB
95-50-1	Soil	Dichlorobenzene, 1,2-	8260B	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	8260B	ANAB
95-50-1	Soil	Dichlorobenzene, 1,2-	8260C	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	8260C	ANAB
95-50-1	Soil	Dichlorobenzene, 1,2-	8270C	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	8270C	ANAB
95-50-1	Soil	Dichlorobenzene, 1,2-	8270D	ANAB
95-50-1	Water	Dichlorobenzene, 1,2-	8270D	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	524.2	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	624	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	625	ANAB
541-73-1	Soil	Dichlorobenzene, 1,3-	8260B	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	8260B	ANAB
541-73-1	Soil	Dichlorobenzene, 1,3-	8260C	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	8260C	ANAB
541-73-1	Soil	Dichlorobenzene, 1,3-	8270C	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	8270C	ANAB
541-73-1	Soil	Dichlorobenzene, 1,3-	8270D	ANAB
541-73-1	Water	Dichlorobenzene, 1,3-	8270D	ANAB
541-73-1	Air	Dichlorobenzene, 1,3-	TO-15	ANAB
106-46-7	Water	Dichlorobenzene, 1,4-	524.2	ANAB
106-46-7	Water	Dichlorobenzene, 1,4-	624	ANAB
106-46-7	Water	Dichlorobenzene, 1,4-	625	ANAB
106-46-7	Soil	Dichlorobenzene, 1,4-	8260B	ANAB
106-46-7	Water	Dichlorobenzene, 1,4-	8260B	ANAB
106-46-7	Soil	Dichlorobenzene, 1,4-	8260C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
106-46-7	Water	Dichlorobenzene, 1,4-	8260C	ANAB
106-46-7	Soil	Dichlorobenzene, 1,4-	8270C	ANAB
106-46-7	Water	Dichlorobenzene, 1,4-	8270C	ANAB
106-46-7	Soil	Dichlorobenzene, 1,4-	8270D	ANAB
106-46-7	Water	Dichlorobenzene, 1,4-	8270D	ANAB
106-46-7	Air	Dichlorobenzene, 1,4-	TO-15	ANAB
91-94-1	Soil	Dichlorobenzidine, 3,3'-	8270C	ANAB
91-94-1	Water	Dichlorobenzidine, 3,3'-	8270C	ANAB
91-94-1	Soil	Dichlorobenzidine, 3,3'-	8270D	ANAB
91-94-1	Water	Dichlorobenzidine, 3,3'-	8270D	ANAB
75-71-8	Water	Dichlorodifluoromethane	524.2	ANAB
75-71-8	Water	Dichlorodifluoromethane	624	ANAB
75-71-8	Soil	Dichlorodifluoromethane	8260B	ANAB
75-71-8	Water	Dichlorodifluoromethane	8260B	ANAB
75-71-8	Soil	Dichlorodifluoromethane	8260C	ANAB
75-71-8	Water	Dichlorodifluoromethane	8260C	ANAB
75-71-8	Air	Dichlorodifluoromethane	TO-15	ANAB
75-34-3	Water	Dichloroethane, 1,1-	524.2	ANAB
75-34-3	Water	Dichloroethane, 1,1-	624	ANAB
75-34-3	Soil	Dichloroethane, 1,1-	8260B	ANAB
75-34-3	Water	Dichloroethane, 1,1-	8260B	ANAB
75-34-3	Soil	Dichloroethane, 1,1-	8260C	ANAB
75-34-3	Water	Dichloroethane, 1,1-	8260C	ANAB
75-34-3	Air	Dichloroethane, 1,1-	TO-15	ANAB
107-06-2	Water	Dichloroethane, 1,2-	524.2	ANAB
107-06-2	Water	Dichloroethane, 1,2-	624	ANAB
107-06-2	Soil	Dichloroethane, 1,2-	8260B	ANAB
107-06-2	Water	Dichloroethane, 1,2-	8260B	ANAB
107-06-2	Soil	Dichloroethane, 1,2-	8260C	ANAB
107-06-2	Water	Dichloroethane, 1,2-	8260C	ANAB
107-06-2	Air	Dichloroethane, 1,2-	TO-15	ANAB
75-35-4	Water	Dichloroethylene, 1,1-	524.2	ANAB
75-35-4	Water	Dichloroethylene, 1,1-	624	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
75-35-4	Soil	Dichloroethylene, 1,1-	8260B	ANAB
75-35-4	Water	Dichloroethylene, 1,1-	8260B	ANAB
75-35-4	Soil	Dichloroethylene, 1,1-	8260C	ANAB
75-35-4	Water	Dichloroethylene, 1,1-	8260C	ANAB
75-35-4	Air	Dichloroethylene, 1,1-	TO-15	ANAB
156-59-2	Water	Dichloroethylene, 1,2-cis-	524.2	ANAB
156-59-2	Water	Dichloroethylene, 1,2-cis-	624	ANAB
156-59-2	Soil	Dichloroethylene, 1,2-cis-	8260B	ANAB
156-59-2	Water	Dichloroethylene, 1,2-cis-	8260B	ANAB
156-59-2	Soil	Dichloroethylene, 1,2-cis-	8260C	ANAB
156-59-2	Water	Dichloroethylene, 1,2-cis-	8260C	ANAB
156-60-5	Water	Dichloroethylene, 1,2-trans-	524.2	ANAB
156-60-5	Water	Dichloroethylene, 1,2-trans-	624	ANAB
156-60-5	Soil	Dichloroethylene, 1,2-trans-	8260B	ANAB
156-60-5	Water	Dichloroethylene, 1,2-trans-	8260B	ANAB
156-60-5	Soil	Dichloroethylene, 1,2-trans-	8260C	ANAB
156-60-5	Water	Dichloroethylene, 1,2-trans-	8260C	ANAB
156-60-5	Air	Dichloroethylene, 1,2-trans-	TO-15	ANAB
120-83-2	Water	Dichlorophenol, 2,4-	625	ANAB
120-83-2	Soil	Dichlorophenol, 2,4-	8270C	ANAB
120-83-2	Water	Dichlorophenol, 2,4-	8270C	ANAB
120-83-2	Soil	Dichlorophenol, 2,4-	8270C-SIM	ANAB
120-83-2	Water	Dichlorophenol, 2,4-	8270C-SIM	ANAB
120-83-2	Soil	Dichlorophenol, 2,4-	8270D	ANAB
120-83-2	Water	Dichlorophenol, 2,4-	8270D	ANAB
120-83-2	Soil	Dichlorophenol, 2,4-	8270D-SIM	ANAB
120-83-2	Water	Dichlorophenol, 2,4-	8270D-SIM	ANAB
94-75-7	Soil	Dichlorophenoxy Acetic Acid, 2,4- (2,4-D)	8151A	ANAB
94-75-7	Water	Dichlorophenoxy Acetic Acid, 2,4- (2,4-D)	8151A	ANAB
78-87-5	Water	Dichloropropane, 1,2-	524.2	ANAB
78-87-5	Water	Dichloropropane, 1,2-	624	ANAB
78-87-5	Soil	Dichloropropane, 1,2-	8260B	ANAB
78-87-5	Water	Dichloropropane, 1,2-	8260B	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
78-87-5	Soil	Dichloropropane, 1,2-	8260C	ANAB
78-87-5	Water	Dichloropropane, 1,2-	8260C	ANAB
78-87-5	Air	Dichloropropane, 1,2-	TO-15	ANAB
542-75-6	Soil	Dichloropropene, 1,3- (cis + trans)	8260B	ANAB
542-75-6	Water	Dichloropropene, 1,3- (cis + trans)	8260B	ANAB
542-75-6	Soil	Dichloropropene, 1,3- (cis + trans)	8260C	ANAB
542-75-6	Water	Dichloropropene, 1,3- (cis + trans)	8260C	ANAB
60-57-1	Water	Dieldrin	608	ANAB
60-57-1	Soil	Dieldrin	8081A	ANAB
60-57-1	Water	Dieldrin	8081A	ANAB
60-57-1	Soil	Dieldrin	8081B	ANAB
60-57-1	Water	Dieldrin	8081B	ANAB
N/A	Soil	Diesel Range Organics (C10 – C25)	AK 102	ANAB
N/A	Water	Diesel Range Organics (C10 – C25)	AK 102	ANAB
84-66-2	Water	Diethyl Phthalate	625	ANAB
84-66-2	Soil	Diethyl Phthalate	8270C	ANAB
84-66-2	Water	Diethyl Phthalate	8270C	ANAB
84-66-2	Soil	Diethyl Phthalate	8270C-SIM	ANAB
84-66-2	Water	Diethyl Phthalate	8270C-SIM	ANAB
84-66-2	Soil	Diethyl Phthalate	8270D	ANAB
84-66-2	Water	Diethyl Phthalate	8270D	ANAB
84-66-2	Soil	Diethyl Phthalate	8270D-SIM	ANAB
84-66-2	Water	Diethyl Phthalate	8270D-SIM	ANAB
105-67-9	Water	Dimethylphenol, 2,4-	625	ANAB
105-67-9	Soil	Dimethylphenol, 2,4-	8270C	ANAB
105-67-9	Water	Dimethylphenol, 2,4-	8270C	ANAB
105-67-9	Soil	Dimethylphenol, 2,4-	8270C-SIM	ANAB
105-67-9	Water	Dimethylphenol, 2,4-	8270C-SIM	ANAB
105-67-9	Soil	Dimethylphenol, 2,4-	8270D	ANAB
105-67-9	Water	Dimethylphenol, 2,4-	8270D	ANAB
105-67-9	Soil	Dimethylphenol, 2,4-	8270D-SIM	ANAB
105-67-9	Water	Dimethylphenol, 2,4-	8270D-SIM	ANAB
131-11-3	Water	Dimethylphthalate	625	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
131-11-3	Soil	Dimethylphthalate	8270C	ANAB
131-11-3	Water	Dimethylphthalate	8270C	ANAB
131-11-3	Soil	Dimethylphthalate	8270C-SIM	ANAB
131-11-3	Water	Dimethylphthalate	8270C-SIM	ANAB
131-11-3	Soil	Dimethylphthalate	8270D	ANAB
131-11-3	Water	Dimethylphthalate	8270D	ANAB
131-11-3	Soil	Dimethylphthalate	8270D-SIM	ANAB
131-11-3	Water	Dimethylphthalate	8270D-SIM	ANAB
99-65-0	Soil	Dinitrobenzene, 1,3-	8270C	ANAB
99-65-0	Water	Dinitrobenzene, 1,3-	8270C	ANAB
99-65-0	Soil	Dinitrobenzene, 1,3-	8270D	ANAB
99-65-0	Water	Dinitrobenzene, 1,3-	8270D	ANAB
51-28-5	Water	Dinitrophenol, 2,4-	625	ANAB
51-28-5	Soil	Dinitrophenol, 2,4-	8270C	ANAB
51-28-5	Water	Dinitrophenol, 2,4-	8270C	ANAB
51-28-5	Soil	Dinitrophenol, 2,4-	8270D	ANAB
51-28-5	Water	Dinitrophenol, 2,4-	8270D	ANAB
121-14-2	Water	Dinitrotoluene, 2,4- (2,4-DNT)	625	ANAB
121-14-2	Soil	Dinitrotoluene, 2,4- (2,4-DNT)	8270C	ANAB
121-14-2	Water	Dinitrotoluene, 2,4- (2,4-DNT)	8270C	ANAB
121-14-2	Soil	Dinitrotoluene, 2,4- (2,4-DNT)	8270D	ANAB
121-14-2	Water	Dinitrotoluene, 2,4- (2,4-DNT)	8270D	ANAB
121-14-2	Soil	Dinitrotoluene, 2,4- (2,4-DNT)	8330A	ANAB
121-14-2	Water	Dinitrotoluene, 2,4- (2,4-DNT)	8330A	ANAB
121-14-2	Water	Dinitrotoluene, 2,4- (2,4-DNT)	8330B	ANAB
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	625	ANAB
606-20-2	Soil	Dinitrotoluene, 2,6- (2,6-DNT)	8270C	ANAB
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	8270C	ANAB
606-20-2	Soil	Dinitrotoluene, 2,6- (2,6-DNT)	8270D	ANAB
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	8270D	ANAB
606-20-2	Soil	Dinitrotoluene, 2,6- (2,6-DNT)	8330A	ANAB
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	8330A	ANAB
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	8330B	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
35572-78-2	Soil	Dinitrotoluene, 2-Amino-4,6-	8330A	ANAB
35572-78-2	Water	Dinitrotoluene, 2-Amino-4,6-	8330A	ANAB
35572-78-2	Water	Dinitrotoluene, 2-Amino-4,6-	8330B	ANAB
19406-51-0	Soil	Dinitrotoluene, 4-Amino-2,6-	8330A	ANAB
19406-51-0	Water	Dinitrotoluene, 4-Amino-2,6-	8330A	ANAB
19406-51-0	Water	Dinitrotoluene, 4-Amino-2,6-	8330B	ANAB
123-91-1	Soil	Dioxane, 1,4-	8260B	ANAB
123-91-1	Water	Dioxane, 1,4-	8260B	ANAB
123-91-1	Soil	Dioxane, 1,4-	8260B-SIM	ANAB
123-91-1	Water	Dioxane, 1,4-	8260B-SIM	ANAB
123-91-1	Soil	Dioxane, 1,4-	8260C	ANAB
123-91-1	Water	Dioxane, 1,4-	8260C	ANAB
123-91-1	Soil	Dioxane, 1,4-	8260C-SIM	ANAB
123-91-1	Water	Dioxane, 1,4-	8260C-SIM	ANAB
123-91-1	Soil	Dioxane, 1,4-	8270C-SIM	ANAB
123-91-1	Water	Dioxane, 1,4-	8270C-SIM	ANAB
123-91-1	Soil	Dioxane, 1,4-	8270D-SIM	ANAB
123-91-1	Water	Dioxane, 1,4-	8270D-SIM	ANAB
123-91-1	Air	Dioxane, 1,4-	TO-15	ANAB
115-29-7	Water	Endosulfan (Endosulfan I + Endosulfan II)	608	ANAB
115-29-7	Soil	Endosulfan (Endosulfan I + Endosulfan II)	8081A	ANAB
115-29-7	Water	Endosulfan (Endosulfan I + Endosulfan II)	8081A	ANAB
115-29-7	Soil	Endosulfan (Endosulfan I + Endosulfan II)	8081B	ANAB
115-29-7	Water	Endosulfan (Endosulfan I + Endosulfan II)	8081B	ANAB
959-98-8	Water	Endosulfan I	608	ANAB
959-98-8	Soil	Endosulfan I	8081	ANAB
959-98-8	Water	Endosulfan I	8081	ANAB
33213-65-9	Water	Endosulfan II	608	ANAB
33213-65-9	Soil	Endosulfan II	8081	ANAB
33213-65-9	Water	Endosulfan II	8081	ANAB
1031-07-8	Water	Endosulfan sulfate	608	ANAB
1031-07-8	Soil	Endosulfan sulfate	8081	ANAB
1031-07-8	Water	Endosulfan sulfate	8081	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
72-20-8	Water	Endrin	608	ANAB
72-20-8	Soil	Endrin	8081A	ANAB
72-20-8	Water	Endrin	8081A	ANAB
72-20-8	Soil	Endrin	8081B	ANAB
72-20-8	Water	Endrin	8081B	ANAB
75-00-3	Soil	Ethyl Chloride	8260B	ANAB
75-00-3	Water	Ethyl Chloride	8260B	ANAB
75-00-3	Soil	Ethyl Chloride	8260C	ANAB
75-00-3	Water	Ethyl Chloride	8260C	ANAB
75-00-3	Air	Ethyl Chloride	TO-15	ANAB
100-41-4	Water	Ethylbenzene	524.2	ANAB
100-41-4	Water	Ethylbenzene	624	ANAB
100-41-4	Soil	Ethylbenzene	8260B	ANAB
100-41-4	Water	Ethylbenzene	8260B	ANAB
100-41-4	Soil	Ethylbenzene	8260C	ANAB
100-41-4	Water	Ethylbenzene	8260C	ANAB
100-41-4	Air	Ethylbenzene	TO-15	ANAB
107-21-1	Soil	Ethylene Glycol	8015B	ANAB
107-21-1	Water	Ethylene Glycol	8015B	ANAB
107-21-1	Soil	Ethylene Glycol	8015C	ANAB
107-21-1	Water	Ethylene Glycol	8015C	ANAB
206-44-0	Water	Fluoranthene	625	ANAB
206-44-0	Soil	Fluoranthene	8310	ANAB
206-44-0	Water	Fluoranthene	8310	ANAB
206-44-0	Soil	Fluoranthene	8270C	ANAB
206-44-0	Water	Fluoranthene	8270C	ANAB
206-44-0	Soil	Fluoranthene	8270C-SIM	ANAB
206-44-0	Water	Fluoranthene	8270C-SIM	ANAB
206-44-0	Soil	Fluoranthene	8270D	ANAB
206-44-0	Water	Fluoranthene	8270D	ANAB
206-44-0	Soil	Fluoranthene	8270D-SIM	ANAB
206-44-0	Water	Fluoranthene	8270D-SIM	ANAB
86-73-7	Water	Fluorene	625	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
86-73-7	Soil	Fluorene	8310	ANAB
86-73-7	Water	Fluorene	8310	ANAB
86-73-7	Soil	Fluorene	8270C	ANAB
86-73-7	Water	Fluorene	8270C	ANAB
86-73-7	Soil	Fluorene	8270C-SIM	ANAB
86-73-7	Water	Fluorene	8270C-SIM	ANAB
86-73-7	Soil	Fluorene	8270D	ANAB
86-73-7	Water	Fluorene	8270D	ANAB
86-73-7	Soil	Fluorene	8270D-SIM	ANAB
86-73-7	Water	Fluorene	8270D-SIM	ANAB
N/A	Soil	Gasoline Range Organics (C6 – C10)	AK 101	ANAB
N/A	Water	Gasoline Range Organics (C6 – C10)	AK 101	ANAB
76-44-8	Water	Heptachlor	608	ANAB
76-44-8	Soil	Heptachlor	8081A	ANAB
76-44-8	Water	Heptachlor	8081A	ANAB
76-44-8	Soil	Heptachlor	8081B	ANAB
76-44-8	Water	Heptachlor	8081B	ANAB
1024-57-3	Water	Heptachlor Epoxide	608	ANAB
1024-57-3	Soil	Heptachlor Epoxide	8081A	ANAB
1024-57-3	Water	Heptachlor Epoxide	8081A	ANAB
1024-57-3	Soil	Heptachlor Epoxide	8081B	ANAB
1024-57-3	Water	Heptachlor Epoxide	8081B	ANAB
118-74-1	Water	Hexachlorobenzene	625	ANAB
118-74-1	Soil	Hexachlorobenzene	8270C	ANAB
118-74-1	Water	Hexachlorobenzene	8270C	ANAB
118-74-1	Soil	Hexachlorobenzene	8270C-SIM	ANAB
118-74-1	Water	Hexachlorobenzene	8270C-SIM	ANAB
118-74-1	Soil	Hexachlorobenzene	8270D	ANAB
118-74-1	Water	Hexachlorobenzene	8270D	ANAB
118-74-1	Soil	Hexachlorobenzene	8270D-SIM	ANAB
118-74-1	Water	Hexachlorobenzene	8270D-SIM	ANAB
87-68-3	Water	Hexachlorobutadiene	524.2	ANAB
87-68-3	Water	Hexachlorobutadiene	625	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
87-68-3	Soil	Hexachlorobutadiene	8260B	ANAB
87-68-3	Water	Hexachlorobutadiene	8260B	ANAB
87-68-3	Soil	Hexachlorobutadiene	8260C	ANAB
87-68-3	Water	Hexachlorobutadiene	8260C	ANAB
87-68-3	Soil	Hexachlorobutadiene	8270C	ANAB
87-68-3	Water	Hexachlorobutadiene	8270C	ANAB
87-68-3	Soil	Hexachlorobutadiene	8270D	ANAB
87-68-3	Water	Hexachlorobutadiene	8270D	ANAB
319-84-6	Water	Hexachlorocyclohexane, Alpha- (α -BHC)	608	ANAB
319-84-6	Soil	Hexachlorocyclohexane, Alpha- (α -BHC)	8081A	ANAB
319-84-6	Water	Hexachlorocyclohexane, Alpha- (α -BHC)	8081A	ANAB
319-84-6	Soil	Hexachlorocyclohexane, Alpha- (α -BHC)	8081B	ANAB
319-84-6	Water	Hexachlorocyclohexane, Alpha- (α -BHC)	8081B	ANAB
319-85-7	Water	Hexachlorocyclohexane, Beta- (β -BHC)	608	ANAB
319-85-7	Soil	Hexachlorocyclohexane, Beta- (β -BHC)	8081A	ANAB
319-85-7	Water	Hexachlorocyclohexane, Beta- (β -BHC)	8081A	ANAB
319-85-7	Soil	Hexachlorocyclohexane, Beta- (β -BHC)	8081B	ANAB
319-85-7	Water	Hexachlorocyclohexane, Beta- (β -BHC)	8081B	ANAB
319-86-8	Water	Hexachlorocyclohexane, Delta- (δ -BHC)	608	ANAB
319-86-8	Soil	Hexachlorocyclohexane, Delta- (δ -BHC)	8081A	ANAB
319-86-8	Water	Hexachlorocyclohexane, Delta- (δ -BHC)	8081A	ANAB
319-86-8	Soil	Hexachlorocyclohexane, Delta- (δ -BHC)	8081B	ANAB
319-86-8	Water	Hexachlorocyclohexane, Delta- (δ -BHC)	8081B	ANAB
58-89-9	Water	Hexachlorocyclohexane, Gamma- (Lindane)	608	ANAB
58-89-9	Soil	Hexachlorocyclohexane, Gamma- (Lindane)	8081A	ANAB
58-89-9	Water	Hexachlorocyclohexane, Gamma- (Lindane)	8081A	ANAB
58-89-9	Soil	Hexachlorocyclohexane, Gamma- (Lindane)	8081B	ANAB
58-89-9	Water	Hexachlorocyclohexane, Gamma- (Lindane)	8081B	ANAB
77-47-4	Soil	Hexachlorocyclopentadiene	8270C	ANAB
77-47-4	Water	Hexachlorocyclopentadiene	8270C	ANAB
77-47-4	Soil	Hexachlorocyclopentadiene	8270D	ANAB
77-47-4	Water	Hexachlorocyclopentadiene	8270D	ANAB
67-72-1	Soil	Hexachloroethane	8270C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
67-72-1	Water	Hexachloroethane	8270C	ANAB
67-72-1	Soil	Hexachloroethane	8270D	ANAB
67-72-1	Water	Hexachloroethane	8270D	ANAB
121-82-4	Soil	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8330A	ANAB
121-82-4	Water	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8330A	ANAB
121-82-4	Water	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	8330B	ANAB
110-54-3	Air	Hexane, N-	TO-15	ANAB
591-78-6	Soil	Hexanone, 2-	8260B	ANAB
591-78-6	Water	Hexanone, 2-	8260B	ANAB
591-78-6	Soil	Hexanone, 2-	8260C	ANAB
591-78-6	Water	Hexanone, 2-	8260C	ANAB
193-39-5	Water	Indeno[1,2,3-cd]pyrene	625	ANAB
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8310	ANAB
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8310	ANAB
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270C	ANAB
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270C	ANAB
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270C-SIM	ANAB
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270C-SIM	ANAB
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270D	ANAB
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270D	ANAB
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270D-SIM	ANAB
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270D-SIM	ANAB
78-59-1	Water	Isophorone	625	ANAB
78-59-1	Soil	Isophorone	8270C	ANAB
78-59-1	Water	Isophorone	8270C	ANAB
78-59-1	Soil	Isophorone	8270D	ANAB
78-59-1	Water	Isophorone	8270D	ANAB
67-63-0	Soil	Isopropanol	8260B	ANAB
67-63-0	Water	Isopropanol	8260B	ANAB
67-63-0	Soil	Isopropanol	8260C	ANAB
67-63-0	Water	Isopropanol	8260C	ANAB
7439-92-1	Water	Lead, Total	200.7	ANAB
7439-92-1	Water	Lead, Total	200.8	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
7439-92-1	Soil	Lead, Total	6010B	ANAB
7439-92-1	Water	Lead, Total	6010B	ANAB
7439-92-1	Soil	Lead, Total	6010C	ANAB
7439-92-1	Water	Lead, Total	6010C	ANAB
7439-92-1	Soil	Lead, Total	6020A	ANAB
7439-92-1	Water	Lead, Total	6020A	ANAB
7439-92-1	Water	Lead, Total	6020B	ANAB
7439-97-6	Water	Mercury (elemental)	245.1	ANAB
7439-97-6	Water	Mercury (elemental)	7470A	ANAB
7439-97-6	Soil	Mercury (elemental)	7471A	ANAB
7439-97-6	Soil	Mercury (elemental)	7471B	ANAB
67-56-1	Soil	Methanol	8015B	ANAB
67-56-1	Water	Methanol	8015B	ANAB
67-56-1	Soil	Methanol	8015C	ANAB
67-56-1	Water	Methanol	8015C	ANAB
72-43-5	Water	Methoxychlor	608	ANAB
72-43-5	Soil	Methoxychlor	8081A	ANAB
72-43-5	Water	Methoxychlor	8081A	ANAB
72-43-5	Soil	Methoxychlor	8081B	ANAB
72-43-5	Water	Methoxychlor	8081B	ANAB
78-93-3	Soil	Methyl Ethyl Ketone (2-Butanone)	8260B	ANAB
78-93-3	Water	Methyl Ethyl Ketone (2-Butanone)	8260B	ANAB
78-93-3	Soil	Methyl Ethyl Ketone (2-Butanone)	8260C	ANAB
78-93-3	Water	Methyl Ethyl Ketone (2-Butanone)	8260C	ANAB
108-10-1	Soil	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260B	ANAB
108-10-1	Water	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260B	ANAB
108-10-1	Soil	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260C	ANAB
108-10-1	Water	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260C	ANAB
1634-04-4	Water	Methyl tert-Butyl Ether (MTBE)	524.2	ANAB
1634-04-4	Water	Methyl tert-Butyl Ether (MTBE)	624	ANAB
1634-04-4	Soil	Methyl tert-Butyl Ether (MTBE)	8260B	ANAB
1634-04-4	Water	Methyl tert-Butyl Ether (MTBE)	8260B	ANAB
1634-04-4	Soil	Methyl tert-Butyl Ether (MTBE)	8260C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
1634-04-4	Water	Methyl tert-Butyl Ether (MTBE)	8260C	ANAB
1634-04-4	Air	Methyl tert-Butyl Ether (MTBE)	TO-15	ANAB
75-09-2	Water	Methylene Chloride	524.2	ANAB
75-09-2	Water	Methylene Chloride	624	ANAB
75-09-2	Soil	Methylene Chloride	8260B	ANAB
75-09-2	Water	Methylene Chloride	8260B	ANAB
75-09-2	Soil	Methylene Chloride	8260C	ANAB
75-09-2	Water	Methylene Chloride	8260C	ANAB
75-09-2	Air	Methylene Chloride	TO-15	ANAB
90-12-0	Soil	Methylnaphthalene, 1-	8310	ANAB
90-12-0	Water	Methylnaphthalene, 1-	8310	ANAB
90-12-0	Soil	Methylnaphthalene, 1-	8270C	ANAB
90-12-0	Water	Methylnaphthalene, 1-	8270C	ANAB
90-12-0	Soil	Methylnaphthalene, 1-	8270C-SIM	ANAB
90-12-0	Water	Methylnaphthalene, 1-	8270C-SIM	ANAB
90-12-0	Soil	Methylnaphthalene, 1-	8270D	ANAB
90-12-0	Water	Methylnaphthalene, 1-	8270D	ANAB
90-12-0	Soil	Methylnaphthalene, 1-	8270D-SIM	ANAB
90-12-0	Water	Methylnaphthalene, 1-	8270D-SIM	ANAB
91-57-6	Soil	Methylnaphthalene, 2-	8310	ANAB
91-57-6	Water	Methylnaphthalene, 2-	8310	ANAB
91-57-6	Soil	Methylnaphthalene, 2-	8270C	ANAB
91-57-6	Water	Methylnaphthalene, 2-	8270C	ANAB
91-57-6	Soil	Methylnaphthalene, 2-	8270C-SIM	ANAB
91-57-6	Water	Methylnaphthalene, 2-	8270C-SIM	ANAB
91-57-6	Soil	Methylnaphthalene, 2-	8270D	ANAB
91-57-6	Water	Methylnaphthalene, 2-	8270D	ANAB
91-57-6	Soil	Methylnaphthalene, 2-	8270D-SIM	ANAB
91-57-6	Water	Methylnaphthalene, 2-	8270D-SIM	ANAB
91-20-3	Water	Naphthalene	524.2	ANAB
91-20-3	Water	Naphthalene	625	ANAB
91-20-3	Soil	Naphthalene	8310	ANAB
91-20-3	Water	Naphthalene	8310	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
91-20-3	Soil	Naphthalene	8260B	ANAB
91-20-3	Water	Naphthalene	8260B	ANAB
91-20-3	Soil	Naphthalene	8260C	ANAB
91-20-3	Water	Naphthalene	8260C	ANAB
91-20-3	Soil	Naphthalene	8270C	ANAB
91-20-3	Water	Naphthalene	8270C	ANAB
91-20-3	Soil	Naphthalene	8270C-SIM	ANAB
91-20-3	Water	Naphthalene	8270C-SIM	ANAB
91-20-3	Soil	Naphthalene	8270D	ANAB
91-20-3	Water	Naphthalene	8270D	ANAB
91-20-3	Soil	Naphthalene	8270D-SIM	ANAB
91-20-3	Water	Naphthalene	8270D-SIM	ANAB
7440-02-0	Water	Nickel, Total	200.7	ANAB
7440-02-0	Water	Nickel, Total	200.8	ANAB
7440-02-0	Soil	Nickel, Total	6010B	ANAB
7440-02-0	Water	Nickel, Total	6010B	ANAB
7440-02-0	Soil	Nickel, Total	6010C	ANAB
7440-02-0	Water	Nickel, Total	6010C	ANAB
7440-02-0	Soil	Nickel, Total	6020A	ANAB
7440-02-0	Water	Nickel, Total	6020A	ANAB
7440-02-0	Water	Nickel, Total	6020B	ANAB
98-95-3	Water	Nitrobenzene	625	ANAB
98-95-3	Soil	Nitrobenzene	8270C	ANAB
98-95-3	Water	Nitrobenzene	8270C	ANAB
98-95-3	Soil	Nitrobenzene	8270D	ANAB
98-95-3	Water	Nitrobenzene	8270D	ANAB
98-95-3	Soil	Nitrobenzene	8330A	ANAB
98-95-3	Water	Nitrobenzene	8330A	ANAB
98-95-3	Water	Nitrobenzene	8330B	ANAB
55-63-0	Soil	Nitroglycerin	8330A	ANAB
55-63-0	Water	Nitroglycerin	8330A	ANAB
62-75-9	Water	Nitrosodimethylamine, N-	625	ANAB
62-75-9	Soil	Nitrosodimethylamine, N-	8270C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
62-75-9	Water	Nitrosodimethylamine, N-	8270C	ANAB
62-75-9	Soil	Nitrosodimethylamine, N-	8270C-SIM	ANAB
62-75-9	Water	Nitrosodimethylamine, N-	8270C-SIM	ANAB
62-75-9	Soil	Nitrosodimethylamine, N-	8270D	ANAB
62-75-9	Water	Nitrosodimethylamine, N-	8270D	ANAB
62-75-9	Soil	Nitrosodimethylamine, N-	8270D-SIM	ANAB
62-75-9	Water	Nitrosodimethylamine, N-	8270D-SIM	ANAB
621-64-7	Water	Nitroso-di-N-propylamine, N-	625	ANAB
621-64-7	Soil	Nitroso-di-N-propylamine, N-	8270C	ANAB
621-64-7	Water	Nitroso-di-N-propylamine, N-	8270C	ANAB
621-64-7	Soil	Nitroso-di-N-propylamine, N-	8270C-SIM	ANAB
621-64-7	Water	Nitroso-di-N-propylamine, N-	8270C-SIM	ANAB
621-64-7	Soil	Nitroso-di-N-propylamine, N-	8270D	ANAB
621-64-7	Water	Nitroso-di-N-propylamine, N-	8270D	ANAB
621-64-7	Soil	Nitroso-di-N-propylamine, N-	8270D-SIM	ANAB
621-64-7	Water	Nitroso-di-N-propylamine, N-	8270D-SIM	ANAB
86-30-6	Water	Nitrosodiphenylamine, N-	625	ANAB
86-30-6	Soil	Nitrosodiphenylamine, N-	8270C	ANAB
86-30-6	Water	Nitrosodiphenylamine, N-	8270C	ANAB
86-30-6	Soil	Nitrosodiphenylamine, N-	8270D	ANAB
86-30-6	Water	Nitrosodiphenylamine, N-	8270D	ANAB
99-08-1	Soil	Nitrotoluene, m-	8330A	ANAB
99-08-1	Water	Nitrotoluene, m-	8330A	ANAB
99-08-1	Water	Nitrotoluene, m-	8330B	ANAB
88-72-2	Soil	Nitrotoluene, o-	8330A	ANAB
88-72-2	Water	Nitrotoluene, o-	8330A	ANAB
88-72-2	Water	Nitrotoluene, o-	8330B	ANAB
99-99-0	Soil	Nitrotoluene, p-	8330A	ANAB
99-99-0	Water	Nitrotoluene, p-	8330A	ANAB
99-99-0	Water	Nitrotoluene, p-	8330B	ANAB
2691-41-0	Soil	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8330A	ANAB
2691-41-0	Water	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8330A	ANAB
2691-41-0	Water	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	8330B	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
117-84-0	Soil	Octyl Phthalate, di-N-	8270C	ANAB
117-84-0	Water	Octyl Phthalate, di-N-	8270C	ANAB
117-84-0	Soil	Octyl Phthalate, di-N-	8270C-SIM	ANAB
117-84-0	Water	Octyl Phthalate, di-N-	8270C-SIM	ANAB
117-84-0	Soil	Octyl Phthalate, di-N-	8270D	ANAB
117-84-0	Water	Octyl Phthalate, di-N-	8270D	ANAB
117-84-0	Soil	Octyl Phthalate, di-N-	8270D-SIM	ANAB
117-84-0	Water	Octyl Phthalate, di-N-	8270D-SIM	ANAB
12674-11-2	Water	PCB - Aroclor-1016	608	ANAB
12674-11-2	Soil	PCB - Aroclor-1016	8082A	ANAB
12674-11-2	Water	PCB - Aroclor-1016	8082A	ANAB
11104-28-2	Water	PCB - Aroclor-1221	608	ANAB
11104-28-2	Soil	PCB - Aroclor-1221	8082A	ANAB
11104-28-2	Water	PCB - Aroclor-1221	8082A	ANAB
11141-16-5	Water	PCB - Aroclor-1232	608	ANAB
11141-16-5	Soil	PCB - Aroclor-1232	8082A	ANAB
11141-16-5	Water	PCB - Aroclor-1232	8082A	ANAB
53469-21-9	Water	PCB - Aroclor-1242	608	ANAB
53469-21-9	Soil	PCB - Aroclor-1242	8082A	ANAB
53469-21-9	Water	PCB - Aroclor-1242	8082A	ANAB
12672-29-6	Water	PCB - Aroclor-1248	608	ANAB
12672-29-6	Soil	PCB - Aroclor-1248	8082A	ANAB
12672-29-6	Water	PCB - Aroclor-1248	8082A	ANAB
11097-69-1	Water	PCB - Aroclor-1254	608	ANAB
11097-69-1	Soil	PCB - Aroclor-1254	8082A	ANAB
11097-69-1	Water	PCB - Aroclor-1254	8082A	ANAB
11096-82-5	Water	PCB - Aroclor-1260	608	ANAB
11096-82-5	Soil	PCB - Aroclor-1260	8082A	ANAB
11096-82-5	Water	PCB - Aroclor-1260	8082A	ANAB
37324-23-5	Soil	PCB - Aroclor-1262	8082A	ANAB
37324-23-5	Water	PCB - Aroclor-1262	8082A	ANAB
11100-14-4	Soil	PCB - Aroclor-1268	8082A	ANAB
11100-14-4	Water	PCB - Aroclor-1268	8082A	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
N/A	Water	PCB – Total	608	ANAB
N/A	Soil	PCB – Total	8082A	ANAB
87-86-5	Water	Pentachlorophenol	625	ANAB
87-86-5	Soil	Pentachlorophenol	8151A	ANAB
87-86-5	Water	Pentachlorophenol	8151A	ANAB
87-86-5	Soil	Pentachlorophenol	8270C	ANAB
87-86-5	Water	Pentachlorophenol	8270C	ANAB
87-86-5	Soil	Pentachlorophenol	8270C-SIM	ANAB
87-86-5	Water	Pentachlorophenol	8270C-SIM	ANAB
87-86-5	Soil	Pentachlorophenol	8270D	ANAB
87-86-5	Water	Pentachlorophenol	8270D	ANAB
87-86-5	Soil	Pentachlorophenol	8270D-SIM	ANAB
87-86-5	Water	Pentachlorophenol	8270D-SIM	ANAB
78-11-5	Soil	Pentaerythritol tetranitrate (PETN)	8330A	ANAB
78-11-5	Water	Pentaerythritol tetranitrate (PETN)	8330A	ANAB
14797-73-0	Water	Perchlorate	314	ANAB
14797-73-0	Soil	Perchlorate	6850	ANAB
14797-73-0	Water	Perchlorate	6850	ANAB
85-01-8	Water	Phenanthrene	625	ANAB
85-01-8	Soil	Phenanthrene	8310	ANAB
85-01-8	Water	Phenanthrene	8310	ANAB
85-01-8	Soil	Phenanthrene	8270C	ANAB
85-01-8	Water	Phenanthrene	8270C	ANAB
85-01-8	Soil	Phenanthrene	8270C-SIM	ANAB
85-01-8	Water	Phenanthrene	8270C-SIM	ANAB
85-01-8	Soil	Phenanthrene	8270D	ANAB
85-01-8	Water	Phenanthrene	8270D	ANAB
85-01-8	Soil	Phenanthrene	8270D-SIM	ANAB
85-01-8	Water	Phenanthrene	8270D-SIM	ANAB
108-95-2	Water	Phenol	625	ANAB
108-95-2	Soil	Phenol	8270C	ANAB
108-95-2	Water	Phenol	8270C	ANAB
108-95-2	Soil	Phenol	8270C-SIM	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
108-95-2	Water	Phenol	8270C-SIM	ANAB
108-95-2	Soil	Phenol	8270D	ANAB
108-95-2	Water	Phenol	8270D	ANAB
108-95-2	Soil	Phenol	8270D-SIM	ANAB
108-95-2	Water	Phenol	8270D-SIM	ANAB
103-65-1	Water	Propyl benzene	524.2	ANAB
103-65-1	Soil	Propyl benzene	8260B	ANAB
103-65-1	Water	Propyl benzene	8260B	ANAB
103-65-1	Soil	Propyl benzene	8260C	ANAB
103-65-1	Water	Propyl benzene	8260C	ANAB
129-00-0	Water	Pyrene	625	ANAB
129-00-0	Soil	Pyrene	8310	ANAB
129-00-0	Water	Pyrene	8310	ANAB
129-00-0	Soil	Pyrene	8270C	ANAB
129-00-0	Water	Pyrene	8270C	ANAB
129-00-0	Soil	Pyrene	8270C-SIM	ANAB
129-00-0	Water	Pyrene	8270C-SIM	ANAB
129-00-0	Soil	Pyrene	8270D	ANAB
129-00-0	Water	Pyrene	8270D	ANAB
129-00-0	Soil	Pyrene	8270D-SIM	ANAB
129-00-0	Water	Pyrene	8270D-SIM	ANAB
N/A	Soil	Residual Range Organics (C25 – C36)	AK 103	ANAB
N/A	Water	Residual Range Organics (C25 – C36)	AK 103	ANAB
7782-49-2	Soil	Selenium	6010B	ANAB
7782-49-2	Water	Selenium	6010B	ANAB
7782-49-2	Soil	Selenium	6010C	ANAB
7782-49-2	Water	Selenium	6010C	ANAB
7782-49-2	Soil	Selenium	6020A	ANAB
7782-49-2	Water	Selenium	6020A	ANAB
7782-49-2	Water	Selenium	6020B	ANAB
7440-22-4	Soil	Silver	6010B	ANAB
7440-22-4	Water	Silver	6010B	ANAB
7440-22-4	Soil	Silver	6010C	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
7440-22-4	Water	Silver	6010C	ANAB
100-42-5	Water	Styrene	524.2	ANAB
100-42-5	Water	Styrene	624	ANAB
100-42-5	Soil	Styrene	8260B	ANAB
100-42-5	Water	Styrene	8260B	ANAB
100-42-5	Soil	Styrene	8260C	ANAB
100-42-5	Water	Styrene	8260C	ANAB
100-42-5	Air	Styrene	TO-15	ANAB
630-20-6	Water	Tetrachloroethane, 1,1,1,2-	524.2	ANAB
630-20-6	Soil	Tetrachloroethane, 1,1,1,2-	8260B	ANAB
630-20-6	Water	Tetrachloroethane, 1,1,1,2-	8260B	ANAB
630-20-6	Soil	Tetrachloroethane, 1,1,1,2-	8260C	ANAB
630-20-6	Water	Tetrachloroethane, 1,1,1,2-	8260C	ANAB
79-34-5	Water	Tetrachloroethane, 1,1,2,2-	524.2	ANAB
79-34-5	Soil	Tetrachloroethane, 1,1,2,2-	8260B	ANAB
79-34-5	Water	Tetrachloroethane, 1,1,2,2-	8260B	ANAB
79-34-5	Soil	Tetrachloroethane, 1,1,2,2-	8260C	ANAB
79-34-5	Water	Tetrachloroethane, 1,1,2,2-	8260C	ANAB
79-34-5	Air	Tetrachloroethane, 1,1,2,2-	TO-15	ANAB
127-18-4	Water	Tetrachloroethylene	524.2	ANAB
127-18-4	Water	Tetrachloroethylene	624	ANAB
127-18-4	Soil	Tetrachloroethylene	8260B	ANAB
127-18-4	Water	Tetrachloroethylene	8260B	ANAB
127-18-4	Soil	Tetrachloroethylene	8260C	ANAB
127-18-4	Water	Tetrachloroethylene	8260C	ANAB
127-18-4	Air	Tetrachloroethylene	TO-15	ANAB
479-45-8	Soil	Tetryl (Trinitrophenylmethylnitramine)	8330A	ANAB
479-45-8	Water	Tetryl (Trinitrophenylmethylnitramine)	8330A	ANAB
479-45-8	Water	Tetryl (Trinitrophenylmethylnitramine)	8330B	ANAB
7440-28-0	Water	Thallium, Total	200.7	ANAB
7440-28-0	Water	Thallium, Total	200.8	ANAB
7440-28-0	Soil	Thallium, Total	6010B	ANAB
7440-28-0	Water	Thallium, Total	6010B	ANAB

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CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
7440-28-0	Soil	Thallium, Total	6010C	ANAB
7440-28-0	Water	Thallium, Total	6010C	ANAB
7440-28-0	Soil	Thallium, Total	6020A	ANAB
7440-28-0	Water	Thallium, Total	6020A	ANAB
7440-28-0	Water	Thallium, Total	6020B	ANAB
108-88-3	Water	Toluene	524.2	ANAB
108-88-3	Water	Toluene	624	ANAB
108-88-3	Soil	Toluene	8260B	ANAB
108-88-3	Water	Toluene	8260B	ANAB
108-88-3	Soil	Toluene	8260C	ANAB
108-88-3	Water	Toluene	8260C	ANAB
108-88-3	Air	Toluene	TO-15	ANAB
N/A	Water	Total Organic Carbon	9060	ANAB
N/A	Water	Total Organic Carbon	SM 5310 B	ANAB
N/A	Soil	Total Organic Carbon	Walkley Black	ANAB
8001-35-2	Soil	Toxaphene	8081A	ANAB
8001-35-2	Water	Toxaphene	8081A	ANAB
8001-35-2	Soil	Toxaphene	8081B	ANAB
8001-35-2	Water	Toxaphene	8081B	ANAB
76-13-1	Soil	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260B	ANAB
76-13-1	Water	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260B	ANAB
76-13-1	Soil	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260C	ANAB
76-13-1	Water	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260C	ANAB
87-61-6	Water	Trichlorobenzene, 1,2,3-	524.2	ANAB
87-61-6	Soil	Trichlorobenzene, 1,2,3-	8260B	ANAB
87-61-6	Water	Trichlorobenzene, 1,2,3-	8260B	ANAB
87-61-6	Soil	Trichlorobenzene, 1,2,3-	8260C	ANAB
87-61-6	Water	Trichlorobenzene, 1,2,3-	8260C	ANAB
120-82-1	Water	Trichlorobenzene, 1,2,4-	524.2	ANAB
120-82-1	Water	Trichlorobenzene, 1,2,4-	624	ANAB
120-82-1	Water	Trichlorobenzene, 1,2,4-	625	ANAB
120-82-1	Soil	Trichlorobenzene, 1,2,4-	8260B	ANAB
120-82-1	Water	Trichlorobenzene, 1,2,4-	8260B	ANAB

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
120-82-1	Soil	Trichlorobenzene, 1,2,4-	8260C	ANAB
120-82-1	Water	Trichlorobenzene, 1,2,4-	8260C	ANAB
120-82-1	Air	Trichlorobenzene, 1,2,4-	TO-15	ANAB
71-55-6	Water	Trichloroethane, 1,1,1-	524.2	ANAB
71-55-6	Water	Trichloroethane, 1,1,1-	624	ANAB
71-55-6	Soil	Trichloroethane, 1,1,1-	8260B	ANAB
71-55-6	Water	Trichloroethane, 1,1,1-	8260B	ANAB
71-55-6	Soil	Trichloroethane, 1,1,1-	8260C	ANAB
71-55-6	Water	Trichloroethane, 1,1,1-	8260C	ANAB
71-55-6	Air	Trichloroethane, 1,1,1-	TO-15	ANAB
79-00-5	Water	Trichloroethane, 1,1,2-	524.2	ANAB
79-00-5	Water	Trichloroethane, 1,1,2-	624	ANAB
79-00-5	Soil	Trichloroethane, 1,1,2-	8260B	ANAB
79-00-5	Water	Trichloroethane, 1,1,2-	8260B	ANAB
79-00-5	Soil	Trichloroethane, 1,1,2-	8260C	ANAB
79-00-5	Water	Trichloroethane, 1,1,2-	8260C	ANAB
79-00-5	Air	Trichloroethane, 1,1,2-	TO-15	ANAB
79-01-6	Water	Trichloroethylene	524.2	ANAB
79-01-6	Soil	Trichloroethylene	8260B	ANAB
79-01-6	Water	Trichloroethylene	8260B	ANAB
79-01-6	Soil	Trichloroethylene	8260C	ANAB
79-01-6	Water	Trichloroethylene	8260C	ANAB
79-01-6	Air	Trichloroethylene	TO-15	ANAB
75-69-4	Water	Trichlorofluoromethane	524.2	ANAB
75-69-4	Water	Trichlorofluoromethane	624	ANAB
75-69-4	Soil	Trichlorofluoromethane	8260B	ANAB
75-69-4	Water	Trichlorofluoromethane	8260B	ANAB
75-69-4	Soil	Trichlorofluoromethane	8260C	ANAB
75-69-4	Water	Trichlorofluoromethane	8260C	ANAB
75-69-4	Air	Trichlorofluoromethane	TO-15	ANAB
95-95-4	Soil	Trichlorophenol, 2,4,5-	8270C	ANAB
95-95-4	Water	Trichlorophenol, 2,4,5-	8270C	ANAB
95-95-4	Soil	Trichlorophenol, 2,4,5-	8270C-SIM	ANAB

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
95-95-4	Water	Trichlorophenol, 2,4,5-	8270C-SIM	ANAB
95-95-4	Soil	Trichlorophenol, 2,4,5-	8270D	ANAB
95-95-4	Water	Trichlorophenol, 2,4,5-	8270D	ANAB
95-95-4	Soil	Trichlorophenol, 2,4,5-	8270D-SIM	ANAB
95-95-4	Water	Trichlorophenol, 2,4,5-	8270D-SIM	ANAB
88-06-2	Water	Trichlorophenol, 2,4,6-	625	ANAB
88-06-2	Soil	Trichlorophenol, 2,4,6-	8270C	ANAB
88-06-2	Water	Trichlorophenol, 2,4,6-	8270C	ANAB
88-06-2	Soil	Trichlorophenol, 2,4,6-	8270C-SIM	ANAB
88-06-2	Water	Trichlorophenol, 2,4,6-	8270C-SIM	ANAB
88-06-2	Soil	Trichlorophenol, 2,4,6-	8270D	ANAB
88-06-2	Water	Trichlorophenol, 2,4,6-	8270D	ANAB
88-06-2	Soil	Trichlorophenol, 2,4,6-	8270D-SIM	ANAB
88-06-2	Water	Trichlorophenol, 2,4,6-	8270D-SIM	ANAB
93-76-5	Soil	Trichlorophenoxyacetic Acid, 2,4,5- (2,4,5-T)	8151A	ANAB
93-76-5	Water	Trichlorophenoxyacetic Acid, 2,4,5- (2,4,5-T)	8151A	ANAB
93-72-1	Soil	Trichlorophenoxypropionic acid, 2,4,5- (2,4,5-TP)	8151A	ANAB
93-72-1	Water	Trichlorophenoxypropionic acid, 2,4,5- (2,4,5-TP)	8151A	ANAB
96-18-4	Soil	Trichloropropane, 1,2,3-	8260B	ANAB
96-18-4	Water	Trichloropropane, 1,2,3-	8260B	ANAB
96-18-4	Soil	Trichloropropane, 1,2,3-	8260C	ANAB
96-18-4	Water	Trichloropropane, 1,2,3-	8260C	ANAB
95-63-6	Water	Trimethylbenzene, 1,2,4-	524.2	ANAB
95-63-6	Soil	Trimethylbenzene, 1,2,4-	8260B	ANAB
95-63-6	Water	Trimethylbenzene, 1,2,4-	8260B	ANAB
95-63-6	Soil	Trimethylbenzene, 1,2,4-	8260C	ANAB
95-63-6	Water	Trimethylbenzene, 1,2,4-	8260C	ANAB
95-63-6	Air	Trimethylbenzene, 1,2,4-	TO-15	ANAB
108-67-8	Water	Trimethylbenzene, 1,3,5-	524.2	ANAB
108-67-8	Soil	Trimethylbenzene, 1,3,5-	8260B	ANAB
108-67-8	Water	Trimethylbenzene, 1,3,5-	8260B	ANAB
108-67-8	Soil	Trimethylbenzene, 1,3,5-	8260C	ANAB
108-67-8	Water	Trimethylbenzene, 1,3,5-	8260C	ANAB

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
108-67-8	Air	Trimethylbenzene, 1,3,5-	TO-15	ANAB
99-35-4	Water	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8270C	ANAB
99-35-4	Soil	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8270D	ANAB
99-35-4	Water	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8270D	ANAB
99-35-4	Soil	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8330A	ANAB
99-35-4	Water	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8330A	ANAB
99-35-4	Water	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8330B	ANAB
99-35-4	Soil	Trinitrobenzene, 1,3,5- (1,3,5-TNB)	8270C	ANAB
118-96-7	Soil	Trinitrotoluene, 2,4,6-	8330A	ANAB
118-96-7	Water	Trinitrotoluene, 2,4,6-	8330A	ANAB
118-96-7	Water	Trinitrotoluene, 2,4,6-	8330B	ANAB
7440-62-2	Water	Vanadium, Total	200.7	ANAB
7440-62-2	Soil	Vanadium, Total	6010B	ANAB
7440-62-2	Water	Vanadium, Total	6010B	ANAB
7440-62-2	Soil	Vanadium, Total	6010C	ANAB
7440-62-2	Water	Vanadium, Total	6010C	ANAB
7440-62-2	Soil	Vanadium, Total	6020A	ANAB
7440-62-2	Water	Vanadium, Total	6020A	ANAB
7440-62-2	Water	Vanadium, Total	6020B	ANAB
108-05-4	Soil	Vinyl Acetate	8260B	ANAB
108-05-4	Water	Vinyl Acetate	8260B	ANAB
108-05-4	Soil	Vinyl Acetate	8260C	ANAB
108-05-4	Water	Vinyl Acetate	8260C	ANAB
108-05-4	Air	Vinyl Acetate	TO-15	ANAB
75-01-4	Water	Vinyl Chloride	524.2	ANAB
75-01-4	Water	Vinyl Chloride	624	ANAB
75-01-4	Soil	Vinyl Chloride	8260B	ANAB
75-01-4	Water	Vinyl Chloride	8260B	ANAB
75-01-4	Soil	Vinyl Chloride	8260C	ANAB
75-01-4	Water	Vinyl Chloride	8260C	ANAB
75-01-4	Air	Vinyl Chloride	TO-15	ANAB
N/A	Water	Xylene, m+p-	524.2	ANAB
N/A	Water	Xylene, m+p-	624	ANAB

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accrediting Body
N/A	Soil	Xylene, m+p-	8260B	ANAB
N/A	Water	Xylene, m+p-	8260B	ANAB
N/A	Soil	Xylene, m+p-	8260C	ANAB
N/A	Water	Xylene, m+p-	8260C	ANAB
95-47-6	Water	Xylene, o-	524.2	ANAB
95-47-6	Water	Xylene, o-	624	ANAB
95-47-6	Soil	Xylene, o-	8260B	ANAB
95-47-6	Water	Xylene, o-	8260B	ANAB
95-47-6	Soil	Xylene, o-	8260C	ANAB
95-47-6	Water	Xylene, o-	8260C	ANAB
95-47-6	Air	Xylene, o-	TO-15	ANAB
1330-20-7	Water	Xylene, Total	624	ANAB
1330-20-7	Soil	Xylene, Total	8260B	ANAB
1330-20-7	Water	Xylene, Total	8260B	ANAB
1330-20-7	Soil	Xylene, Total	8260C	ANAB
1330-20-7	Water	Xylene, Total	8260C	ANAB
1330-20-7	Air	Xylene, Total	TO-15	ANAB
7440-66-6	Water	Zinc, Total	200.7	ANAB
7440-66-6	Water	Zinc, Total	200.8	ANAB
7440-66-6	Soil	Zinc, Total	6010B	ANAB
7440-66-6	Water	Zinc, Total	6010B	ANAB
7440-66-6	Soil	Zinc, Total	6010C	ANAB
7440-66-6	Water	Zinc, Total	6010C	ANAB
7440-66-6	Soil	Zinc, Total	6020A	ANAB
7440-66-6	Water	Zinc, Total	6020A	ANAB
7440-66-6	Water	Zinc, Total	6020B	ANAB

APPENDIX F

Response to Comments

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**REVIEW
COMMENTS**

PROJECT: Nome Tank Site “E” POL Contamination (F10AK0052-11)

DOCUMENT: Draft Groundwater Sampling Work Plan, May 2018

U.S. ARMY CORPS OF ENGINEERS		DATE: June 04, 2018 REVIEWER: D. Shepard (ADEC) PHONE: 907-451-2180		Action taken on comment by:	
Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)

1	Pg. 2-5, Section 2.2	<p>Concerning the detections of contaminants above the DEC Method Two, Table C groundwater cleanup levels at MW-E1:</p> <p>The MW-E1 has consistently exceeded the Table C cleanup level for DRO. DEC has commented on the exceedances and the potential that this is a separate release point along historic tank farm infrastructure (supported by the 1947 Tank Farm as-built and the 2007 ROST results).</p> <p>The groundwater evaluation in this work plan section is inadequate. DEC is requesting additional soil and groundwater sampling of the area near MW-E1 to determine if a release from buried tank farm infrastructure has occurred and is continuing to occur. The buried infrastructure of the tank farm may still contain contaminants and long term monitoring will not satisfy the DEC requirements under 18 AAC 75.335 for characterizing the release and delineating the extent of contamination. In accordance with 18 AAC 75.330, FUDS needs to identify whether interim actions are needed to address soil contamination and associated tank farm infrastructure.</p> <p>Please add to the previous investigations section to document and address these DEC concerns that were identified in comments for the 2017 Groundwater sampling report. Please add a Figure depicting the Tank Farm Infrastructure as-built.</p>	A/Noted	<p>Based on the 6/7/2018 teleconference between USACE (Will Mangano) and ADEC (Dennis Shepard):</p> <p>USACE intends to decommission MW-E1, reinstall a replacement well in the same location, as well as install another well to the southeast as a replacement well for MW-E2 (destroyed by adjacent mining activities). This work will be completed as part of the ongoing soil remediation effort at the site (currently underway and being conducted by Bethel Environmental Services through FY19). Soil samples will be collected as part of well installation and analyzed for fuel impacts.</p> <p>Per the comment, the following text will be added to the Work Plan:</p> <p>“2.3 As-Built Analysis</p> <p>Based on ADEC comments generated on the 2017 Groundwater Sampling Report (F10AK005211_02.04_0508_a), USACE conducted an updated historical document review and as-built analysis of fuel storage and distribution infrastructure at Nome Tank Site “E”. Results of that effort identified multiple appurtenant piping runs and storage structures in the vicinity of the former tank footprint (Figure 2-3). The evaluation of information generated</p>	
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**REVIEW
COMMENTS**

PROJECT: Nome Tank Site “E” POL Contamination (F10AK0052-11)

DOCUMENT: Draft Groundwater Sampling Work Plan, May 2018

U.S. ARMY CORPS OF ENGINEERS		DATE: June 04, 2018 REVIEWER: D. Shepard (ADEC) PHONE: 907-451-2180		Action taken on comment by:	
Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)

				from that as-built analysis is beyond the scope of this groundwater sampling effort. However, USACE will coordinate future actions to address this new information with the ADEC, landowners, and other pertinent stakeholders as necessary.”	
2	Pg. 4-1, Section 4.0	Please ensure that the 2018 monitoring report addresses the DEC concerns expressed in comment 1. Please include available as-built of the historic tank farm infrastructure / UVOST overlays and discuss the exceedances at MW-E1 relative to these information sources. The reporting needs to make recommendations consistent with the site cleanup rules at 18 AAC 75.325 – 18 AAC 75.900.	A/Noted	Please see response to Comment #1	
3	Pg. 5-1, Section 5.0	The current version of 18 AAC 75 is dated November 2017. Please revise.	A	The referenced date will be corrected to November 2017.	
4	Appendix A	Right of Entry document, DACA85-9-14-00039: DEC notes that the Right of Entry will expire in September 2019. DEC recommends that the USACE review the current Tank E remediation schedule and the remaining investigation and assessment tasks that will be required to close the site to determine if the right of entry needs to be revised and/or renewed.	A	USACE will continue to work with the landowners to ensure that the updated ROE reflects the anticipated future course(s) of action at the site.	
5	Appendix C, SOP 04, 2.1	Please reference the ADEC Field Sampling Guidance (August 2017).	A	The reference will be corrected to ADEC Field Sampling Guidance (August 2017).	
6	Appendix E,	It appears that the DEC Laboratory approvals submitted have expired. EMAX laboratories need to renew their DEC approval. Please provide updated Laboratory approval documentation with Final version of the work plan.	A	The updated ADEC Laboratory approvals were issued by ADEC after the Draft Work Plan was	

**REVIEW
COMMENTS****PROJECT: Nome Tank Site "E" POL Contamination (F10AK0052-11)****DOCUMENT: Draft Groundwater Sampling Work Plan, May 2018**

U.S. ARMY CORPS OF ENGINEERS		DATE: June 04, 2018 REVIEWER: D. Shepard (ADEC) PHONE: 907-451-2180		Action taken on comment by:	
Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)

				submitted. These new approvals will be included in the Final Work Plan.	
		-End of Comments-			

APPENDIX B

ADEC QUALIFIED ENVIRONMENTAL PROFESSIONAL RESUMES

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Zack Kirk

Title: Senior Environmental Scientist / Project Manager



Education

B.S. Environmental Science, University of Michigan, Ann Arbor, Michigan December 2002

Training / Certifications

Corps of Engineers – Construction Quality Management for Contractors	December 2009
OSHA 40-Hour Hazardous Waste Operations and Emergency Response Training	October 2006
OSHA 8-Hour HAZWOPER Supervisor Training	Annual
Confined Space Procedure Training	February 2010
DOT / IATA Hazmat Shipping (8 hour)	November 2010
CPR and First Aid Training	Annual
Bloodborne Pathogens Training	Annual

Employment History

Rescon Alaska, LLC

Senior Environmental Scientist / Project Manager 2013-Present

Geosyntec Consultants, Inc.

Environmental Scientist / Project Manager 2011-2013

OASIS Environmental, LLC

Associate Scientist / Junior Project Manager 2006-2011

United States Navy

Lieutenant / Ship's Navigator / Department Head 2002-2006

Field of Competence

Mr. Kirk has over thirteen years of experience in environmental investigation and remediation in Alaska and the Western United States. Mr. Kirk has managed or served as project technical lead for CERCLA-compliant site investigations as well as numerous State regulated cleanup projects for agency and private industry clients. Mr. Kirk has over 10 years of project management experience in varying locales ranging from high density urban areas in the Pacific Northwest and California to remote sites throughout Alaska. His diversified experience includes due diligence Environmental Site Assessments (ESAs), water quality characterizations, soil and sediment investigations, regulatory compliance, HTRW removal actions, disaster response actions, contaminated site remediation, risk assessments, data validation, vapor intrusion mitigation, storm and wastewater discharge permitting and monitoring wastewater treatment programs. Mr. Kirk has performed remedial environmental actions at sites with various contaminants including; chlorinated solvents, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, petroleum hydrocarbons, metals, herbicides, pesticides, and dioxins/furans.

Mr. Kirk provides technical guidance and support to junior associates through mentoring on the correct performance of field data collection of various media including; soil, soil vapor, indoor and outdoor air, sediment, surface water, and/or groundwater data in order to accurately quantify an environmental condition. Mr. Kirk also manages the company reporting schedule and provides senior level review and guidance on the development of planning and reporting documents.

Zack Kirk

Senior Environmental Scientist / Project Manager

Additional Expertise

- Evaluation and implementation of environmental safety measures
- Marine oil spill response
- Monitoring of vessel waste and wastewater treatment and handling operations
- Remote and arctic site remediation
- Wildfire environmental impact response
- Soil vapor extraction and/or mitigation system installation
- In-situ soil and groundwater remediation
- Heavy equipment operation (front end loader, skid steer, roller compactor)
- Baseline fishery population studies

Key Project Experience:

Project Manager, Release Investigation and Closure of Tank 300-1 (ADEC Tank #8), Remedial Action-Construction Activities, King Salmon Airport, AFCEC, 2018.

Mr. Kirk managed the over \$150K project to successfully close in place an existing UST, and characterize and define the extent of impacted POL soil from a nearby subgrade sump at the site at the King Salmon Airport in the summer of 2018. The project consisted of the use of ground penetrating radar to identify the extents of the UST and the locations of the associated piping runs for the placement of investigative borings. The project team advanced 11 soil borings around the UST and the sump and installed 3 monitoring wells to quantify the impacts to the groundwater quality in the area. Mr. Kirk worked closely with the ADEC regulator and the AFCEC client to ensure the closure activity met the requirements for an ADEC closure determination. Mr. Kirk completed the project on time and under budget while also meeting the project objectives of a successful closure of the UST and full characterization and delineation of the extent of petroleum impact at the site.

Project Manager, Notices of Environmental Contamination (Multiple USAF Installations), Restoration Advisory Board Meetings, Updating the Clear Air Force Base LUCMP and Cold Bay LRRS LTM Event, USAF, 2019-Ongoing.

Mr. Kirk is the project manager for this \$200K multi-faceted project for the USAF. The project includes the development of Notices of Environmental Contamination for over 75 contaminated USAF sites throughout Alaska, the management and recording of Restoration Advisory Board Meetings for the Point Lay and Point Barrow LRRS installations, updating the LUCMP including development of field guides, site figures and installation posters for Clear Air Force Base and the performance of a LTM sampling event and LUC inspections at three sites at the Cold Bay LRRS. All project activities have been completed ahead of schedule and under budget and are currently awaiting final ADEC and USAF approval for project completion.

Project Manager, Drum Removal and Remote Soil Remediation, Pfaff Mine, National Parks Service, Katmai, Alaska, 2008-2010.

Mr. Kirk managed successive annual drum removal actions and onsite contaminated soil remediation efforts at the former Pfaff Mine site in Katmai Alaska. Field activities included locating and air lifting over twenty 55-gallon fuel drums scattered throughout the mine claim area. Mr. Kirk performed the soil investigation and sampling in areas of observed environmental contamination at multiple drum locations.

Zack Kirk

Senior Environmental Scientist / Project Manager

He also performed excavations of two areas of petroleum-contaminated soil for onsite remediation in treatment cells through application and mixing of an oxidizing agent. Duties included planning, remote site field logistics, soil sampling, excavation and treatment and reporting.

Project Manager, Big Mountain Long Radio Relay Station, Long Term Environmental Monitoring, Debris Inventory and Removal, AFCEC/USACE, Big Mountain, Alaska 2013 – Ongoing.

Mr. Kirk has managed the Long Term Environmental Monitoring program at the Big Mountain Long Radio Relay Station near Lake Illiamna in western Alaska since May 2014. He oversees the annual performance of groundwater, surface water and sediment sampling and the assessment of established land use controls at several sites within the former installation. He has performed evaluations on concentrations of natural attenuation parameters in groundwater samples to provide the USAF with an understanding of the natural attenuation potential of residual contaminants. In 2017, he oversaw a debris inventory effort to locate, quantify and assess the environmental impact of over 50 remnant debris sites at the former installation. Through the development of a robust debris site database with the incorporation of geolocation and analytical data he was able to provide the Air Force with a comprehensive quantification of the costs and logistics necessary to coordinate the subsequent removal effort in the summer 2019 field season. Duties include drafting project plans and reporting, client correspondence and monthly status reporting and validating and uploading the analytical data into the USAF ERPIMS data management program.

Project Manager, Development of Notices of Contamination, U.S. Air Force Civil Engineer Center, Over 50 Installation Sites, Alaska, 2017-2018

Mr. Kirk managed the development of Notice of Contamination reports for over 50 Air Force Installation sites throughout Alaska for recording with the Alaska Department of Natural Resources. Through incorporation of all available resources, including agency regulatory records, site decision documents and remedial contractor reports, Mr. Kirk accurately and succinctly reported the current environmental condition of each installation site along with the requisite ongoing monitoring and management requirements to ensure continued regulatory compliance. The reports were completed with well-defined site maps and recorded with the Alaska DNR in formats that were clear and understandable to facilitate awareness to the public.

Project Manager, Phase I and II Environmental Site Assessment / Surface Water Impact Assessment, North Slope Borough Former Water and Wastewater Treatment Plant, Deadhorse, Alaska, 2016-2018

Mr. Kirk managed the performance of a Phase I and subsequent Phase II Environmental Site Assessment (ESA) at the North Slope Borough's former Water and Wastewater Treatment Plant (WWTP) in Deadhorse, Alaska. Utilizing the findings from historic site reports and agency records, Mr. Kirk identified several recognized environmental conditions at the site in the Phase I ESA report. Mr. Kirk, subsequently led a Phase II ESA effort and a surface water quality assessment in 2017 to quantify and define the extent of impacted soil at the site and on the nearby new WWTP property adjacent to the south. The results of the investigation provided the North Slope Borough with a thorough understanding of the extent of contaminant impact and the remedial costs needed for planning and development of an upcoming corrective action.

"I want to recognize your team, led by Zack, as the most prepared, safe and professional contract group that we've have encountered. Zack led the kickoff safety meeting and covered all aspects of the project and

Zack Kirk

Senior Environmental Scientist / Project Manager

associated risks, leaving very little for us to add. In addition, each one of the crew was engaged in the safety process as well as their individual job duties. They made our jobs easy and we wanted to say thanks."

Rich Helinski
Project Manager, ICE Services, Inc.

Project Manager, In-situ Injection of Oxidizing Agent and Groundwater Monitoring and Statistical Analysis, Copper Valley Electric Association, Glennallen, Alaska, 2008-2011.

Project manager for the implementation of multiple in-situ injections of an oxidizing agent to enhance attenuation of petroleum contaminated soil and groundwater. By augmenting the design of the delivery screen and the injection methods, he significantly improved the flow and dispersion of the agent into the dense silty substrate. Using statistical analysis of the groundwater monitoring data, Mr. Kirk was able to prove that the contaminant plume was stable and declining, and was no longer a risk for offsite migration. Duties included work plan preparation, design and implementation of the oxidizing agent injection and injection methods, groundwater monitoring, HSE management, performing the statistical analysis on the analytical results and project reporting.

Project Manager, Site Characterization ADOT&PF Snow Removal Equipment Building, ADEC, Unalakleet, Alaska, May 2009.

Project manager for a site characterization of an abandoned fuel pipeline and the associated petroleum release at the Unalakleet airport in northwest Alaska. He led the field team in defining the extent of the impacted area and the installation of the monitoring wells to quantify and track the down-gradient contaminant migration. During the investigation, he was able to locate, restore and redevelop two former monitoring wells in the area, providing the ADEC with a more robust characterization of the subsurface conditions at the site. Duties included work plan development, HSE management, design of the geophysical survey grid to identify an abandoned fuel line, field sampling and logging of soil cores, installation of monitoring wells, surveying monitoring wells and project reporting.

Project Manager, Monitored Natural Attenuation and Bioventing System Monitoring, Horizon Lines, LLC, Anchorage, Alaska, 2009-2010.

Project manager for the execution of a long term monitoring program to quantify the enhanced attenuation progress. In analyzing the monitored attenuation parameter results of the background (or baseline) well, initially installed in an uncontaminated location, Mr. Kirk discovered that the groundwater quality parameters in vicinity of the well were inconsistent with levels expected in an un-impacted area. Due to a previously unidentified up-gradient contaminant source, the background well could no longer be used as a comparison for evaluating natural attenuation progress at the site. As a result, Mr. Kirk developed a plan for investigation and installation of new background well in order to sufficiently monitor the natural attenuation and improve quantification of the effect of the passive bioventing system at the site. Duties included field logistics, work plan preparation, HSE management, groundwater monitoring and analysis of the attenuation parameters, monitoring of the site bioventing system, and project reporting.

Lead Field Scientist, Soil and Groundwater Investigation, Sweetwater Marsh, San Diego Bay National Wildlife Refuge, Chula Vista, California, 2011 - 2012.

Performed a Preliminary Assessment / Site Investigation of the Sweetwater Marsh area in the San Diego Bay National Wildlife Refuge. Collected soil and groundwater samples to investigate the impact to the marsh soils from historic dumping of burn ash by nearby landfills. Advanced soil borings at several locations of known and suspected impact at the 80 acre site to analyze for the presence of petroleum,

Zack Kirk

Senior Environmental Scientist / Project Manager

metals, PCBs, dioxins and PAHs contaminants. Duties included development of the project Health and Safety Plan, field sampling, and reporting. The characterization enabled identification of the impacted areas within the marsh area for subsequent delineation and removal efforts.

Field Lead, 2011 East Canal Site Investigation and Remediation, NAVFAC Northwest, Adak, Alaska May – July 2011.

Mr. Kirk supervised the investigation of petroleum contaminated soil adjacent to the Adak municipal airstrip, which was impacting the surface water in nearby drainage canals. He guided environmental drilling subcontractor in the advancement soil borings and UVOST exploratory drilling to define the extent of diesel impacted soil. He oversaw the excavation of over 35,000 cubic yards of soil from a 7,500 square foot area that was impacting an adjacent airstrip canal. Duties included drafting the Waste Management Plan, logging and sampling soil cores, supervision of delineation efforts using UVOST investigation technology, soil characterization, design and implementation of canal dewatering, oversight of excavation, oxidizing agent application and backfill efforts in accordance with plan specifications, supervision of well installation. The remedial effort was successful in removing over 800 cubic yards of contaminated soil and eliminating several petroleum seeps to the adjacent canal that had been impacting the water body since their discovery in 2002.

Management and maintenance of the oil spill at sea response equipment for petroleum exploration and production industries, Alyeska Pipeline Company and Shell Oil, Alaska, 2008-2011.

Mr. Kirk supervised the maintenance and training of the oil spill at sea response fluorometer equipment for major petroleum exploration and production companies. He participated in multi-platform training scenarios utilizing the fluorometer equipment to evaluate the efficacy of dispersant deployments in marine environments off the coast of Alaska. He was instrumental in coordinating the upgrade of the fluorometer equipment to comply with Special Monitoring of Applied Response Technologies standards.

Field Scientist, Impaired Water Body Characterization, Alaska Department of Environmental Conservation, Dutch Harbor, Illiuliuk Bay, Illiuliuk Harbor, Alaska, 2008.

Field scientist for the marine water quality and sediment assessment in Dutch and Illiuliuk Harbors in support of an evaluation of the impaired water bodies under the ADEC Term Water Contract. Duties included operation of sampling equipment utilized for discrete sample collection of the sediment and the stratified water column to characterize the extent of contamination and data management and analysis. The characterization effort helped identify the impacted areas of concern for Dutch and Illiuliuk Harbors and confirmed that conditions in Illiuliuk Bay met the ADEC marine water quality standards.

Lead Field Scientist, BP Former Tuboscope Plant Site, BP Alaska, Prudhoe Bay, Alaska, 2008-2010.

Lead field scientist for the investigation of the release of VOC and dioxin contaminants at the former Tuboscope Plant site on the BP lease in Prudhoe Bay, Alaska. He guided the installation and performed the periodic monitoring of several subsurface thermistors placed at the site to identify the time and locations when and where the impacted active-layer water was mobile and migrating into the tundra. His work with the thermistor data supported tracking of freeze and thaw rates on and off the pad and identifying areas where offsite migration of contaminated active-water was the greatest risk. The findings greatly helped guide the investigation on the spread of VOC contaminants into the tundra and to develop and alter controls to mitigate further releases. Duties included HSE management, field logistics, work plan preparation, installation of monitoring wells, groundwater and tundra surface water monitoring, thermistor installation and project reporting. Additional duties included the design and construction of

Zack Kirk

Senior Environmental Scientist / Project Manager

plant transpiration domes placed over various native tundra flora to evaluate and quantify the degree of transpiration occurring from the tundra vegetation.

Project Manager, ERA Helicopter Pad, ERA Aviation, Deadhorse, Alaska, 2008-2010.

Project manager for the annual groundwater monitoring program at the ERA Aviation Helicopter Facility in Deadhorse, Alaska. Utilizing statistical analysis, he was able to confirm that the contaminant plume was stable and no longer a concern for releasing to the adjacent tundra. Duties included HSE management, field logistics, work plan preparation, groundwater and tundra surface water monitoring and project reporting.

Field Technical Lead, Vapor Intrusion Assessment, Denali Parks Building 107, National Parks Service, Denali, Alaska, 2012.

Mr. Kirk conducted a vapor intrusion assessment of office Building 107 in the National Parks Service headquarters. He installed four soil vapor probes around the exterior of the building to assess the concentrations of contaminants in the soil gas following a release from a nearby fuel tank. Duties included the installation and sampling of four permanent vapor probes and the performance of a building survey to assess the potential vapor intrusion exposure to the subject building.

Kynan Adams

Environmental Scientist

8361 Petersburg St.

Anchorage, AK 99507

(907) 744-4695

kadams@resconalaska.com



Kynan Adams is an Environmental Scientist with 7 years of experience in Alaska performing environmental site investigations and remediation projects for State, Federal, and private industry clients. Mr. Adams is an ADEC Qualified Environmental Professional per 18 AAC 75.33, and has extensive experience conducting soil, sediment, and groundwater investigations, as well performing site remediation and removal efforts. Kynan has experience investigating sites containing environmental contaminants including petroleum hydrocarbons, chlorinated solvents, polychlorinated biphenyls, perfluoroalkyl substances, metals, pesticides, herbicides, and more. He is skilled at coordinating project logistics, developing planning documents, project reporting, and waste management, and has managed or provided technical support for a variety of projects throughout Alaska.

As a born and raised Alaskan, Kynan is uniquely suited to facing the challenges associated with performing project activities at remote locations, where limited services exist and self-sufficiency is required to successfully complete project objectives. Kynan emphasizes effective communication and respect between clients, subcontractors, shareholders, and local individuals. In addition to his experience as an environmental scientist, Kynan has worked in the general construction industry as a heavy equipment operator, was crew boss on a trail maintenance crew for the United States Forest Service, and worked as a commercial fisherman in Prince William Sound for eight seasons.

Education

- B.A. Environmental Studies, Western State College of Colorado, United States, 2011

Training

- 40-hour Hazardous Waste Operator and Emergency Response (HAZWOPER)
- DOT/IATA Hazardous Material Transportation Certification
- McCoy's Resource Conservation and Recovery Act (RCRA) Training
- US Army Corps of Engineers Construction Quality Management for Contractors
- North Slope Training Cooperative Certification
- BP Alaska - General Environmental Management System (EMS) Compliance Training
- BP Alaska- Managing Accumulation Areas Training
- American Red Cross First Aid and Adult CPR/AED
- BPXA Waste Management/Redbook Training
- Subsurface Clearance Experienced Person (EP)
- Alaska Certified Erosion and Sediment Control (AK-CESCL)
- Helicopter Operations Safety Training (Heli-Dunk)

Work Experience

- Commercial Fisherman - Deckhand (1999-2006)
- USDA - US Forest Service (2007-2011)
- ERM Alaska, Inc. (2012-2015)
- Paving Products, Inc. (2015-2016)
- Great Northwest, Inc. (2017)
- Rescon Alaska, LLC. (2017-current)

Fields of Competence

- Alaskan Ecosystems and Wildlife
- Contaminated Site Monitoring
- Contaminated Site Remediation
- Sample Management and Quality Assurance
- Waste Management
- Heavy Equipment Operations

Key Projects

Defense Energy Supply Point-Whittier, Alaska United States, Defense Logistics Agency, 2012 - 2013. Field Operations/Machine Operator

Collected annual and investigative low-flow groundwater samples and water quality parameters from roughly 80 monitoring wells using a peristaltic pump, interface probe, YSI multi-meter, and turbidity meter during the winters of 2012 and 2013.

Contaminated Sites Monitoring, Crude Oil Topping Unit, BP Exploration (Alaska), Inc., 2012 - 2013.

Working closely with subcontractors, collected soil samples and was responsible for logging soil cores in addition to Quality Assurance/Quality Control duties as well as field documentation and recording data during spring 2012. Participated in annual groundwater/surface water sampling event in August 2012, and again in 2013.

Contaminated Sites Monitoring, Sand Dunes/Pad 13, BP Exploration (Alaska), Inc., 2012 - 2013.

Using a direct push drill rig, installed monitoring wells at over 50 locations in addition to installing multiple thermistors used for recording groundwater temperatures. Assisted with Quality Assurance/Quality Control duties by recording accurate information in field log books and ensuring safe transportation of soil macrocores.

Contaminated Sites Monitoring, Former Tubscope Facility, BP Exploration (Alaska), Inc., 2012.

Collected groundwater and surface water samples in various locations within the former Tubscope Site in the Western Operating Area (WOA) of the North Slope as a part of an annual hydrologic study. Assisted with Quality Assurance/Quality Control duties by properly packing and labeling water samples in preparation for shipment. Assisted in collecting hydrologic data from previously installed data loggers at various monitoring well locations throughout the Tuboscope Site.

Former M&M Enterprises, Cover Replacement and Site Drainage Improvements, Alaska Dept. of Environmental Conservation, Anchorage, 2012.

Performed construction oversight as the Site Lead at a lead-contaminated site located at a former metal shop in Anchorage. Oversaw the construction of a concrete retaining wall, the installation of a 60" diameter drywell, the installation of a window box designed to prevent ponding and stormwater infiltration near the building foundation, and the construction of a new gravel cover designed to provide drainage away from the building. Responsible for ensuring the Health and Safety processes

were in place for all sub-contractors involved, and recorded daily field notes to track the progress of the project.

Contaminated Site Monitoring, Jimmy Huntington School Stockpile Sampling, Alaska Dept. of Environmental Conservation, Huslia, 2012.

Collected surface soil samples from contaminated stockpiles located in Huslia, Alaska. Sampling was conducted using a multi-Incremental technique which provides a statistically valid representation of the amount of contaminant present in the soil. Assisted with the Quality Assurance duties as well as packing and shipping hazardous materials.

Contaminated Site Monitoring, Joseph Guy Community Center, Brownfield Cleanup Action, Alaska Dept. of Environmental Conservation, Kwethluk, 2012.

Collected in-situ soil screenings using a portable handheld XRF from the building footprint of the Joseph Guy Community Center. Results from the screenings were used to select samples for laboratory analysis using EPA method 6020.

Kanakanak Hospital, Dillingham, Alaska, Bristol Bay Area Health Corporation, 2012-2013.

Collected groundwater and surface water samples at the Kanakanak Hospital site to assist in a site closure determination. Performed subsurface contamination characterization by delineating the extent of contamination beneath the ground surface. Worked closely with all public and private utility companies to clear any utility conflicts and to ensure all subsurface clearance was performed safely.

Prescott Equipment Facility, Anchorage, Alaska, Alaska Dept. of Environmental Conservation, 2012.

Collected groundwater samples at the Prescott Equipment Facility site to characterize the current groundwater contaminant levels and potential trends. Assisted with quality assurance controls and sample management.

Solid Waste Facility Compliance Monitoring Prudhoe Bay, Alaska, 2013.

Work included annual surface water monitoring of upgradient and downgradient surface water bodies from solid waste facilities related to North Slope oil and gas exploration and production. Also included thermistor data downloads to measure freeze thaw elevations of capped waste.

Remedial Action – Operations/Long Term Management, Driftwood Bay Radio Relay Station, Unalaska Island, Alaska. 2017.

Performed a site delineation at a former Air Force Radio Relay Station at a remote site near Dutch Harbor, Alaska. Collected soil and groundwater samples as part of the Institutional Controls program at the site. Duties included fieldwork and equipment logistics, health and safety, and report development and submittal.

Remedial Action – Operations/Long Term Management, Nikolski Radio Relay Station, Nikolski, Alaska. 2017.

Performed a site delineation at a former Air Force Radio Relay Station at a remote site near Nikolski, Alaska. Collected soil and groundwater samples as part of the Institutional Controls program at the site and to support an estimate of remaining contaminated soils at the site, in addition to installing Land Use Control Signs to notify any site visitors about remaining contamination. Duties included fieldwork and equipment logistics, health and safety, sample management, and report development and submittal.

Crowley LLC Nome South Tank Farm. 2017-2018.

Site lead for activities performed in support of contaminated soil delineation and removal. Both hydrocarbon contaminated soil and lead contaminated soil were excavated and placed into supersacks for removal. Responsible for tracking daily activities performed, sampling tasks, and equipment operations.

Remedial Action – Operations/Long Term Management, Cape Romanzof Radio Relay Station, Alaska. 2017.

Performed a site delineation at a former Air Force Radio Relay Station at a remote site near Cape Romanzof, on the west coast of Alaska. Collected soil, sediment, surface water and groundwater samples as part of the Institutional Controls program at the site and installed Land Use Control signage. Duties included fieldwork and equipment logistics, health and safety, and report development and submittal.

DU-9 Soil Stockpile Transport and Disposal, Open Burn/Open Detonation River Site, Ft. Wainwright, Alaska. 2017-2018.

Equipment operator for a contaminated soil removal effort at Ft Wainwright, Alaska. Work involved transporting equipment to the site, utilizing an excavator and a telehandler to load RCRA hazardous waste into supersacks for offsite disposal.

Disaster Relief Work– Northern California Forest Fires Response – Region 9 Operations. 2018.

Provided support for disaster response efforts in Northern California. As an EPA contractor, Mr. Adams performed assessments of residential sites affected by the forest fires. Activities included identifying potential asbestos-containing material (ACM) as part of a household hazardous waste (HHW) cleanup and fire-related debris removal.

Environmental Services and Construction – Water Tank Repairs, Cape Newenham Long Range Radar Station, Alaska. 2018

Site lead for a water tank repair job at a Pacific Air Force Installation located at Cape Newenham, Alaska. Tasks included performing oversight, managing subcontractors, logistics, project tracking, daily report submittal, and analytical sample management.

Colville Milepost 382.5 Tanker Truck Rollover – Spill Response Activities. 2018

Lead sampler during spill response activities conducted during a removal of approximately 120 cubic yards of soils containing ultra-low sulfur diesel. Performed initial site delineation and all sampling activities during the removal phase. Responsible for sample tracking, collection, excavation guidance, health and safety, and report development and submittal.

Site Characterization, Site Assessment and Release Investigation and Closure of Tank 300-1 (ADEC Tank #8) – King Salmon Airport. 2019

Performed an in-place closure of an underground storage tank in accordance with 18 AAC 78 and the UST Procedures Manual. Field work was performed to characterize the degree and extent of petroleum contamination detected in the vicinity of the UST during a previous closure attempt. Performed all sampling activities and guided borehole advancement activities. Installed and sampled multiple groundwater monitoring wells.

Environmental Services and Construction – Water Tank Maintenance, Sparrevohn, Indian Mountain, and Tatalina Long Range Radar Stations, Alaska. 2020

Site lead for water tank repair jobs at multiple Pacific Air Force Installations in Alaska. Tasks included performing oversight, managing subcontractors, logistics, project tracking, daily report submittal, and analytical sample management.

APPENDIX C

STANDARD OPERATING PROCEDURES

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SOP – 01 Logbook Documentation and Field Notes

PURPOSE

This SOP provides criteria for the content and format of field logbooks.

SCOPE

This procedure applies to all field personnel and subcontractors engaged in note taking and data collection to be recorded in field logbooks for project tasks. The field documentation will be recorded per the following ADEC documents:

- *Field Sampling Guidance* (ADEC, 2019)
- *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* (ADEC, 2017a)
- *Underground Storage Tanks Procedures Manual; Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures* (ADEC, 2017b)

GENERAL

An essential part of any environmental field project is proper documentation. The primary form of documentation used to record site data is the field logbook, which describes the history of field activities. This record of field activities is necessary to demonstrate that the data have been obtained according to required procedures. The logbooks may be used as evidence in legal proceedings to defend procedures and techniques employed during site investigations. As a result, it is important that documentation be factual, complete, accurate, consistent, and clear.

DOCUMENT SOURCES

Field documents consist of the following hard copies or electronic types:

- Field notebooks
- Field datasheets
- Soil boring logs
- Field calibration sheets
- Photographs and photographic logs
- Global positioning system (GPS) and Geographic Survey Coordinate Data
- Field instrument data (such as water-quality instruments, PID units, and test kits)
- Laboratory chain-of-custody forms
- Shipping waybill and manifest documents
- Field health and safety records

RESPONSIBILITIES

Site Personnel

All site personnel who make logbook entries are required to read this procedure before engaging in this activity. The Field Team Lead will inform personnel who will be responsible for field notebook and form entries, care, and maintenance.

FIELD NOTEBOOK PROCEDURE

Front Cover

Field notebooks will be bound with lined, consecutively numbered pages. Record the following information on the outside front cover of all field notebooks:

- Project name
- Client name and contract number
- Logbook activity title (such as “Drilling and Soil Sampling” or “Groundwater Sampling”)

Project Contact Information

Reserve Pages 1 and 2 of the field notebook for project related contacts (such as contact names and phone numbers of subcontractors, project assistance, field team, and emergency use) and special instructions.

Daily Entries

Following the Project Contact Information, enter details of all field activities, events, data, and other relevant project task information daily (at minimum), throughout the course of field activities.

Enter daily activities within field notebooks according to the following minimum requirements:

- Record the **field activity and date** at the top of each page.
- Consecutively number the top of page corner of each page (if logbook is not already numbered).
- Precede all entries in the field logbook with the time, written following the 24-hour clock (0915, 1320, and similar). Record the time frequently and at the point of events or measurements that are critical to the activity being logged.
- Make entries in waterproof ink (unless inclement weather prevents pens from working).

- Write entries clearly and legibly enough so that any reviewer can read and understand the entry.
- Draw a diagonal line or similar through any space left at the bottom of the last page of field entries at the conclusion of daily site activities.
- Sign and date the bottom of each page.
- Do not remove any pages from the field logbook.

At a minimum, record events and observations according to the following:

- Current weather and any changing weather conditions that might impact field activities.
- The location(s) and field conditions in which the field task will be conducted.
- The names and organization(s) of all task field staff and/or visitors, including the field team lead, subcontractors, clients, and regulators.
- Site conditions (upon arrival and departure) and any changes in site conditions.
- All relevant field observations, major task decisions, comments, or other valuable site investigation information throughout the course of the site activities (make entries as specific and detailed as possible and practical).
- Reference to relevant documentation type and/or forms (for example, field datasheets, soil boring log sheets, photographs, or sample location coordinates) specified by another SOP (do not duplicate information; include references only).
- Documentation of field instrument calibration or reference to any appropriate field calibration sheets.
- Field map sketches drawn with a North arrow and approximate scale.
- Boring or sample locations with measurements (swing ties) to at least two fixed objects to locate points for mapping.
- Changes and/or deviations from task protocols (such as sampling procedures) outlined in any governing planning documents.
- Reason(s) for any noted deviations, and whom the deviations was discussed with and authorized by.
- Any problems, downtime, or delays and the reasons for the problem or delay.
- Upgrade or downgrade of personal protective equipment.

- All equipment make, model, and property numbers or serial numbers used at the site.
- Health and safety monitoring equipment, including calibration procedures and results and actual and background readings.
- Start and end times of sampling.
- Sampling steady-state parameters or reference to applicable datasheet.
- Decontamination times and methods.
- Type, amount, and disposal methods used for any IDW.

Field Datasheets and Forms

Other unbound data documentation types (including field datasheets, soil boring/test pit log sheets, field calibration sheets, photographic logs, laboratory chain-of-custody forms, shipping waybill and manifest documents, field health and safety forms and similar documents) are part of the field form records. Generally, the use of these documentation types is task-specific and, when used, should be referenced within the field logbook. However, specific data entered on these types of documents will not typically be documented in the logbooks; perform document handling and archiving in the same manner as the logbooks.

Electronic Data Documents

Electronic data documents consist of photographs, GPS and survey coordinate data, field instrument data, and other electronic data files. Investigation field instruments and tools such as digital cameras, GPS units, water quality meters, PIDs, pressure-transducers, and hand-held computers all store investigation data in electronic formats that can be later downloaded and stored electronically for future reference. Take care when retrieving, storing, and managing these electronic data. Consult the field team lead or designee for electronic data management instruction before using any unfamiliar electronic instrument or tool requiring electronic data retrieval and storage. At a minimum, manage electronic data documents according to the following:

- After collection, retrieve (download) all electronic data from the field instrument daily and store all electronic data files at a digital location specifically reserved for that data document type. Store the data at a location that can be readily accessed by multiple team members as necessary.
- Back up all electronic data documents on a USB drive for use in the event of data loss.
- Name electronic files appropriately to easily identify the content and data of collection or download (for example, **SS008_FieldNotes_(insert your initials).pdf**).

DOCUMENT CONTROL

At the conclusion of a task or when a field document is completed, submit all field documentation for records retention. Keep all documents in the project files. Project personnel may keep their own duplicate files, but all original documents will be placed in the official project file. Field or boring logs, sampling, and well installation activities will be maintained by the field team lead and submitted to the PM after field efforts.

REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2019. *Field Sampling Guidance*. October.

ADEC, 2019. *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures*. March 22.

ADEC, 2017a. *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites*. March 7.

ADEC, 2017b. *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures*. March 22.

SOP – 02 Sample Handling and Chain of Custody

PURPOSE

This SOP outlines protocols for sample handling and chain of custody.

SCOPE

This SOP applies to all project team personnel and subcontractors engaged in collecting and handling environmental samples on AFCEE projects in Alaska, and was developed using the following ADEC documents:

- *Field Sampling Guidance* (ADEC, 2019)
- *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures* (ADEC, 2017a)

This SOP focuses on the most commonly used environmental sampling handling and custody tracking tasks and applications anticipated and should be used in conjunction with other applicable project SOPs, including the following:

- *SOP-01, Logbook Documentation and Field Notes*
- *SOP-08, Groundwater Well Sampling*
- *SOP-09, Surface Water Sampling*
- *SOP-16, Surface and Subsurface Soil Sampling*
- *SOP-18, Boring Log Completion, Soil Classification and Logging*

Qualified persons, as defined by 18 AAC 75.990(100), will be engaged in or directly supervise the collection and handling of environmental samples (i.e., Project Manager, Site Manager, Field Team Lead, Project Chemist, Field Sampler).

GENERAL

An essential part of the sampling activities of any environmental project is assuring the integrity of the samples from collection through data reporting. Sample labels and chain-of-custody forms are used to document identification and handling of samples from the time of collection through the completion of chemical and/or physical analysis. Documentation of the history of a sample will be prepared and maintained to demonstrate that the data are a true representation of the environmental media. In some projects, analytical data may be used in litigation. The chain-of-custody record is used as evidence in legal proceedings to demonstrate that a sample was not tampered with or altered in any way that may bias the analytical accuracy of the laboratory results. It is extremely important that chain-of-custody records be complete, accurate, and consistent.

RESPONSIBILITIES

Project Manager

The Project Manager is responsible for providing adequate resources and verifies that field staff has adequate experience and training to successfully comply with, and execute, project specific SOPs and implement the project HSE program. The Project Manager will solicit the appropriate technical expertise and adequately identify the best methods and technology for the job given the current understanding of the site and project goals. In addition, the Project Manager should be consulted if any complications arise with following these critical sample handling and custody procedures.

Site Manager

The Site Manager coordinates and schedules daily field activities. In addition, the Site Manager verifies compliance with this SOP and ensures that all field staff engaged in this activity are trained in this SOP.

Project Chemist

The Project Chemist should verify that the systems are maintained to create chain-of-custody forms from the Sample Tracking and Scheduling Program. The Sample Tracking and Scheduling Program is a database that has the sample identification and sample analytes entered into it from and site specific field sampling plans.

The Project Chemist should alert the laboratory that samples have been shipped, and follow up with the laboratory to verify that samples have been received in compliance with paperwork and temperature requirements. The Project Chemist should also confirm with the laboratory any special analytical requests (such as rapid turnaround times).

Health and Safety Manager

The Health and Safety Manager oversees site specific HSE requirements and verifies overall compliance with the project HSE requirements. The Health and Safety Manager conducts HSE evaluations, selects the appropriate safety procedures for the project, lists the requirements in the project specific HASP, and coordinates with the Site Manager to complete and certify the HSE program.

Field Team Lead

The Field Team Lead maintains compliance with sample handling and custody requirements, particularly the procedures to be used. The Field Team Lead should know the requirements of sampling handling and custody, and should maintain adequate documentation of sampling shipping activities. The Field Team Lead must be aware of these sampling handling procedures and schedule accordingly, taking into account that sample packing and custody requirements or potentially hazardous samples that may require more time and materials (ex. properly labeled paint cans and manifests) than handling nonhazardous samples. The Field Team Lead should

take responsibility for correctly completing chain-of-custody forms and for coordinating with the Project Chemist to successfully handle, packaging, and shipping of samples as described *SOP-01, Packing and Shipping of Environmental Samples*. The Field Team Lead should also determine or seek guidance as to which samples are potentially hazardous and handle them accordingly.

Field Sampler

The Field Sampler, under the supervision of the Field Team Lead (who may be the same person), confirms that samples are correctly collected, labeled, tracked by chain of custody, and sorted until they are delivered to the Field Team Lead, laboratory, or carrier that will transport them to the laboratory. The Field Sampler maintains custody of the samples until they are relinquished to the Field Team Lead, laboratory, or transport carrier. The Field Sampler informs the Field Team Lead and/or Project Chemist of Sampling conditions and if any of the samples are potentially hazardous.

The Field Sampler produces chain-of-custody forms and sample labels for field samplers, and verifies that all information, including labels and chain-of-custody forms, is correct. Labels and chain-of-custody forms are typically generated by the Sample Tracking and Scheduling Program, which the Project Chemist manages. Once the information is entered, the Field Sampler generates labels and chains of custody based upon specifications in the site-specific field sampling plans.

Sample Custodian

The Sample Custodian is any individual who is responsible for the custody of samples and completion of associated documentation.

PROCEDURES

Sample Custody

Follow procedures to preserve and verify the integrity of all samples from the time of collection through analysis. A critical aspect of sample collection and analysis protocols is the maintenance of strict chain-of-custody procedures, as described in this technical procedure. Chain-of-custody procedures include tracking and documentation during sample collection, shipment, and laboratory processing.

A sample is considered to be in an individual's custody if any of the following apply:

1. It is in the physical possession of the responsible party.
2. It is in view of the responsible party after being in their possession.
3. It is placed in a designated, secure area that is controlled and restricted by the responsible party.

Maintain records of the custody of samples, both in the field and in the laboratory. Document custody throughout all sampling activities on the chain-of-custody record for each day of sampling, and verify that this record accompanies the samples from the site to the laboratory. Transfer sample custody according to **Transfer of Custody and Shipment** section below.

Ship samples to subcontractor laboratories via expeditor or air courier. Use air waybills as custody documentation during this time; they should be retained as part of the permanent sample custody documentation. If the situation warrants, hand-deliver samples to an on-site field laboratory; in these cases, note the hand delivery on the chain-of-custody form.

Place custody seals across the front and back edges of each sample cooler lid to maintain its integrity during shipping until it is opened by the laboratory, according to *SOP-07, Packing and Shipping of Environmental Samples*. In addition, seal sample coolers with a custody seal any time they are not in possession or view before shipping. The responsible sampling custodian should sign and date all custody seals.

The subcontractor laboratory is responsible for sample custody after receiving samples. Custody must be maintained at the laboratory once samples are received until all tests are completed. This will be accomplished using an internal custody system that requires samples to be kept in a secured and restricted area when not in use, and to be checked out and checked back in by the analysts who use them. Internal custody records must be maintained by the laboratory as part of the documentation file for each sample.

Transfer of Custody and Shipment

All personnel with sample custody must sign, date, and record the time on the chain-of-custody form when receiving and relinquishing samples from their immediate custody. Note any discrepancies at this time. If the samples must be shipped, the Project Chemist will notify the laboratory project manager or coordinator of when and how the samples were shipped. Notification will include the following information:

- Date of shipment
- Name of shipping company
- Air waybill number
- Number of coolers
- Name and phone number of point of contact
- Estimated date of shipment arrival
- Type of samples (water, sediment, or soil)

Upon receipt of each sample cooler and after verification of chain-of-custody records, the laboratory will provide a cooler receipt form documenting any discrepancies such as, but not limited to, the following:

- Inappropriate sample containers or preservation

- Broken sample containers
- Cooler temperature outside range of 0 to 6 °C (where applicable)
- Missing chain-of-custody form or QA sample form
- Errors on chain-of-custody or QA sample form
- Missing custody seals

The laboratory should notify the project team of any such discrepancies within 24 hours of its receipt of the samples. For US Army Corps of Engineers (USACE) projects, the laboratory will email all sample receipt forms to receipt.cooler@usace.army.mil within 24 hours of cooler receipt.

Laboratory Sample Custody Procedures

A designated sample custodian will receive the samples and verify that they match those on the chain-of-custody record. The condition, temperature, and preservation of the samples shall be checked and documented on the chain-of-custody form. The occurrence of any anomalies in the received samples and their resolution shall be documented in the laboratory records. All sample information shall then be entered into a tracking system, and unique analytical sample identifiers shall be assigned. A copy of this information shall be reviewed by the laboratory for accuracy.

Sample holding time begins with the collection of samples and continues until the analysis is complete. Analyses shall be documented with the chain-of-custody form. Procedures ensuring internal laboratory chain of custody shall also be implemented and documented by the laboratory. Specific instructions concerning the analysis specified for each sample shall be communicated to the analysts. Analytical batches shall be created, and laboratory QC samples shall be introduced into each batch.

Samples shall be stored in limited-access, temperature-controlled areas. Refrigerators, coolers, and freezers shall be monitored for temperature 7 days a week or during use. Acceptance criterion for the temperature of the refrigerators and coolers is 0 to 6 °C. Acceptance criteria for the temperature of the freezers shall be lower than -7°C. All of the cold storage areas shall be monitored by thermometers that have been calibrated with a National Institute of Standards and Technology (NIST)-traceable thermometer. As indicated by the findings of the calibration, correction factors shall be applied to each thermometer. Records that include acceptance criteria shall be maintained.

Samples for VOC analysis shall be stored separately from other samples and/or sample extracts. Refrigerators storing VOC samples shall contain a blank that is analyzed at a minimum of every 2 weeks. Samples shall be properly stored after analysis until disposed. The samples will be disposed of in accordance with applicable local, state, and federal regulations. Disposal records shall be maintained by the laboratory. SOPs describing sample control and custody shall be maintained by the laboratory.

Chain-of-Custody Record

Chain-of-custody forms document sample collection and shipment to the laboratory. Chains of custody are legal documents that record the transfer and disposition of collected environmental samples. The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Fill out chain-of-custody forms at each sampling location for each sample/analysis to maintain a record of sample collection, transfer of samples between personnel, shipment of samples, and receipt of samples at the laboratory. The Field Sampler will generate the chain-of-custody form using the Sample Tracking and Scheduling Program, or by hand on laboratory provided forms. If the samples collected are part of a USACE project the NPDL number will be added to the chain-of-custody.

Information entered by the Project Chemist includes the following:

- Project Name and project number
- Name, address, and phone number of the laboratory to receive the samples
- Chain-of-custody control number
- Sample type/sample collection method
- Location ID
- Unique sample ID
- Matrix type
- Analytical methods requested
- Field duplicate, if applicable
- Field QC for MS/MSD samples, if applicable
- Container type, size and number
- Preservatives used
- TAT for laboratory analysis
- Air waybill number or Bill of Landing number
- Special instruction or comments to laboratory or Field Sampler, if applicable

The Field Team Lead or Field Sampler will enter the following information using indelible black or blue ink:

- Date of sample collection
- Time of sample collection (in 24-hour military format)
- Depths, if applicable sampler's initials
- Void reason, if applicable
- Special instructions or comments to laboratory or Field Sampler, if applicable

The Field Team Lead and Project Chemist should verify that the chain-of-custody record is complete, accurate in all aspects, and consistent with all other sample documentation (for example, number of samples, sample labels, and field logs). The Field Sampler or Field Team Lead will sign the "Sampled By" and "Relinquished By" fields on the chain-of-custody record,

marking the date and time of custody is transferred to the laboratory, transport carrier, or other authorized person.

The Field Team Lead or Field Sampler will perform the following duties:

- Obtain the signature of the Field Sampler or Field Team Lead to transfer sample custody
- Prepare the samples for shipment from the field to the laboratory
- Record the carrier service and air waybill number on the chain-of-custody form
- Sign and enter the date and time relinquished to the expeditor or air carrier

Every transfer of physical custody shall be documented on the chain-of-custody record.

Make any corrections to the chain-of-custody form entries by creating a single-line strike mark through the incorrect item, and then entering the correct entry adjacent to the strikeout item according to *SOP-01, Logbook Documentation and Field Notes*. The person making the change will initial and date corrections. After the form has been inspected and determined to be satisfactorily complete, the Field Team Lead or Field Sampler will sign, date, and note the time of transfer and will reference a shipper tracking number (such as an air waybill number) on the form.

Complete chain-of-custody forms in duplicate for each sampling event, at a minimum. Deliver the original, completed chain-of-custody form with the sample shipping cooler, and retain a field copy (such as a carbon copy, PDF, or photocopy) in the field project files. Place the original chain-of-custody form in a re-sealable plastic bag and place it inside the cooler according to *SOP-07, Packing and Shipping of Environmental Samples*.

Sample Labels

Attach sample labels to all sample containers at the time of sample collection. Generate the label along with the chain-of-custody form using a Sample Tracking and Scheduling Program, or similar appropriate database method, depending on the sample container. For certain types of samples (such as Summa gas canisters), use the blank labels provided by the laboratory when the lab provides sample containers. Verify that labels generated by the Sample Tracking and Scheduling Program are preprinted with the following information:

- Project name and number
- Unique sample ID
- Site
- Sample location
- Matrix
- Container
- Laboratory
- Preservative used
- Number of containers

- Analytical methods requested

Handwrite the same information listed above on labels not preprinted by the Sample Tracking and Scheduling Program, if necessary.

When the sample collection is complete, the Field Sampler fills in the following information in indelible waterproof ink:

- Date and time of sample collection
- Sampler's initials

Once complete, cover the sample labels with clear tape, unless the sample container is pre-weighted for laboratory analysis (such as for GROs, VOCs, or VPHs), and prepared for shipment following *SOP-07, Packing and Shipping of Environmental Samples*. Follow laboratory specified procedures identified by the Project Chemist, Site Manager, or Field Team Lead for labeling for other types of containers, such as soil gas and air samples.

Sample Identification

Verify that all samples are identified with a unique naming convention that identifies the sample area, location type, location number media matrix, sample depth, and any special designation (for example, MS/MSD samples). Unless specified otherwise in the project specific work plan, identify samples using the following sample naming convention:

YYSITE-LOC(or QC)##(A)-MEDIA-0/1

- YY = year (12 for 2012, 13 for 2013, etc.)
- SITE = Site ID (SS008)
- LOC(or QC)## = The sample number based on its location or whether it is a QC blank (WL01 for monitoring wells, SB01 for soil boring, TB01 for trip blank, EB01 for equipment blank, etc.)
- (A) = Depth of sample based on interval from which it is collected (A for 0-5 feet bgs, B for 5-10 feet bgs, etc.)
- MEDIA = GW for groundwater, SO for soil, SW for surface water, SD for sediment, DR for drum sample etc.
- -0/-1 = 0 for primary samples and 1 for field duplicates

Sample Handling and Storage

Take care when handling environmental samples. Handle samples only while wearing new, disposable nitrile gloves, and keep empty sample containers and collected samples clean, dry and away from potential cross-contaminant sources (such as vehicle exhausts, fuel sources, and contaminated equipment). Transport collected samples separately from other sampling equipment and tools and store the transfer samples in an upright position and sealed tightly.

If samples cannot be shipped immediately to a laboratory and must be temporarily stored until arrangements can be made for delivery, place the samples in a secured project team facility area with sufficient refrigeration or ice in order to maintain 0 to 6 °C storage temperatures (if required for preservation of the samples). Verify that a temperature blank and chain-of-custody form accompanies samples during storage. Samples may be stored in a secure, temperature-controlled refrigerator as long as reliable power is provided to the refrigerator and the refrigerator is designed for environmental samples only. Do not store samples in refrigerators potentially used for food storage. Use storage custody seals to maintain sample security in refrigerated storage.

Samples temporarily stored overnight must be received by the custodian that placed them in storage, and may in turn be relinquished to the appropriate laboratory, or another sample custodian. Record each transfer of custody on the appropriate laboratory, or another sample custodian. Record each transfer of custody on the appropriate chain-of-custody form(s).

RECORDS

Record sample handling and custody information in a field logbook and on a chain-of-custody form according to *SOP-01, Logbook Documentation and Field Notes*. Complete chain-of-custody forms, air waybills, and any other shipping documentation according to SOP-07 and retain a copy in the project files.

REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2019. *Field Sampling Guidance*. August.

ADEC, 2017. *Underground Storage Tanks Procedures Manual; Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures*. March 22.

American Society for Testing and Materials (ASTM), 2018. *Standard Guide for Sampling Chain-of-Custody Procedures*. ASTM Standard D4840-99, ASTM International, West Conshohocken, PA.

United States Environmental Protection Agency (EPA), 1994. *User's Guide to the Contract Laboratory Program*. Office of Emergency and Remedial Response. EPA/540/R-941/013. February.

EPA, 2020. *Sampler's Guide; Contract Laboratory Program Guidance for Field Samplers. Office of Superfund Remediation and Technology Innovation*. EPA-540-R-20-005. November.

DEFINITIONS

- air waybill – The shipping document that identifies the sender and addressee, transport carrier, size, and priority of a shipment transported by aircraft.
- custody – Physical possession or control. A sample is under custody if it is in possession or under control so as to prevent tampering or alteration of its characteristics.
- sample label – A record attached to samples to verify legal documentation of traceability.
- chain-of-custody form – A legal document that records the transfer and disposition of collected environmental samples.
- sampling tracking and scheduling program – A database program that the Project Chemist uses to record and track field sample collection. The program is also used to generate chain-of-custody forms before and after sample collection.
- turnaround time (TAT) – The duration for laboratory sample analysis from the time the sample receiving to the time a laboratory data report is produced.

SOP – 03 Photographic and Video Documentation

INTRODUCTION

This purpose of this SOP is to provide the project team with a step-by-step guide for photographic and video documentation. Photographs/videos should be used to document field activities including initial site conditions during assessments and emergencies prior to, during and after removal and remedial actions, and during enforcement actions.

PHOTOGRAPHIC AND VIDEO DOCUMENTATION

Photographs

The project team will document site, sampling and special events using digital photographs. Digital photographs will be used so they can be employed in trip reports and other site deliverables.

The project team will use supplied digital cameras. If digital cameras are not available, standard 35mm cameras will be utilized. All cameras should utilize a date stamp feature to document the date of the photography. Descriptions of the photograph subject, date, time, site name, and location should be noted in the site logbook which can be translated to photograph labels following developing. If using a digital camera the photograph number will also be recorded in the logbook and correspond to photo-specific notes for photograph labels during reporting. Digital photographs will be saved within the digital project; photographs will be named with corresponding photograph number to the log book and will be incorporated into a photograph log. It is not necessary to record film speed, camera type, or lens size for automatic cameras using standard settings. Special lenses, lens filters, or other photograph enhancement features, if used, should be noted in the logbook.

Videotape

If necessary, the project team will document site activities using hand-held video recorders. High-quality videotapes will be utilized to accommodate future copying, dubbing, and splicing activities. All video cameras should utilize the date stamp and video counter features to help identify if the film has been edited or altered.

SPECIFIC PROTOCOL

Adhere to the following protocol for both photographic and video documentation:

- Enter description of filming activities in the site logbook documenting type of camera, time (military time) and date, filming individual, and orientation angle of the viewing angle.
- Print the site name, project number, and coverage dates on each diskette/videotape/roll of film that has been used.
- Submit film as necessary for processing to ensure that all information on the developing envelope is complete.
- If film is not processed in a timely manner, notify the vendor immediately.

- Label all photographs/video with information including the project number, site name, site location, date and time, description of photograph, and photographer.
- Store all original videos, diskettes, or site negatives in the official site file.
- Be objective for all photographs/video. Ensure the purpose of the photograph is entered into the site log (e.g., documenting labels for enforcement or condition of neighboring properties prior to the initiation of a removal action, or documenting an exposure pathway).

SOP-07 Packing and Shipping of Environmental Samples

PURPOSE

This SOP provides guidance for packing and shipping environmental samples in accordance with applicable transportation regulations and sample storage requirements.

SCOPE

This SOP applies to all project team personnel engaged in the packing and shipping of environmental samples in Alaska. It is intended to comply with recommended practices in the following documents:

- *Field Sampling Guidance* (ADEC, 2019)
- *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures* (ADEC, 2017a)
- ASTM Standard D6911-15, *Standard Guide for Packing and Shipping Environmental Samples for Laboratory Analysis* (ASTM, 2015)
- Alaska Airlines Air Cargo website (2021a and 2021b)
- Ravn Alaska Cargo Services website (2021)

This SOP focuses on the most commonly used environmental sample packing and shipping tasks and applications and should be used in conjunction with other applicable project SOPs, including:

- *SOP-01, Logbook Documentation and Field Notes*
- *SOP-08, Groundwater Well Sampling*
- *SOP-09, Surface Water Sampling*
- *SOP-11, Hydropunch Groundwater Sampling*
- *SOP-15, Drilling Methods*
- *SOP-16, Surface and Sub-surface Soil Sampling*
- *SOP-17, Sediment Sampling*

This SOP describes shipping considerations, including preparation of shipping manifests and instructions on determining whether shipments are hazardous waste and need to be identified as Accepted Quantities or Dangerous Goods.

GENERAL

Proper shipment of environmental samples from the field to the laboratory is a critical part of sample management. If not packaged in accordance with this SOP, samples may reach the laboratory without proper documentation. In addition, the data quality of valuable environmental

samples may be diminished or the samples may become unusable if they become warm and are received at the laboratory out of temperature compliance. Improper sample packing may also result in sample containers breaking, causing loss of data or data quality, compromising other samples within the shipment, or stopping or delaying the entire shipment because of leaking shipping containers.

If the articles or substances will be shipped by air, they must be properly identified, classified, packed, marked, labeled, and documented according to applicable regulations.

All sample shipments to be transported by air must meet the requirements of the International Air Transport Association (IATA) and the International Civil Aviation Organization for air transportation of dangerous goods (IATA, 2021). Anyone who violates the regulations for shipping articles or substances may be subject to civil or criminal penalties.

Complete an original manifest or shipping manifest (air waybill) to accompany each shipment. Original manifests or air waybills can be obtained either directly from the transporter (such as FedEx, Alaska Air Cargo, or Ravn Alaska) or from the project team's office. Air waybills for Alaska Airlines Cargo can also be completed online (Alaska Air Cargo, 2021a and 2021b). The air waybill serves four primary purposes:

- It serves as a tracking device to trace shipments of samples, hazardous substances, or other items.
- It provides information on the contents manifested during transport emergencies.
- It provides documentation of shipment date, priority, method, shipper information, addressee information, and, often, proof of delivery.
- It is used by the USEPA and the disposal facility for recordkeeping and reporting on hazardous substance shipping.

Follow all instructions on the reverse side of the air waybill; contact the Field Team Lead or transporter for assistance with completing the air waybill.

RESPONSIBILITIES

Project Manager

The Project Manager is responsible for providing adequate resources and verifying that field staff have adequate experience and training to successfully comply with and execute project-specific SOPs and implement the project HSE program. The Project Manager solicits the appropriate technical expertise to verify that the project has identified the best sampling methods and technology for the job, given the current understanding of the site and project goals.

Site Manager

The Site Manager is responsible for the coordination and scheduling of daily field activities with the Field Team Lead. In addition, the Site Manager is consulted on decisions concerning shipping costs and any complications or uncertainties with following these procedures.

Field Team Lead

The Field Team Lead is responsible for verifying compliance with this SOP and that all field staff engaged in this activity have been trained in this SOP. The Field Team Lead, or designee, knows the requirements for packing and shipping samples and maintains adequate documentation of sample shipping activities. The Field Team Lead, in coordination with the sample shipper and Project Chemist, determines which samples are potentially hazardous and ships them accordingly. The Field Team Lead coordinates scheduling with the laboratories and the Project Chemist before each sampling event and before shipping samples. In addition, the Field Team Lead coordinates with the Project Chemist to verify that the samples have arrived at the laboratory without complications.

Project Chemist

The Project Chemist should verify that the systems are maintained to create chain-of-custody forms from the Sample Tracking and Scheduling Program. The Sample Tracking and Scheduling Program is a database that has the sample identification and sample analytes entered into it from and site specific field sampling plans.

The Project Chemist should alert the laboratory that samples have been shipped and follow up with the laboratory to verify that samples have been received in compliance with paperwork and temperature requirements. The Project Chemist should also confirm with the laboratory any special analytical requests (such as rapid turnaround times).

Health and Safety Manager

The HSM is assigned to oversee the site-specific HSE program and verifies overall compliance with project HSE requirements. The HSM conducts HSE evaluations, selects the appropriate safety procedures for the project, identifies the requirements in the project-specific HASP, and coordinates with the Field Team Lead to complete and certify the HSE program.

Field Team Lead

The Field Team Lead maintains compliance with sample handling and custody requirements, particularly the procedures to be used. The Field Team Lead should know the requirements of sampling handling and custody, and should maintain adequate documentation of sampling shipping activities. The Field Team Lead must be aware of these sampling handling procedures and schedule accordingly, taking into account that sample packing and custody requirements or potentially hazardous samples that may require more time and materials (ex. properly labeled

paint cans and manifests) than handling nonhazardous samples. The Field Team Lead should take responsibility for correctly completing chain-of-custody forms and for coordinating with the Project Chemist to successfully handle, packaging, and shipping of samples as described *SOP-07, Packing and Shipping of Environmental Samples*. The Field Team Lead should also determine or seek guidance as to which samples are potentially hazardous and handle them accordingly.

Field Sampler

The Field Sampler, under the supervision of the Field Team Lead (who may be the same person), confirms that samples are correctly collected, labeled, tracked by chain-of-custody, and sorted until they are delivered to the Field Team Lead, laboratory, or carrier that will transport them to the laboratory. The Field Sampler maintains custody of the samples until they are relinquished to the Field Team Lead, laboratory, or transport carrier. The Field Sampler informs the Field Team Lead and/or Project Chemist of Sampling conditions and if any of the samples are potentially hazardous.

The Field Sampler produces chain-of-custody forms and sample labels for field samplers, and verifies that all information, including labels and chain-of-custody forms, is correct. Labels and chain-of-custody forms are typically generated by the Sample Tracking and Scheduling Program, which the Project Chemist manages. Once the information is entered, the Field Sampler generates labels and chains-of-custody based upon specifications in the site-specific field sampling plans.

Sample Shipper

The sample shipper (who may also be the Project Chemist or Field Team Lead) prepares and packs the coolers for shipping and verifies that the chain-of-custody forms are correct, as described in the procedures below. The sample shipper coordinates with the project expediting subcontractor to ship the samples effectively. If shipping hazardous materials, the sample shipper completes Dangerous Goods and Waste Management training before sample shipping. In addition, the sample shipper coordinates with the Project Chemist to verify that the laboratory is alerted that samples have been shipped and that other necessary follow-up tasks are completed.

Sample Custodian

The sample custodian is any individual who is responsible for the custody of samples and completion of associated documentation.

PROCEDURES

Determining Whether Samples Are Classified as Hazardous Waste

The sample shipper must complete Dangerous Goods and Waste Management training, which requires that the trainee become familiar with U.S. DOT and federal regulations for shipping dangerous goods before shipping any samples.

The 40 CFR, Part 261, Section 4, delineates sample shipping requirements, which are included in *SOP HSE-417, Hazardous Materials Transportation*, as follows:

... a sample of solid waste or a sample of water, soil, or air, which is collected for the sole purpose of testing its characteristics or composition, is not subject to any requirements of this part (hazardous materials shipping requirements)... when:

- (i) The sample is being transported to a laboratory for the purpose of testing; or*
- (ii) The sample is being transported back to the sample collector after testing.*

In order to qualify for the(se) exemption(s)..., a sample collector shipping samples to a laboratory and a laboratory returning samples to a sample collector must:

- (i) Comply with Department of Transportation (DOT), U.S. Postal Service (USPS), U.S. Department of Agriculture, or any other applicable shipping requirements; or*
- (ii) Comply with the following requirements if the sample collector determines that DOT, U.S. Postal Service (USPS), or other shipping requirements do not apply to the shipment of the sample:*
 - (A) Assure that the following information accompanies the sample:*
 - (1) the sample collector's name, mailing address, and telephone number;*
 - (2) the laboratory's name, mailing address, and telephone number;*
 - (3) the quantity of the sample;*
 - (4) the date of shipment; and*
 - (5) a description of the sample.*
 - (B) Package the sample so that it does not leak, spill, or vaporize from its packing.*

To establish compliance with this requirement, assess samples to determine potential hazards. Potentially hazardous samples are required by law to be properly handled and labeled. If the coolers will not be delivered by hand but will be shipped to the laboratory, the samples must be

packaged for shipment in accordance with DOT/IATA regulations; ship hazardous samples according to the requirements of the shipper (ex. FedEx, Alaska Air Cargo, or Ravn Alaska) and the project team. Verify that marking and labeling procedures are consistent with DOT/IATA regulations. Enter the method of shipment, courier names, and other pertinent information on the chain-of-custody form. After properly completing air waybills, make a copy and place copies in the project file.

Packing and Shipping Samples

Environmental Samples (Nonhazardous)

Label, package, and ship nonhazardous (as determined by the Field Team Lead) environmental samples within insulated sample coolers as described below. Environmental samples do not require DOT marking, labeling, or shipping papers, and there are no DOT restrictions on the mode of transportation.

Packing Samples

- Determine the approximate shipping duration for the sample to be sent. If the shipping duration will be extensive (for example, greater than 24 hours), consider shipping the samples in extended-use 5-day or 6-day coolers.
- Determine the maximum allowable weight of each cooler.
- Remove all inappropriate or old marks and labels when reusing packing material. If the labels and marks cannot be removed, the labels will be crossed out so that they are not visible.
- Legibly and durably mark each piece of the shipment with the name and address of the shipper and the consignee (to be done by the shipper). A consignee phone number is required if the shipment is perishable. Markings should include the application of special handling stickers, such as “THIS SIDE UP,” “FROZEN,” or “COOL.”
- Properly prepare the shipment. Most shippers will not accept a shipment for transportation when it appears that the shipment is in a condition deemed by the shipper to be unacceptable, as follows:
 - Improperly packed or packaged
 - Of a kind or type likely to incur damage from high or low temperatures under normal air transportation conditions
 - Of an inherent nature or defect that indicates transportation could not be furnished without loss or damage to the shipment or damage to the shipper’s facilities or equipment

- Check the sample container caps to make sure they are tightened properly. Discard and re-collect samples of volatile components if the caps are loose.
- Tape the drain plug on the inside and outside of the cooler.
- Place a minimum of 2 inches of cushioning material (such as asbestos-free vermiculite, perlite, or bubble wrap sheets) in the bottom of the cooler.
- Place a large plastic bag (such as a trash bag) in the bottom of the cooler to contain samples. Allowed the top edges of the plastic bag to hang over the outside of the cooler while filling.
- Place each sample container in a resealable bag and sealed, squeezing as much air as possible from the bag before sealing. Wrap any glass containers in bubble wrap.
- Place all bottles upright in the cooler so that they will not touch each other during shipment. Allow enough room for ice bags and cushioning material to be placed among and around the containers.
- Place a temperature blank in every cooler to allow the receiving laboratory to accurately assess the temperature of samples.
- Place additional cushioning material around sample bottles, filling the voids between bottles. Ensure that the samples are insulated with enough bubble wrap to prevent breakage.
- Place a minimum of six to eight ice substitute bags (such as gel ice) between samples and over the containers to preserve them between 0 to 6°C. Ensure that the ice substitute is evenly placed along the walls and top of each cooler. (Note: loose-bagged ice is not acceptable when transporting via commercial aircraft such as Alaska Air Cargo.)
- Fill the remaining spaces within the cooler with additional ice substitute and/or cushioning material such that the contents cannot shift and move inside the cooler. Additional ice or fewer samples per cooler may be needed so that all samples arrive at the laboratory within the accepted temperature range of 0 to 6°C—particularly important during periods of warmer weather and/or longer shipping durations.
- Pull up and together the top edges of the large plastic bag before tying them into a knot by twisting edges together while forcing out extra air.

Shipping Samples

- If shipping via a commercial carrier (such as FedEx, Alaska Air Cargo, or Frontier Alaska Cargo), write the carrier's name and the air waybill number on the chain-of-custody form (Alaska Airlines, 2021a and 2021b).

- Place the completed chain-of-custody form inside a re-sealable bag, then tape the bag to the inside lid of the cooler. Each cooler must have a copy of the chain-of-custody inside the cooler. Retain an original carbon copy or photocopy of the completed chain-of-custody form and submit it to the Project Chemist or Field Team Lead for project archiving.
- The chain-of-custody form sent to the laboratory must be completed with all designated information, and the form must be unique to the samples contained within each specific cooler according to *SOP-02, Sample Handling and Chain-of-Custody*.
- Close and seal the cooler with a strong adhesive tape. Wrap nylon-reinforced strapping tape completely around the ends of the cooler multiple times to secure it; fill any open space between the lid and the cooler. Tape the cooler latch closed with strapping tape. Using clear packing tape or duct tape on the cooler is not acceptable.
- Complete two custody seals, then seal the cooler by placing the seals on the front and the rear of the cooler across the edge where the cooler and cooler lid meet. The signature on the custody seals should match the signature on the chain-of-custody form. Tape over the custody seals with clear packing tape around the entire cooler.
- Attach the completed shipping label to the top of the cooler, then print the words “Laboratory Samples” on the label. Print the laboratory and project team office addresses and telephone numbers on the top of the cooler.
- Attach “THIS SIDE UP” labels on all four sides of the cooler, and place “FRAGILE,” “CHILL,” or “COOL” labels on at least two sides.
- Complete the appropriate air waybill (or manifest) with all designated information, including:
 - Shipper service requested (for example, Express, Goldstreak, and Priority)
 - Laboratory addresses and telephone numbers
 - Project team office addresses and telephone numbers
 - Project number (as the internal reference number or purchase order number)
 - Sender/shipper account number or customer identification number
 - Special handling requests for “Notify upon Arrival” with laboratory contact name and phone number, “Cool - Place in Cooler,” and “Do Not Freeze” – special handling requests may need to be made in person when dropping off shipments with the carrier
- Attach an original copy of the air waybill to the sample cooler. Retain and submit an original carbon copy or photocopy of the air waybill with the chain-of-custody to the

Project Chemist or Field Team Lead for project archiving. Multiple coolers may be shipped under a single air waybill if each cooler is appropriately labeled with the laboratory and project team office addresses and telephone numbers.

- Notify the laboratory when the samples have been shipped, and provide it with the name of the carrier, air waybill number, and shipment date from the retained copy or photocopy of the air waybill. The laboratory must be prepared to receive and check the samples and sign the chain-of-custody form. In some cases, the laboratory may need to pick up the sample shipment from the carrier directly. The sample shipper or sample coordinator will coordinate with the laboratory to successfully deliver the samples to the laboratory.

Hazardous Samples

Pack and ship hazardous samples using the same procedures as those used for nonhazardous samples, except for the following:

- Consult the Field Team Lead and/or Health and Safety Manager whenever hazardous sample shipping is expected. Shipment of hazardous samples should follow the procedures outlined in the section below on Hazardous Materials Transportation.
- Place the sample container inside a 1-quart or 1-gallon steel, hazardous materials shipping can, and fill the void space with vermiculite. Place the can in a cooler and pack as described above.
- Complete a carrier-approved air waybill or shipper's certification for restricted articles, providing the following information in the order listed:
 - "Flammable Liquid, No. UN 1993" or "Flammable Solid, No. UN 1325"
 - "Limited Quantity" (or "Ltd. Qty.")
 - Net weight or net volume of total sample material in cooler
 - "Laboratory Samples"
 - "Cargo Aircraft Only"
- Affix a corporate address label to the cooler with the address of the laboratory.

Note that DOT regulations do not apply to transport by government-owned vehicles, including aircraft (IATA, 2012).

RECORDS

Log sample shipments on a sample shipment log or in a field notebook. Complete chain-of-custody forms, air waybills, manifests, IATA Dangerous Goods Declaration forms, DOT shipping paperwork, and any other shipping documentation according to *SOP-01, Logbook Documentation and Field Notes*; store any documentation in the project files.

REFERENCES

- Alaska Airlines, Alaska Air Cargo, 2021a. *Alaska Air Cargo Book a Shipment*. <https://www.alaskacargo.com/bookonline>. Accessed August 9, 2021.
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SOP – 08 Groundwater Well Sampling

PURPOSE

This SOP describes the methodology for planning groundwater sampling events, well purging, and collection of groundwater samples through the use of positive displacement, submersible and peristaltic pumps, and bailers.

SCOPE

This SOP applies to all project team personnel engaged in groundwater sampling tasks and was developed using the following Alaska Department of Environmental Conservation (ADEC) documents:

- *Field Sampling Guidance* (ADEC, 2019)
- *Monitoring Well Guidance* (ADEC, 2013)
- *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures* (ADEC, 2017a)

This SOP focuses on the most commonly used monitoring well development tasks and applications anticipated and should be used in conjunction with other applicable project SOPs, including the following:

- *SOP-01, Logbook Documentation and Field Notes*
- *SOP-10, Water Level Measurements*
- *SOP-12, Monitoring Well Decommissioning and Borehole Abandonment*
- *SOP-13, Water Quality Measurements and Calibration*
- *SOP-14, Monitoring Well Installation*
- *SOP-15, Drilling Methods*
- *SOP-23, Operations and Maintenance of Photoionization Detector*
- *SOP-24, Equipment Decontamination Procedures*

Qualified persons, as defined by ADEC Title 18 Alaska Administrative Code (AAC) 75.333(c) (18 AAC 75.333(c)), will be engaged in or directly supervise the collection and handling of environmental samples (i.e., Project Manager, Site Manager, Field Team Lead, Project Chemist, Field Sampler).

RESPONSIBILITIES

Project Manager

The Project Manager is responsible for providing adequate resources and verifying that field staff have adequate experience and training to successfully comply with and execute project-specific SOPs and implement the project HS&E program. The Project Manager will solicit the appropriate technical expertise to verify that the project has identified the best sampling methods and technology for the job given the current understanding of the site and project goals.

Site Manager

The Site Manager is responsible for the coordination and scheduling of daily field activities. In addition, the Site Manager is responsible for verifying compliance with this SOP and that all field staff engaged in this activity are trained in this SOP.

Field Team Lead

The Field Team Lead should develop or direct the preparation of a detailed sampling plan that includes the specifics of groundwater sampling, particularly the procedures to be used. The Field Team Lead or their designee should know the requirements for groundwater sampling and should maintain adequate documentation of groundwater sampling measurements and calibration activities.

Health and Safety Manager

The Health and Safety Manager is assigned to oversee site-specific HSE and verify overall compliance with project HSE requirements. The Health and Safety Manager conducts PPE evaluations, selects the appropriate PPE for the project, lists the requirements in the project-specific HASP, coordinates with the Site Manager and/or Safety Coordinator to complete and certify the PPE program, and conducts project H&S audits on the effectiveness of HS&E program.

Field Safety Officer

The Field Safety Officer assists in implementing the project HASP; the role of Field Safety Officer is either taken by the Site Manager or is designated to Field Team Lead by the Site Manager. The Field Safety Officer assists the Health and Safety Manager with the HSE program, implements the PPE requirements described in the project HASP, and receives input from project staff on the effectiveness of the assigned PPE requirements and ongoing HSE procedures.

Field Sampler

The Field Sampler, under the supervision of the Field Team Lead (who may be the same person), confirms that samples are correctly collected, labeled, tracked by chain of custody, and sorted until they are delivered to the Field Team Lead, laboratory, or carrier that will transport them to the laboratory. The Field Sampler maintains custody of the samples until they are relinquished to the Field Team Lead, laboratory, or transport carrier. The Field Sampler informs the Field Team Lead and/or Project Chemist of Sampling conditions and if any of the samples are potentially hazardous.

The Field Sampler produces chain-of-custody forms and sample labels for field samplers, and verifies that all information, including labels and chain-of-custody forms, is correct. Labels and chain-of-custody forms are typically generated by the Sample Tracking and Scheduling Program, which the Project Chemist manages. Once the information is entered, the Field Sampler generates labels and chains of custody based upon specifications in the site-specific field sampling plans.

Sample Custodian

The Sample Custodian is any individual who is responsible for the custody of samples and completion of associated documentation.

GENERAL

Groundwater sampling consists of collecting a water sample representative of the in situ conditions and chemistry of a specific aquifer or portion of an aquifer. The groundwater sampling method addressed in this SOP is termed Low-Flow sampling.

The following sections include summaries and procedures for the Low-Flow sampling method. Under normal circumstances, groundwater samples can be collected as soon as the groundwater has re-equilibrated following well development (when the groundwater is primarily sediment-free and water quality parameters have stabilized) or at least 24 hours after development (ADEC, 2017a). Disturbance of the well, water column, and samples must be minimized, and only discrete grab samples may be obtained. Composite groundwater samples are unacceptable. If multiple groundwater monitoring wells are to be sampled during the same sampling event, samples must be collected from the monitoring wells expected to be uncontaminated or to have only low levels of contamination first, and then progressing to wells expected to have higher levels of contaminant last. This practice helps reduce the potential for cross-contamination between monitoring wells.

Groundwater samples must be collected as close as possible to the vadose zone/saturated zone interface (that is, water table) unless analysis indicates that contamination is at a different depth (ADEC, 2017b). If further vertical delineation of contaminant concentration(s) is necessary, groundwater samples will be collected at the interval(s) within the water column based on the physical characteristics of the contaminant (ADEC, 2019). This should be a consideration especially for LNAPLs and DNAPLs (such as chlorinated solvents). If multiple different contaminant analytes are to be sampled from the same well, samples must be transferred to sample containers in the order of volatility.

Contaminant analytes should be collected in the following order:

1. In-field water quality parameters (*SOP-13 Water Quality Measurements and Calibration*)
2. VOCs, GRO, BTEX, methane, and carbon dioxide (CO₂)
3. SVOCs, DRO, RRO, PAHs, PCBs, pesticides, and herbicides
4. TOC
5. Inorganic compounds (such as total metals, dissolved metals, nitrate/nitrite, and sulfide)

Equipment and Materials

Groundwater sampling may be performed using several sampling devices including submersible pumps, peristaltic pumps, inertial pumps, and bailers. The choice of sampling device will be based on site-specific considerations including the well diameter, depth of groundwater, and well sampling method. Groundwater sampling devices must compliment the intended data use and site decisions, and selected groundwater purging and sampling equipment should minimize increases in sample temperature, water column agitation, and sample agitation (ADEC, 2019).

Materials used during groundwater sampling must not absorb, desorb, or leach contaminants of concern from or into a potential groundwater sample (ADEC, 2019). The materials used must be resistant to chemical and biological degradation. If bailers are used, the bailer must be made of glass, stainless steel, other suitable materials, or of disposable materials such as Teflon[®] or polyethylene (ADEC, 2017a). Polyvinyl chloride (PVC) bailers are not acceptable for sampling of VOCs.

Groundwater and LNAPL Level Measurement

Before groundwater sampling, conduct a site-wide groundwater-level survey to determine the current site hydrogeologic conditions. Measure the depth to groundwater in each well to within 0.01 feet. If the possibility of LNAPL is suspected, check the monitoring well for the presence of LNAPL using an oil-water indicator probe. If LNAPL is encountered in a well, measure the product thickness and record it on the well purge and sampling datasheet. Unless otherwise specified by the site-specific sampling plan or the Site Manager, do not collect laboratory samples from wells that contain LNAPL.

Historical Groundwater Level Information

The initial step in developing a groundwater sampling plan for a particular site is to acquire historic groundwater elevation data from monitoring wells at the site, if available. If no monitoring wells currently exist, acquire groundwater level data for wells at or as close as possible to the site. Evaluate these data to determine the range of seasonal water level fluctuations that occur at the site and the shallowest and deepest observed water levels over the period of record. This information defines the depth interval of the intermittently saturated zone, or potential “smear zone,” that is created as an LNAPL layer rises and falls with seasonal water level fluctuations.

RECORDS

Record details regarding the pumping method, parameter readings, purge volumes, and samples collected in the field logbook and on a groundwater monitoring datasheet.

PROCEDURES

This section describes groundwater sampling procedures including Pre-sampling tasks, pump setup, well purging, sample collection preparation, potential sample collection techniques, sample collection, and investigation derived waste.

Pre-sampling Tasks

This section describes tasks that occur prior to purging and sampling a well including planning tasks, field equipment decontamination and calibration, and equipment selection.

Planning Tasks

The Field Team Lead should work with the Project Manager and Site Manager to obtain historical information on which wells have historically had contaminants present, so that wells with the greatest concentrations may be sampled last to minimize potential cross contamination.

Site background information (historical Well Purge and Sampling Datasheets), including depth to water, well total depth, and water quality parameters from previous events (if available), should be obtained before the field sampling event to augment data quality and allow for verification of data consistency.

Expected purge volumes should be estimated before field deployment such that proper pumps may be selected, and purge water management may be planned.

Field Equipment Decontamination

Decontaminate groundwater sampling equipment and materials before use. Groundwater sampling equipment that typically requires decontamination before purging a well includes the

water level or oil-water interface probe, water quality meters and probes, and the inside of flow-through cells (SOP-24). Decontaminate submersible pumps between sampling at each well. Portable decontamination supplies (for example, decontamination water containers, spray bottles, Alconox, and deionized water containers) should be available during sampling so that all appropriate accessory equipment can be decontaminated in the field. Place used decontamination solutions in the purged well water containers and manage as IDW, according to the Waste Management Plan.

Field Equipment Calibration

Before going into the field, the Field Team Lead or designee should verify that field instruments are operating properly and that there are no obvious defects that could prevent proper operation. Calibrate all instruments before obtaining field data to within an acceptable range (SOP-13). Minimize field sampling time or data quality lost because of malfunctioning equipment through proper pre-event planning and by using adequate backup equipment, as necessary. Collect field measurements for temperature, pH, turbidity, specific conductance, DO, temperature, and ORP.

Air monitoring may be necessary during groundwater sampling activities, as specified in the HASP. Calibration and operation of air monitoring equipment (PIDs or FIDs) (SOP-23). If instrument readings become erratic during normal operations, recalibrate the equipment.

Equipment Selection

Obtaining a representative sample depends greatly on the methodology and technology used to obtain the sample. A peristaltic pump or submersible centrifugal pump with dedicated sample tubing will be used to collect groundwater samples.

Follow these basic equipment setup guidelines when setting up groundwater sampling equipment.

Submersible Centrifugal Pump

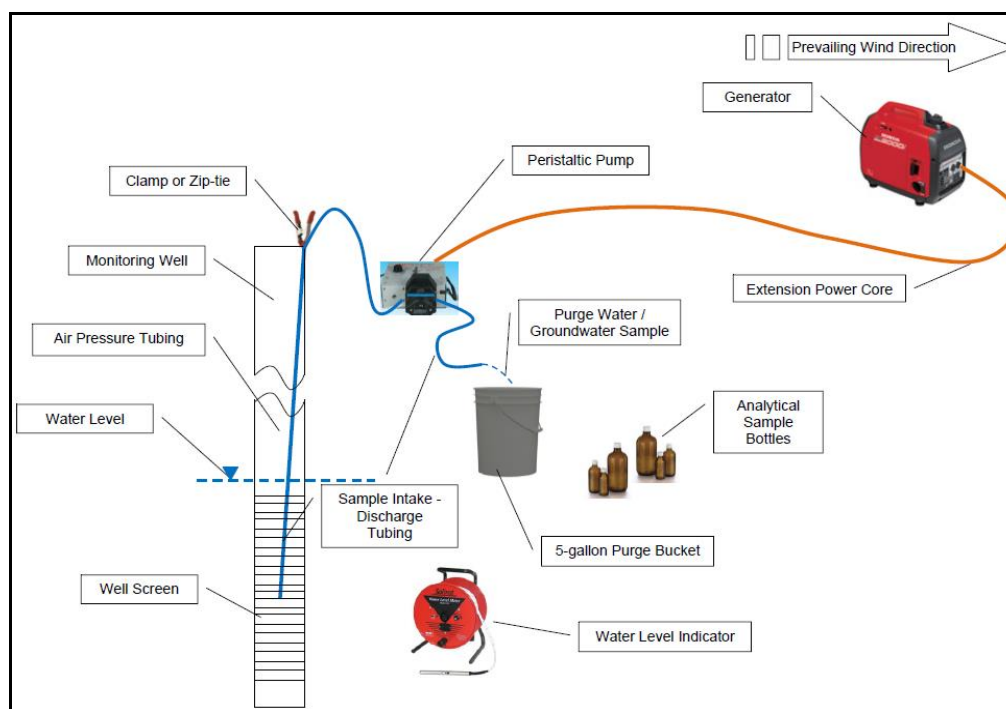
- Connect an appropriate length of tubing to end of the submersible pump.
- Slowly and carefully lower the pump with attached tubing into the well to the desired sample intake depth.
- Secure the sample intake tubing to the top of the casing using multiple zip-tie fasteners or a spring clamp.
- Clamp the other end of the discharge tubing to the purge bucket in a way that discharging purge water will flow into the bucket.
- Connect the submersible pump directly to the discharge velocity controller and battery and begin pumping.

Peristaltic Pumps

- Connect an appropriate length of sample intake tubing to one end of an approximately 8- to 12-inch piece of Masterflex or similar silicone tubing. Connect the other end of the silicone tubing to a 3- to 4-foot piece of pump discharge tubing. Try to minimize the length of sample tubing whenever possible to reduce sample turbulence and aeration during pumping.
- Slowly and carefully lower the sample intake tubing into the well to the desired sample intake depth.

- Secure the sample intake tubing to the top of the casing using multiple zip-tie fasteners or a spring clamp.
- Insert the 8- to 12-inch silicone tubing section into the peristaltic pump head and lock the tubing within the pump head.
- Clamp the other end of the discharge tubing to the purge bucket in a way that discharging purge water will flow into the bucket.
- Connect the peristaltic pump directly to the generator (or battery if available) using an extension power cord.
- Place the generator downwind of the sampling area a significant distance away (~20 feet or more). If a battery is available, it should be used while a sample is being collected.
- Make sure that the generator supplying power to the pump is sufficiently fueled before purging and sampling to avoid power loss.

Figure 2 summarizes the typical setup for a peristaltic groundwater sampling set.



• **Figure 2. Typical Peristaltic Pump Sampling Equipment Setup**

Well Purging

Most groundwater methods (except no-purge sampling methods) require purging of the well before groundwater sampling in order to remove stagnant water from the well and obtain a water sample representative of the aquifer being sampled with a minimum of disturbance to the water column. Using the low-flow or the well volume approach methodology, purge the well until field parameters (such as DO, ORP, conductivity, pH, turbidity, and temperature) have stabilized, until three well casing volumes are purged, or until the well is purged dry according to *SOP-13, Water Quality Measurements and Calibration*. When possible, do not collect a groundwater

sample until the groundwater level and the groundwater parameters have stabilized according to the criteria indicated in SOP-13.

Sample the well immediately following purging, without moving or adjusting the position of the pump or sample intake line. Containerize purge water and manage as IDW according to the Waste Management Plan.

Preparation for Groundwater Sampling

Perform the following procedures at each well in preparation for groundwater sampling. All air monitoring readings and observations should be recorded on the Groundwater Sampling Datasheet and/or in a field logbook.

- Wear PPE and take any other precautions as specified in the HASP.
- Monitor the ambient air and any vapors within or near a well while opening the well and during sampling. Check the area around the well for organic vapors (background reading) using the PID or FID. Open the well cap and immediately checking for organic vapors in the well casing and breathing zone. Take appropriate readings in the breathing zone during purging and sampling with air monitoring equipment (PID or FID) according to the HASP (generally every 30 minutes).
- Inspect the condition any permanent monitoring wells for any unusual site or well conditions. Record the condition of the well monument, concrete well pad, protective posts (if present), or other well condition. Any deficiencies encountered should be reported to the Field Team Lead and Site Manager as soon as possible.
- If the well is sealed with an airtight cap, allow time for pressure to equilibrate after the cap is removed before measuring water levels. Measure the depth of the static water level and the total well depth with a water level or oil-water indicator probe to the nearest 0.01 foot from the measurement reference point on the well casing pipe. Take measurements until three consecutive readings are within 0.01 foot.
- If previous total well depth information is available from either well construction or previous sampling events), compare the current total well depth with the previously measured total well depth and note any differences greater than 0.5 foot. Notify the Field Team Lead and/or Site Manager of the observation.

Groundwater Sampling Techniques

Low-Flow Sampling

Low-flow sampling is a method of collecting samples from a well that does not require purging large volumes of water from the well and relies on natural flow of formation water through the well. Using this method, the water flowing into and through the well is representative of the groundwater with the formation surrounding the screen and thus representative groundwater samples can be obtained by slowly pumping.

“Low flow” refers to the velocity with which water enters the pump intake and is imparted during pumping to the formation pore water adjacent to the well screen (ASTM D6771). Low flow does not necessarily refer to the flow rate of water discharged by a pump at the surface, which can be affected by valves, connections, and discharge tubing restrictions. However, typical low-flow surface discharger rates should be limited to less than 0.5 L/min (0.13 gal/min). Low-flow sampling methods emphasize minimal stress to the groundwater by low water-level

drawdown and low pumping rates in order to collect samples with minimal alterations to water chemistry (EPA, 2002; ASTM D6771). This is the preferred method for natural attenuation monitoring, which requires careful measurements of DO and oxidation-reduction sensitive analytes, such as iron and manganese. Low-flow sampling is the most recommended sampling method for collecting groundwater samples and should be used whenever possible and practical, including at conventional, permanent wells, microwells, and at DPS well points if possible. Wells with low recharge rates may require special pumps capable of very-low-flow rates, such as bladder or peristaltic pumps. If the well is dewatered during purging, then it should be sampled as discussed in Section 6.4.13 of the Field Sampling Guidance (ADEC, 2019) for low-permeability formations.

Low-flow sampling is typically conducted using positive displacement pumps, submersible pumps, or peristaltic pumps. Commonly used low-flow pumps include the QED Sample Pro bladder pump, Geotech bladder pumps; Grundfos Redi-Flo 2 or ProActive Monsoon or Hurricane submersible pump, and the Geotech Geopump Series II peristaltic pump.

Low-flow groundwater sampling should be conducted as follows and should be used along with *SOP-13, Water Quality Measurements and Calibration*.

Setup

1. Measure an initial water level within the well using a water level meter, if possible. Record the depth to water on the groundwater datasheet.
2. Set up the sampling equipment and pump according to the manufacturer's instructions.
3. Secure the water quality meter to the flow-through cell and connect a short discharge tube to the effluent connector at the top of the flow-through cell and run the other end of the discharge tube into a five-gallon graduated purge water discharge bucket. Securing the discharge tube to the five-gallon bucket with a metal spring clamp is recommended.
4. Lower the pump at a moderate, controlled rate until a little above the groundwater table. As the groundwater surface is approached, lower the pump or pump intake tubing very slowly into the groundwater to the desired sample intake depth (preferably within the screened interval). Record the approximate pump or pump intake tubing depth.
5. Run the aboveground end of the intake tube from the pump directly into the five-gallon purge water bucket.

Purging

1. Turn on the pump and start to pump on the lowest setting. Adjust the flow slowly until water begins to discharge. Slowly pump at a flow rate of approximately one liter (0.25 gallons) every five minutes or 0.1 gal/min for approximately one to two minutes, or until the purge water begins to visually clear up. The intent is to limit any initial high turbidity water from filling and settling in the flow-through cell.
2. Once most of the observable turbidity has cleared, briefly turn off the pump and secure the tube from the pump to the influent connector at the bottom of the flow-through cell. Turn on the pump again and then allow the flow-through cell to completely fill with water. Make a continuous effort to keep air bubbles and significant air volume from collecting in the flow-through cell. To remove any collected air volume within the flow-through cell, partially unscrew the multimeter sonde from the flow-through cell while pumping until all

the air escapes and water begins to slowly leak from the sonde/flow-through cell connection.

3. Continue pumping and begin low-flow purging the monitoring well at a flow rate of approximately one liter (0.25 gallons) every three minutes or 0.1 gal/min, such that the pumping rate does not lower the water level more than 0.3 foot. Initially monitor the drawdown frequently, to establish a steady pumping rate that minimizes drawdown. If the minimal drawdown exceeds 0.3 foot, *but remains stable*, continue purging.
4. Purge the water through the flow-through cell and into a five-gallon graduated purge water discharge bucket. Observe the purge rate and cumulative total discharge volume based on the graduated marks on the purge bucket. Empty the purge bucket into an IDW drum or dispose of the purge water according to the Waste Management Plan.
5. Routinely measure and record the DO, ORP, conductivity, pH, turbidity, temperature, current groundwater level, and cumulative total purge volume throughout the purge at approximately three- to five-minute intervals. Measurement frequency should be (at minimum) three minutes or the length of time required to completely fill the flow-through cell, whichever is greater. A minimum of three of groundwater parameter measurements should be monitored and recorded. The groundwater level should be measured frequently during purging to verify that the water level has not dropped lower than the desired 0.3 foot. Record the groundwater parameters, groundwater level, and cumulative total purge volume.
6. Stabilization of water quality parameters is the primary criterion for sample collection by this method. Continue to measure and record the groundwater parameters and current groundwater level until the parameters stabilize according to the following stabilization criteria. Groundwater parameters are considered stable after purging if three successive readings are within the following parameters:
 - $\pm 3\%$ temperature (minimum of $\pm 0.2\text{ }^{\circ}\text{C}$)
 - ± 0.1 pH
 - $\pm 3\%$ conductivity
 - ± 10 mV ORP
 - $\pm 10\%$ for DO or 0.2 mg/L
 - $\pm 10\%$ turbidity or ≤ 5 NTUs

A minimum of three (minimum of four if using temperature as an indicator) of these parameters should be monitored and recorded.

7. If it does not appear that the groundwater parameters are approaching stabilization after the removal of two well volumes, check the calibration of the field instrument or try using a different water quality instrument. If the instrument check or recalibration shows that the field instruments are working properly and parameter stabilization is still not occurring, the Field Team Lead may elect to collect the sample after a minimum of three or maximum of six well casing volumes have been purged (EPA, 2002). The Field Team Lead will contact the Site Manager when this behavior is observed and will record on the groundwater datasheet that parameter stabilization could not be achieved.

8. If and once groundwater parameters have stabilized or a minimum of three well casing volumes have been purged, record the final parameter measurements, water level, total purge volume, and any other purge observations.

Sampling

1. Following purging, collect groundwater samples without altering the flow rate or extensively interrupting the flow. Disconnect the aboveground end of the pump intake tube from water quality meter and flow-through cell before sampling. Do not sample from the discharge of the flow-through-cell.
2. While sampling, discharge any groundwater pumped between filling sample containers in a five-gallon groundwater purge bucket. Dispose of this water along with other purge water accumulated.
3. Begin filling the laboratory-supplied analytical sample containers in the order of volatility as previously.
4. Record the sample ID, date and time, sampler, analytes, and other sample information on the sample bottle labels, the sample COC, and on the groundwater datasheet.

Optional – Field Filtered Samples

1. If field filtered samples are required (for dissolved metals, phosphate, nitrate/nitrite, or perchlorate, for example), connect the field filtering apparatus or an in-line filter capsule to the aboveground end of the pump intake tube per the laboratory analytical method and/or filter equipment manufacturer's instructions. A 0.45-micron disposable in-line filter capsule is typically used for field filtering dissolved metals. Consult the laboratory analytical method for the correct filter size and type for the analytes sampled.
5. Once connected, pre-rinse the field filter apparatus or capsule with approximately 25 to 50 ml of pumped groundwater. To do this, pump water through the filter for approximately 30 seconds to flush and rinse the filter media.
6. Begin filling the laboratory-supplied analytical sample containers with filtered water until complete.
7. Record the sample ID, date and time, sampler, analytes, and other sample information on the sample bottle labels, the sample chain-of-custody form, and the *Well Purge and Sampling Field Datasheet*, as required (see *SOP-02, Sample Handling and Chain of Custody*).

Sample Collection

VOC groundwater samples should be collected according the following:

- Fill sample containers so that the sample is allowed to flow gently along the inside wall of the container. Take care to minimize turbulence, agitation, and aeration of the sample.
- Minimize the headspace in the sample container by filling the sample jar until a positive meniscus is present (ADEC, 2017a).
- Quickly and adequately seal the containers. Unless otherwise specified, seal the jar using Teflon[®]-lined screw caps.

- Clean rims before tightening lids.
- Label and handle sample containers as outlined in *SOP-02, Sample Handling and Chain of Custody*.
- Preserve containers immediately according to the procedures in *SOP-02, Sample Handling and Chain of Custody*. Unless specified otherwise, at a minimum, immediately cool the samples to 0 to 6°C and maintain this temperature through delivery to laboratory until the samples are analyzed (ADEC, 2017a).

Investigation-derived Waste

If any IDW or free product is generated during purging or sampling, store and dispose of according to the Waste Management Plan.

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- Alaska Department of Environmental Conservation (ADEC). 2019. *Field Sampling Guidance*. October.
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SOP-10 Water Level Measurements

PURPOSE

This SOP provides guidance on the methods and equipment used to determine water levels, depth to floating product, or total depth in a groundwater monitoring well, production well, or piezometer.

SCOPE

This SOP applies to all project team personnel and subcontractors engaged in measuring water levels, floating product, and total depths in wells on AFCEE projects and tasks in Alaska. This SOP was developed using the following guidance documents:

- *ADEC Monitoring Well Guidance* (ADEC, 2013)
- “Accuracy of Depth to Ground Water Measurements,” *EPA Superfund Ground Water Issue* (Thornhill, 1989)
- ASTM Standard D 4750, *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*. (ASTM, 1993)
- *Groundwater and Wells* (Driscoll, 1986)
- *Groundwater Manual, A Water Resource Technical Publication* (U.S. Department of the Interior, 1981)

This SOP is applicable to the sampling of monitoring wells and must be performed before any activities that may disturb the groundwater table level, such as pumping, purging, or aquifer testing. This SOP should be used in conjunction with other project SOPs, including the following:

- SOP-08, Groundwater Well Sampling
- SOP-14, Monitoring Well Installation

Qualified persons, as defined by 18 AAC 75.990(100), will be engaged in or directly supervise the collection and handling of environmental samples (i.e., Project Manager, Site Manager, Field Team Lead, Project Chemist, Field Sampler).

GENERAL

Groundwater level data can be used for several purposes during site investigations, including the following:

- To determine the magnitude of horizontal and vertical hydraulic gradients in an aquifer system
- To measure changes in groundwater levels over time

- To estimate the magnitude of surface water/groundwater interaction that occurs during various flow conditions
- To estimate aquifer properties after aquifer testing
- To calculate the purge volume of standing water in the well
- To establish whether wells have fully recharged after purging and aquifer testing

A water level meter will typically be used to measure the groundwater level and total depth in wells. If LNAPL is present in the well, an oil-water interface probe will be used.

Water level meters use a battery-powered probe assembly attached to a cable marked in 0.01-foot increments. When the probe contacts the water surface, a circuit is closed and electricity is transmitted through the cable to sound an audible and/or visual alarm. The equipment has a sensitivity adjustment switch that enables the operator to distinguish between actual and false readings caused by the presence of conductive, immiscible components (such as LNAPL floating on the groundwater) or condensation inside the well casing. Consult the manufacturer's operating manual for instructions on adjusting sensitivity.

Measure static groundwater level DTW, DTP, and TD relative to an established measurement reference point (generally the top of the casing). For easy reference, mark the point 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 casing. If a reference mark is not present at the time of water level measurement, use and mark the north side of the casing. Decontaminate all equipment before and after introducing it to the well, following procedures in *SOP-24, Equipment Decontamination Procedures*.

RESPONSIBILITIES

Project Manager

The Project Manager is responsible for providing adequate resources and engaging field staff with adequate experience and training to successfully comply with and execute project-specific SOPs and implement the project HSE program. The Project Manager will solicit the appropriate technical expertise to adequately identify the best sampling methods and technology for the job given the current understanding of the site and project goals.

Health and Safety Manager

The HSM is responsible for site-specific and overall compliance with project HSE requirements. The HSM conducts PPE evaluations, selects the appropriate PPE for the project, lists the requirements in the project-specific Health and Safety Plan, coordinates with the Site Manager and/or Field Safety Officer to complete and certify the PPE program, and conducts audits on the effectiveness of the HSE program.

Site Manager

The Site Manager is assigned to oversee all project field operations and is responsible for verifying that the field SOPs are effectively communicated and appropriately implemented. The Site Manager will assist the Project Manager, Health and Safety Manager, and Field Team Lead regarding onsite activities.

Field Safety Officer

The Field Safety Officer assists in implementing the project Health and Safety Manager; the role of Field Safety Officer is either taken by the Field Team Lead or is designated to a field team member by the Field Team Lead. The Field Safety Officer assists the Health and Safety Manager with the HSE program, implements the PPE requirements described in the project HASP, and receives input from project staff on the effectiveness of the assigned PPE requirements and ongoing HSE procedures.

Field Team Lead

The Field Team Lead is responsible for determining that staff measuring water levels know the procedures in this SOP and that this SOP is implemented effectively and accurately. The Field Team Lead will also confirm that applicable requirements of the HASP are followed.

PROCEDURES

General

Decontaminate all measurement devices according to *SOP-24, Equipment Decontamination Procedures* before and between measurements.

Equipment

Use the following equipment for groundwater and NAPL level measurement:

- Water level meter with audible alarm and a cable marked in 0.01-foot increments. The point on the probe that triggers the alarm corresponds to the zero point. Calibrate the water level meter according to the manufacturer's instructions.
- Oil-water interface probe and a cable marked in 0.01-foot increments, if a floating LNAPL layer is suspected in the well.
- Decontamination equipment (one spray bottle containing Alconox or Liquinox solution, one spray bottle containing deionized water, paper towels, five-gallon poly bucket, and absorbent pads).
- Additional weight may be necessary at depths deeper than 80 feet because of the buoyancy of the cable when the weight of the tape is approximately equal to or greater than the weight of the probe.

Depth to Water/Depth to LNAPL Measurement

If the well is sealed with an airtight cap, allow time for pressure to equilibrate after the cap is removed before measuring water levels. Take measurements until consecutive readings are within 0.01 foot.

Measure DTW and DTP as follows:

1. With the water level indicator switched on, wet the tip of the probe in potable water to test whether the meter is working properly. If no audible alarm is observed, the meter is not working properly.
2. Slowly lower the water level meter or oil-water indicator 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 tip and tape free-fall down the well. Always hold onto 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 TOC reference point to the top surface of the LNAPL layer (that is, DTP). The oil-water indicator probe alarm will sound a continuous tone when LNAPL is detected.
5. Continue to lower the probe until the meter indicates the presence of groundwater. The alarm will typically emit a beep when water is detected. Measure the first static groundwater level and record the measurement (DTW) from the reference point to the top of the static groundwater level.
6. Record the measurements in the field logbook or groundwater sampling datasheet according to *SOP-01, Logbook Documentation and Field Notes*.

Total Depth Measurement

Use the following procedures to measure the TD of a groundwater monitoring well:

1. Slowly lower the water level meter until the cable goes slack. Do not let the probe tip and tape free-fall down the well. Always hold onto the meter's reel handle.
2. Gently raise and lower the water level meter probe to tap the bottom of the well.
3. Record the reading on the cable at the established reference point to the nearest 0.01 foot. If there is an offset between the bottom of the probe and the water level sensor, adjust the measurement accordingly. Record the TD measurement in the field logbook or groundwater sampling datasheet according to *SOP-01, Logbook Documentation and Field Notes*.

RECORDS

Document all measurements in the field notebook and/or on a groundwater sampling datasheet according to *SOP-01, Logbook Documentation and Field Notes*.

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

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SOP-13 Water Quality Measurements and Calibrations

PURPOSE

This SOP describes general methods for calibrating, maintaining, and operating water quality meters and probes used for groundwater sampling.

SCOPE

This SOP applies to all project team personnel responsible for collecting water quality parameters during well development, sampling. The SOP was developed per the following Alaska Department of Environmental Conservation (ADEC) guidance documents:

- Field Sampling Guidance (ADEC, 2019)
- Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures (ADEC, 2017a)

This SOP focuses on the most commonly used field water quality measurement tasks and applications anticipated and should be used in conjunction with other applicable project SOPs, including the following:

- *SOP-01, Logbook Documentation and Field Notes*
- *SOP-08, Groundwater Well Sampling*
- *SOP-09, Surface Water Sampling*
- *SOP-11, Hydropunch Groundwater Sampling*
- *SOP-24, Equipment Decontamination Procedures*

Qualified persons, as defined by Title 18 Alaska Administrative Code (AAC) 75.333(c) (18 AAC 75.333(c)), will be engaged in or directly supervise the collection and handling of environmental samples (i.e., Project Manager, Site Manager, field Team Lead, Project Chemist, Field Sampler).

GENERAL

Water quality meters are typically used in the field to measure the following parameters:

- DO
- ORP
- Conductivity
- pH
- Turbidity
- Temperature

Instructions for maintenance and operation of these field instruments are described in the operation manuals provided by the manufacturer.

RESPONSIBILITIES

Project Manager

The Project Manager is responsible for providing adequate resources and verifying that field staff have adequate experience and training to successfully comply with and execute project-specific SOPs and implement the project health, safety, and environment program. The Project Manager will solicit the appropriate technical expertise to verify that the project has identified the best sampling methods and technology for the job given the current understanding of the site and project goals.

Field Team Lead

The Field Team Lead is responsible for implementation of a detailed sampling plan that includes the specifics of field water quality measurement, particularly the procedures to be used. The Field Team Lead, or their designee, should know the requirements for field water quality measurement and should maintain adequate documentation of field water quality measurements and calibration activities. The Field Team Lead is also responsible for verifying compliance with this SOP and that all field staff engaged in this activity are trained in this SOP.

Health and Safety Manager

The Health and Safety Manager is assigned to oversee site-specific HSE and verify overall compliance with project HSE requirements. The Health and Safety Manager conducts PPE evaluations, selects the appropriate PPE for the project, lists the requirements in the Project HASP, coordinates with the Field Team Lead and/or Field Safety Officer to complete and certify the PPE program, and conducts project health and safety audits on the effectiveness of the HSE program.

PROCEDURES

Instruments and Supplies

Water quality meters and instruments vary in their manufacturer and model number. Below is a list of commonly used meters and instruments and other related supplies that can be used for field water quality measurements:

- MPS Multi-parameter Instrument
- YSI 650 MDS Multi-parameter Datalogger
- YSI 6-Series sonde or similar multiparameter probe
- YSI 5083 Flow Cell or similar flow-thru cell
- Hach 2100P Portable Turbidimeter

- Data transfer connector cables
- Discharge hoses (two)
- Fittings to attach sample tubing to-flow through cell (barbs and master flex pump tubing)
- Distilled water
- Calibration solutions and buffers (ORP, conductance, pH, and confidence)

Calibration

Calibration or verification of calibration using a confidence solution or standard, of all instruments for all field parameters daily before collecting water quality data, according to the manufacturer calibration specifications developed for the instrument being calibrated. In addition, if there are anomalous readings during sample collection, stop sample collection and recalibrate, if possible. Document field calibration in the field logbook.

If a field instrument will not calibrate, perform troubleshooting as described in the manufacturer's manual. Check that the calibration standards have not expired. If the issue cannot be resolved, use a backup instrument. If one is not available, consult with the PM on whether data collection should continue and on any other corrective actions to be taken. Flag any data recorded from a meter with calibration problems on the groundwater purge and sampling field datasheet as discussed and provided in *SOP-08, Groundwater Well Sampling Procedures* and *SOP-09, Surface Water Sampling*.

pH Calibration (2-point or 3-point calibration)

Calibrate using at minimum a 2-point calibration method. A 2-point calibration uses only two pH buffer calibration solutions (for example, pH 4 and pH 7 or pH 7 and pH 10) and is valuable only if the water being monitored is known to be either basic or acidic. For example, if the pH is known to vary between 5.5 and 7, a 2-point calibration with a pH 7 and pH 4 buffer solutions is sufficient.

If the pH of water being measured is unknown, use a 3-point calibration method. Using this calibration, the pH sensor is calibrated with a pH 7 buffer and two additional buffers (such as pH 4 and pH 10). The 3-point calibration method accounts for the full pH range and assures maximum accuracy when the pH of the media to be monitored cannot be anticipated. Typically, the procedure for a 3-point calibration is the same as for a 2-point calibration, but the instrument may prompt you to select a third pH buffer. Follow the recommended manufacturer pH calibration instructions for additional detailed instruction. Enter all pH calibration values based on the appropriate temperature as labeled on the pH calibration solutions used or according to Table 1. Record the final pH calibration reading, with the corresponding temperature, on the Field Calibration Sheet.

Table 1. pH Buffer Solution Values Based on Temperature

Temperature				pH Buffers				Temperature				pH Buffers			
°C				4.01	7	10.01		°C				4.01	7	10.01	
0				4	7.11	10.32		26				4.01	6.99	10	
1				4	7.11	10.31		27				4.01	6.99	9.99	
2				4	7.1	10.29		28				4.01	6.99	9.98	
3				4	7.09	10.28		29				4.01	6.99	9.98	
4				4	7.09	10.26		30				4.02	6.98	9.97	
5				4	7.08	10.25		31				4.02	6.98	9.96	
6				4	7.08	10.23		32				4.02	6.98	9.95	
7				4	7.07	10.22		33				4.02	6.98	9.94	
8				4	7.07	10.21		34				4.02	6.98	9.93	
9				4	7.06	10.2		35				4.02	6.97	9.93	
10				4	7.06	10.18		36				4.03	6.97	9.92	
11				4	7.05	10.17		37				4.03	6.97	9.91	
12				4	7.05	10.16		38				4.03	6.97	9.9	
13				4	7.04	10.14		39				4.03	6.97	9.9	
14				4	7.04	10.13		40				4.03	6.97	9.89	
15				4	7.03	10.12		41				4.04	6.97	9.88	
16				4	7.03	10.11		42				4.04	6.97	9.88	
17				4	7.02	10.1		43				4.04	6.96	9.87	
18				4	7.02	10.09		44				4.04	6.96	9.86	
19				4	7.02	10.08		45				4.04	6.96	9.86	
20				4	7.01	10.06		46				4.05	6.96	9.85	
21				4.01	7.01	10.05		47				4.05	6.96	9.85	
22				4.01	7.01	10.04		48				4.05	6.96	9.84	
23				4.01	7	10.03		49				4.05	6.96	9.84	
24				4.01	7	10.02		50				4.06	6.96	9.83	
25				4.01	7	10.01		51				4.06	6.96	--	

Conductivity Calibration

Perform calibration for conductivity according to the recommended manufacturer's calibration instructions. Conductivity should be calibrated for specific conductance and is typically entered as mS/cm at 25 °C. Typical conductivity standard solution has a specific conductance value of 1.413 mS/cm; which is equivalent to 1413 μ S/cm or 1413 μ mho/cm. Table 2 summarizes the value relationship of a 1413 μ S/cm (1.413 mS/cm) standard solution to temperature and should

be referenced following calibration to verify an accurate final conductivity calibration at the appropriate temperature of the calibration solution used. Record the final conductivity calibration reading, with the corresponding temperature, on the Field Calibration Sheet.

Table 2. Conductivity Standard Solution Values Based on Temperature

Temperature	1413 $\mu\text{S/cm}$ Conductivity Standard	Temperature	1413 $\mu\text{S/cm}$ Conductivity Standard
$^{\circ}\text{C}$	($\mu\text{S/cm}$)	$^{\circ}\text{C}$	($\mu\text{S/cm}$)
0	776	26	1441
1	799	27	1468
2	822	28	1496
3	846	29	1524
4	870	30	1552
5	894	31	1580
6	918	32	1608
7	943	33	1636
8	968	34	1665
9	992	35	1693
10	1017	36	1722
11	1043	37	1751
12	1068	38	1780
13	1094	39	1808
14	1119	40	1837
15	1145	41	1866
16	1171	42	1896
17	1198	43	1925
18	1224	44	1954
19	1251	45	1983
20	1277	46	2013
21	1304	47	2042
22	1331	48	2071
23	1358	49	2101
24	1386	50	2130
25	1413		

Calibration Check of the Oxidation Reduction Potential Probe

A calibration check of the ORP probe can be performed by placing it into a Zobell solution that is within approximately 10°C of the expected groundwater temperature, or as close to groundwater temperature as practical. Groundwater temperatures ranging from approximately 3°C to 10°C can generally be expected in Alaska. This is not a calibration solution, but a check that the probe is working properly. Zobell solution has a short shelf life, typically lasting only 3 months. If expired, make or obtain new solution before measurement. The Zobell reading is dependent upon temperature and should fall within 20% of the value shown in Figure 1 before taking measurements. If readings are out of this range, then take a second reading with a backup electrode. If both instruments fail, replace the Zobell solution, and repeat the measurements. Record the Zobell solution ORP reading, with the corresponding temperature, on the field calibration sheet.

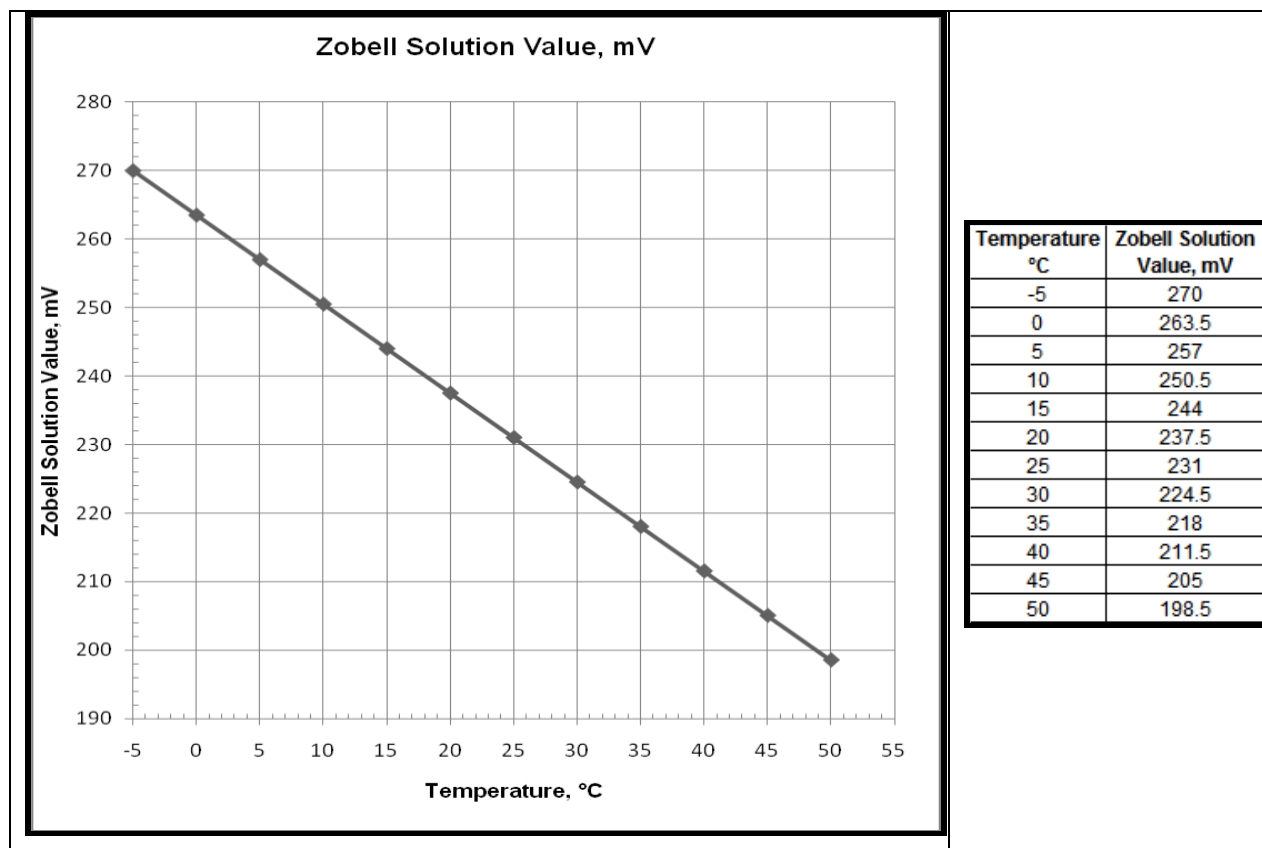


Figure 1. Zobell Solution ORP Dependence on Temperature for a Silver Chloride (Ag:AgCl) Electrode

Turbidity Calibration Check

Perform routine calibration check of the turbidity instrument using the standards provided by the rental company. Record the calibration standard value and the calibrated turbidity value of each standard in the field logbook.

Water Quality Instrument Field Measurement and Usage

The general procedures for measuring groundwater quality parameters and flow-through cell setup are as follows:

1. Before taking any field measurements, calibrate instruments according to the manufacturer's procedures and record the calibration on the Field Calibration Sheet.
2. Perform a saturated air check of the DO probe by placing a wet piece of cloth or paper towel in the cap that covers the probe. If the instrument is not reading in the proper range, it should be recalibrated, or the DO probe membrane should be replaced.
3. Secure the multi-meter sonde (or analyte-specific probes) to the flow-through cell. Connect a short discharge tube to the effluent connector at the top of the flow-through cell and run the other end of the discharge tube into a 5-gallon purge water capture bucket.
4. Place the tube from the pump directly into the 5-gallon purge water bucket and start to purge (pump) for approximately 1 to 2 minutes or until the purge water begins to visually clear up. The intent is to limit any initially high turbidity water from filling and settling in the flow-through cell.
5. Once the turbidity has stabilized, briefly turn off the pump and secure the tube from the pump to the influent connector at the bottom of the flow-through cell. Turn on the pump again and allow the flow-through cell to completely fill with water. Try to keep air bubbles from collecting in the flow-through cell. To remove any collected air from the cell, disconnect the probes from the cell while pumping until all the air escapes and then reconnect the probes.
6. Continue pumping and begin low-flow purging of the monitoring well at a flow rate of approximately 1 liter (0.25 gallons) every 3 minutes or 0.1 gal/min.
7. Routinely measure and record the DO, ORP, conductivity, pH, turbidity, temperature, and current groundwater level throughout the purge at approximately 3- to 5-minute intervals. A minimum of three (minimum of four if using temperature as an indicator) of these parameters should be monitored and recorded. Record the purge groundwater parameters on a Attachment 3: Groundwater Purge and Sampling Field Datasheet.
8. Continue to measure and record the groundwater parameters and current groundwater level until the parameters stabilize according to the following stabilization criteria, or until three well casing volumes are purged. Groundwater parameters are considered stable after purging if three successive readings are within the following parameters:
 - $\pm 3\%$ temperature (minimum of ± 0.2 °C)
 - ± 0.1 pH
 - $\pm 3\%$ conductivity
 - ± 10 mV ORP
 - $\pm 10\%$ for DO or 0.2 mg/L
 - $\pm 10\%$ turbidity or ≤ 5 NTUs

9. Note the following before and during water quality measurement and groundwater purging:
 - Obtain the typical ranges for the water quality parameters at a well (or site) prior to measurement and purging, if possible, and bring these values to the field for reference during sampling. Water quality parameter ranges can often be obtained from historical groundwater purging and sampling events. These previous values should be used as clues to determine if an instrument is reading correctly and/or if it is drifting during water quality measurement.
 - ORP and DO measurements should always correlate with each other. Generally ORP should be negative whenever DO is near or less than 1 mg/L; likewise, DO should be greater than 1 mg/L if ORP is positive.
 - DO measurement should always be positive and should range between 0 and 14.62 mg/L.
 - ORP measurements should range between -500 mV and 275 mV.
 - The pH of environmental samples will typically range from 6 to 8 pH units.
 - When measuring turbidity, be sure to clear any moisture or dust off of the turbidity sample cell and emplace the sample cell and light cover completely and securely. Keep the turbidity instrument out of direct sunlight (it should be shadowed) to avoid false readings from light interference.
10. When parameters have stabilized, record final measurements and collect samples as specified in *SOP-08, Groundwater Well Sampling Procedures* and *SOP-09, Surface Water Sampling*.

Storage

Perform the following tasks each day after using any water quality measurement instrument:

1. Decontaminate the instrument(s): rinsing with distilled water, a dilute solution of Alconox or Liquinox (or similar), and rinsing again with distilled water as specified in *SOP-24, Equipment Decontamination Procedures*.
2. Moisten protective caps (that protect the tips of probes or sensors) with fresh water and return them to their probes or sensors for storage.
3. Recharge or replace batteries on any instruments and meters to ensure full battery charge for next use.
4. Store the instrument or meter in the protective case provided with the instrument or meter.
5. Take any additional storage and maintenance steps recommended by the manufacturer as specified in the instruments operations and maintenance manual.

Service and Maintenance

Perform service and maintenance according to manufacturer's instructions.

RECORDS

Record all instrument calibration information on the Instrument Calibration Log. Calibration information that should be recorded into the logbook for each instrument calibrated includes the brand and model number, unique identification number, type, lot number, expiration date of any calibration solutions, and results of the calibration. Record all field data collected during groundwater sampling on a Groundwater Sampling Record and Well Evacuation / Field Parameters Forms.

REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2019. *Field Sampling Guidance*. October.

Alaska Department of Environmental Conservation (ADEC). 2017a. *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures*. March 22, 2017.

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SOP – 24 Equipment Decontamination Procedures

PURPOSE

This SOP provides the step-by-step procedures for field decontamination of environmental sampling equipment and PPE. Decontamination of equipment and PPE is designed to ensure that sample cross-contamination, human health exposure, and contamination transport are minimized.

SCOPE

This procedure applies to all project team personnel and subcontractors engaged in collecting environmental samples and/or operating in environments in which hazardous or contaminating substances are expected to be present. All decontamination procedures will be conducted according to the following Alaska Department of Environmental Conservation (ADEC) guidance documents:

- ADEC Field Sampling Guidance (ADEC, 2019)
- Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures (ADEC, 2017)

GENERAL

Decontamination consists of physically removing contaminants from the surface of sampling equipment and cleaning materials potentially exposed to those contaminants. A decontamination plan should be based on the most conservative, worst-case scenario, using all available information about the work area. The plan can be modified, if justified by supplemental information. Initially, the decontamination plan assumes that all protective clothing and equipment that leave the exclusion zone are contaminated. Based on this assumption, a system is established to wash and rinse all non-disposable equipment and dispose of all disposable equipment.

The type of decontamination procedures and solutions needed at each site should be determined after considering the following site-specific conditions:

- Type of equipment to be decontaminated
- Type of contaminants present
- Extent of contamination
- Potential human and ecological risk scenarios

RESPONSIBILITIES

Project Manager

The Project Manager is responsible for overall compliance with this procedure and for verifying that field staff are properly trained and meet project HSE requirements.

Site Manager

The Site Manager coordinates and schedules daily field activities. In addition, the Site Manager verifies compliance with this SOP and ensures that all field staff engaged in this activity are trained in this SOP.

Field Team Lead

The Field Team Lead is responsible for following these procedures or delegating tasks to technicians to perform decontamination tasks. The Field Team Lead verifies that subcontractors are taking necessary precautions to decontaminate field equipment before and throughout field activities. The Field Team Lead also verifies that decontamination waste and PPE are disposed of appropriately according to Waste Management Plan..

Health and Safety Manager

The Health and Safety Manager is assigned to oversee the site-specific HSE program and overall compliance with project HSE requirements. The Health and Safety Manager conducts PPE evaluations, selects the appropriate PPE for the project, lists the requirements in the project-specific HASP, coordinates with the Site Manager, Field Team Lead, and/or Field Safety Officer to complete and certify the PPE program, and conducts project health and safety audits on the effectiveness of the HSE program.

Field Safety Officer

The Field Safety Officer assists in implementing the project HASP; the role of Field Safety Officer is either taken by the Site Manager or is designated to Field Team Leads by the Site Manager. The Field Safety Officer assists the Health and Safety Manager with the HSE program, implements the PPE requirements described in the project HASP, and receives input from project staff on the effectiveness of the assigned PPE requirements and ongoing HSE procedures.

PROCEDURE

- Decontaminate all non-disposable sampling equipment used at the site **before activities begin and after each sample is collected.**
- Decontaminate all drilling and excavation equipment before activities begin and between each investigation location.

- Take care that materials and solutions used for decontamination procedures are not hazardous and will not potentially contaminate samples (i.e., acids and solvents).

Decontamination Area

Identify a localized decontamination area for drill rigs and other sampling equipment. Select the decontamination so that decontamination fluids and soil wastes can be managed in a controlled area with minimal risk to the surrounding environment. The decontamination area should be large enough to allow temporary storage of cleaned equipment and materials before use and to stage drums of decontamination IDW. In the case of large decontamination areas (ex. hollow-stem auger decontamination), line each area with heavy-gauge plastic sheeting and include a collection system designed to capture potential decontamination IDW. Lay out all decontamination areas in such a way as to prevent overspray while performing equipment and personnel decontamination.

Smaller decontamination tasks, such as surface water and sediment equipment decontamination, may occur at the sampling locations. In this case, mobilize all required decontamination supplies and equipment to the site, and provide smaller decontamination areas for personnel and portable equipment as necessary. Include basins, buckets, or tubs to capture decontamination IDW at these locations, and transfer to larger containers as necessary.

Decontamination Equipment

The following is a list of equipment and materials that may be needed to perform decontamination:

- Concrete or synthetic material-lined decontamination pad
- Plastic sheeting/membrane to serve as secondary containment for liquids
- Brushes and flat-bladed scrapers
- Garden-type water sprayers (without oil-lubricated, moving parts)
- High-pressure washer
- Portable steam cleaner
- Sump or collection system for contaminated liquid
- Wash basins and buckets
- Spray and rinse bottles
- Potable water, deionized water, and laboratory-grade detergent (Liquinox, Alconox, or similar)

- Plastic waste bags
- Leak-tight liquid waste containers (55-gallon drums or similar)
- Bulk solid waste containers (super-sacks, 55-gallon drums, or similar)

Decontamination Procedures

Personnel and Personal Protective Equipment

Decontamination of personnel and PPE will prevent undesired human health exposure to contaminants via ingestion, absorption, and inhalation. Decontaminate all personnel and PPE as outlined in the HASP. Address any further concerns regarding personnel and PPE decontamination procedures directly to the Site Manager, Project Manager, or Health and Safety Manager.

Sampling Equipment

Consistently conduct decontamination of sampling equipment to ensure the quality of the samples collected. Decontaminate all equipment that contacts potentially contaminated samples. Disposable equipment intended for one-time use that is factory wrapped generally does not need to be decontaminated before use, unless evidence of contamination is present. Use disposable equipment, such as disposable bailers, spoons, or volatile organic compound samplers over reusable equipment whenever appropriate. Decontaminate sampling equipment, including split-barrel samplers, hand augers, reusable bailers, spoons, trowels, shovels, and pumps used to collect samples for chemical analyses before each use and before sampling at a new location.

Take the following steps to decontaminate non-dedicated sampling equipment:

- Wear the appropriate PPE as required by the HASP.
- Use the following sequence for actual decontamination:
 1. Remove as much gross contamination (such as pieces of soil or residual groundwater remaining in a pump) as possible from equipment at the sampling site.
 2. If heavy petroleum residuals are encountered during sampling, use an appropriate solvent such as methanol to remove petroleum residues from sampling equipment. If a solvent is used, properly use, collect, store, and dispose of it according to the Waste Management Plan. If heavy petroleum residuals are not encountered, omit this step.
 3. Wash water-resistant equipment thoroughly and vigorously with potable water containing nonphosphate laboratory-grade detergent such as Liquinox, Alconox, or equivalent. Use a bristle brush or similar utensil to remove remaining residual contamination.

4. Thoroughly rinse equipment with potable, distilled, or deionized water (first rinse).
 5. Thoroughly rinse equipment with distilled or deionized water (second rinse).
 6. For sensitive field instruments, rinse equipment with distilled, deionized, or ASTM reagent-grade water (third rinse).
 7. Perform air drying at a location where dust or other fugitive contaminants may not contact the sample equipment. Alternatively, use a clean, disposable paper towel to assist the drying process of wet. All equipment should be dry before reuse.
- If the equipment is not used soon after decontamination, cover or wrap it in new, oil-free aluminum foil or new, unused plastic bags to protect the decontaminated equipment from fugitive contaminants before reuse.
 - Store decontaminated equipment at a secure, unexposed location out of the weather and potential contaminant exposure.
 - Replace rinse and detergent water with new solutions between borings or sample locations, depending on site conditions and the number of samples collected at each location.

Groundwater Sampling

Proper decontamination between wells is essential to avoid introducing contaminants from the sampling equipment. For sampling with decontamination of peristaltic pumps, replace the pump head tubing after sampling each well. If sampling with a submersible bladder or a similar pump in which mechanisms of the pump directly contact contaminated water, or if sampling with a reusable stainless steel bailer, decontaminate the pump or bailer. Use the following steps for pumps and bailers contaminated with dissolved phase contamination only:

1. Thoroughly and vigorously wash the exterior of the pump or bailer and associated cable with potable water containing non-phosphate laboratory-grade detergent such as Liquinox, Alconox, or equivalent. Decontaminate using a dedicated wash bristle brush or similar brush.
2. Place the pump into a potable water wash basin/reservoir containing non-phosphate laboratory-grade detergent, making sure the pump intake is fully submerged and the pump outlet is allowed to flow directly back into the wash reservoir. Set the pump w to a very low flow rate and turn on, allowing the wash water to recirculate through the pump mechanism for a minimum of 5 minutes. Disregard this step if reusable bailers are used.
3. Rinse the pump or bailer by repeating Steps 1 and 2 using potable water, a dedicated rinse bristle brush, and a rinse basin/reservoir containing only potable water (first rinse).

4. Give the pump or bailer a final rinse by duplicating Step 3 using distilled, deionized, or ASTM reagent-grade water (second rinse).
5. Dry off any excess water with a clean, disposable paper towel and allow to air dry at a location where dust or other fugitive contaminants may not contact the sample pump or bailer.

If the pump or bailer is used to sample groundwater containing NAPL or other heavy petroleum contamination, field-strip the equipment according to the manufacturer's guidelines, and decontaminate the interior and exterior surfaces of the pump or bailer using the wash, double rinse, and dry steps outlined in Steps 1, 3, 4, and 5. If significant heavy petroleum residue is encountered during decontamination, use an appropriate solvent such as methanol to remove petroleum residues from pump or bailer surfaces. If a solvent is used, it must be properly used, collected, stored, and disposed of according to the WMP.. If heavy petroleum residuals are not encountered, omit this step.

Measurement Devices and Monitoring Equipment

Water quality instruments, oil-water interface indicators, water level indicators, continuous water level dataloggers, and other field instruments that have the potential to contact site media will be washed, at a minimum, with diluted laboratory-grade detergent (Liquinox or similar) and will be double-rinsed with potable and distilled/deionized water before and after each use using the procedure discussed, as outlined above. If heavy petroleum residuals are encountered during sampling, use an appropriate solvent such as methanol to remove petroleum residues according to the manufacturer's maintenance guidelines.

Drilling and Subsurface Soil Sampling Equipment

The drilling contractor will decontaminate drilling equipment and associated materials before drilling operations and between borings. Decontaminate tools used for soil sampling (for example, split spoon samplers) before and between collecting analytical samples, as outlined above. Thoroughly clean external and internal surfaces of drilling equipment (that is, drill bits, auger, drilling stem, and hand tools) before drilling operations and between borings using the following basic sequence:

1. Remove as much gross contamination as possible from equipment at the sampling site.
2. Thoroughly and vigorously wash equipment with high-temperature potable water using a high-pressure washer and/or steam cleaner. Use a bristle brush to remove any persistent gross contamination.
3. Thoroughly rinse equipment twice with potable water (first and second rinses).
4. Air dry at a location where dust or other fugitive contaminants may not contact the sample equipment. Equipment must be dried before reuse.

5. Store decontaminated equipment at a location away from potential exposure to fugitive contamination.

Investigation-Derived Waste

Depending on the contaminant, potentially hazardous IDW (such as wash water or rinsate solutions) should be accumulated in 55-gallon drums and transported to a waste storage area designated by the client, according to project-specific and installation-wide procedures for management of IDW as described in the Waste Management Plan, and in accordance with all federal, state, and local waste regulations (ADEC, 2019).

RECORDS

Sampling personnel will be responsible for documenting decontamination of sampling and drilling equipment. Documentation will be recorded in the field notebook or on a field datasheet as discussed in *SOP-01, Logbook Documentation and Field Notes*.

REFERENCES

- Alaska Department of Environmental Conservation (ADEC), 2019. *Field Sampling Guidance*. October.
- ADEC, 2017. *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures*. August.
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DEFINITIONS

- decontamination area - an area that is not expected to be contaminated and is upwind of suspected contaminants

- decontamination equipment - equipment used during the process of decontamination of personnel or sampling equipment drilling and subsurface soil sampling equipment: equipment and tools used during the process of drilling or subsurface soil sampling
- earthwork equipment - heavy earthmoving equipment typically used for excavation and test pit investigations
- health and safety plan - a plan developed to ensure that all hazards associated with a site are evaluated prior to site entry
- measurement/monitoring equipment - equipment used to check or evaluate site conditions
- personal protective equipment (PPE) - personal health and safety equipment used to protect the individual from contaminant exposure, physical injury, or death
- potable - water acceptable for drinking and washing
- sampling equipment - equipment used during the process of sample collection

APPENDIX D

SGS NORTH AMERICA – ANCHORAGE – CURRENT ACCREDITATIONS

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

**Department of Environmental
Conservation**

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

555 Cordova Street
Anchorage, Alaska 99501
Main: 907.465.5390
Fax: 907.269.7649
cs.lab.cert@alaska.gov

January 13, 2020

Charles Homestead
SGS North America – Anchorage
200 W. Potter Drive
Anchorage, AK 99518

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

Dear Mr. Homestead,

Thank you for submitting an application to the Alaska Department of Environmental Conservation's Contaminated Sites Laboratory Approval Program (CS-LAP), on January 9, 2020. 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 – 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 December 31, 2019, and expires on **January 31, 2022**.

Be aware that **any** changes in your DoD-ELAP approval status must be reported to the CS program within 3 business days. Failure to do so will result in revocation of **all** CS-LAP approvals 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.

Please remember to include the laboratory's ID number, listed above, on all correspondence concerning the laboratory. To apply for renewal of your approval, please complete the application found on the CS-LAP webpage and submit to cs.submittals@alaska.gov. The required documentation must be submitted for renewal no later than 30 days before your date of expiration.

If you have any questions, please contact the CS-LAP at (907) 465-5390, 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,

A handwritten signature in blue ink that reads "Brian Englund".

Brian Englund

Attachment: Scope of Approval



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, 2021

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 5.3 of the DoD 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

<u>Parameter/Analyte</u>	<u>Solid & Chemical Materials</u>	
	<u>Aqueous</u>	<u>Solid</u>
<u>Metals</u>		
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
Nickel	EPA 6020B	EPA 6020B

<u>Parameter/Analyte</u>	<u>Solid & Chemical Materials</u>	
	<u>Aqueous</u>	<u>Solid</u>
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
<u>Nutrients</u>		
Nitrate (as N)	EPA 9056A	EPA 9056A
Nitrate + Nitrite (as N)	EPA 9056A	EPA 9056A
Nitrite (as N)	EPA 9056A	EPA 9056A
<u>Demands</u>		
Total Organic Carbon	EPA 9060A	EPA 9060A
<u>Wet Chemistry</u>		
Bromide	EPA 9056A	EPA 9056A
Chloride	EPA 9056A	EPA 9056A
Fluoride	EPA 9056A	EPA 9056A
Sulfate	EPA 9056A	EPA 9056A
<u>Purgeable Organics (volatiles)</u>		
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
2-Chlorotoluene	EPA 8260D	EPA 8260D

<u>Parameter/Analyte</u>	<u>Solid & Chemical Materials</u>	
	<u>Aqueous</u>	<u>Solid</u>
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
Dibromomethane	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
Trichloroethene	EPA 8260D	EPA 8260D

<u>Parameter/Analyte</u>	<u>Solid & Chemical Materials</u>	
	<u>Aqueous</u>	<u>Solid</u>
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	EPA 3511	EPA 3511
Volatiles Preparation Methods	EPA 1311	EPA 1311
Zero Headspace Extraction	EPA 5030B	EPA 5035A
<u>Total Petroleum Hydrocarbons (TPH)</u>		
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 3535A	EPA 3550C
<u>Extractable Organics (semivolatiles)</u>		
Acenaphthene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM
Acenaphthylene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM
Aniline	EPA 8270D	EPA 8270D
Anthracene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM
Azobenzene	EPA 8270D	EPA 8270D
Benzoic Acid	EPA 8270D	EPA 8270D
Benzo(a)anthracene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM
Benzo(b)fluoranthene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM
Benzo(k)fluoranthene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM
Benzo(ghi)perylene	EPA 8270D EPA 8270D SIM	EPA 8270D EPA 8270D SIM

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

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

<u>Parameter/Analyte</u>	<u>Solid & Chemical Materials</u>	
	<u>Aqueous</u>	<u>Solid</u>
Endrin Aldehyde	EPA 8270D SIM	EPA 8270D SIM
Endrin Ketone	EPA 8270D SIM	EPA 8270D SIM
Heptachlor	EPA 8270D SIM	EPA 8270D SIM
Heptachlor Epoxide	EPA 8270D SIM	EPA 8270D SIM
Methoxychlor	EPA 8270D SIM	EPA 8270D 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 8270D SIM	EPA 8270D SIM
Toxicity Characteristic Leaching Procedure	EPA 1311	EPA 1311
<u>Hazardous Waste Characteristics</u>		
Corrosivity	EPA 9040C	EPA 9045D
Ignitability	EPA 1020B	-----



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 5.3 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).



Presented this 10th day of December 2019.

A blue ink signature of the Vice President, Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2944.01
Valid to December 31, 2021
Revised April 16, 2020

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

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
83-32-9	Soil	Acenaphthene	8270D	A2LA
83-32-9	Water	Acenaphthene	8270D	A2LA
83-32-9	Soil	Acenaphthene	8270D-SIM	A2LA
83-32-9	Water	Acenaphthene	8270D-SIM	A2LA
208-96-8	Soil	Acenaphthylene	8270D	A2LA
208-96-8	Water	Acenaphthylene	8270D	A2LA
208-96-8	Soil	Acenaphthylene	8270D-SIM	A2LA
208-96-8	Water	Acenaphthylene	8270D-SIM	A2LA
67-64-1	Soil	Acetone	8260C	A2LA
67-64-1	Water	Acetone	8260C	A2LA
309-00-2	Soil	Aldrin	8270D-SIM	A2LA
309-00-2	Water	Aldrin	8270D-SIM	A2LA
120-12-7	Soil	Anthracene	8270D	A2LA
120-12-7	Water	Anthracene	8270D	A2LA
120-12-7	Soil	Anthracene	8270D-SIM	A2LA
120-12-7	Water	Anthracene	8270D-SIM	A2LA
7440-36-0	Soil	Antimony (metallic)	6020A	A2LA
7440-36-0	Water	Antimony (metallic)	6020A	A2LA
7440-38-2	Soil	Arsenic, Inorganic	6020A	A2LA
7440-38-2	Water	Arsenic, Inorganic	6020A	A2LA
7440-39-3	Soil	Barium	6020A	A2LA
7440-39-3	Water	Barium	6020A	A2LA
56-55-3	Soil	Benz[a]anthracene	8270D	A2LA
56-55-3	Water	Benz[a]anthracene	8270D	A2LA
56-55-3	Soil	Benz[a]anthracene	8270D-SIM	A2LA
56-55-3	Water	Benz[a]anthracene	8270D-SIM	A2LA
71-43-2	Soil	Benzene	8260C	A2LA
71-43-2	Water	Benzene	8260C	A2LA
50-32-8	Soil	Benzo[a]pyrene	8270D	A2LA
50-32-8	Water	Benzo[a]pyrene	8270D	A2LA
50-32-8	Soil	Benzo[a]pyrene	8270D-SIM	A2LA
50-32-8	Water	Benzo[a]pyrene	8270D-SIM	A2LA
205-99-2	Soil	Benzo[b]fluoranthene	8270D	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
205-99-2	Water	Benzo[b]fluoranthene	8270D	A2LA
205-99-2	Soil	Benzo[b]fluoranthene	8270D-SIM	A2LA
205-99-2	Water	Benzo[b]fluoranthene	8270D-SIM	A2LA
191-24-2	Soil	Benzo[g,h,i]perylene	8270D	A2LA
191-24-2	Water	Benzo[g,h,i]perylene	8270D	A2LA
191-24-2	Soil	Benzo[g,h,i]perylene	8270D-SIM	A2LA
191-24-2	Water	Benzo[g,h,i]perylene	8270D-SIM	A2LA
207-08-9	Soil	Benzo[k]fluoranthene	8270D	A2LA
207-08-9	Water	Benzo[k]fluoranthene	8270D	A2LA
207-08-9	Soil	Benzo[k]fluoranthene	8270D-SIM	A2LA
207-08-9	Water	Benzo[k]fluoranthene	8270D-SIM	A2LA
65-85-0	Soil	Benzoic Acid	8270D	A2LA
65-85-0	Water	Benzoic Acid	8270D	A2LA
100-51-6	Soil	Benzyl Alcohol	8270D	A2LA
100-51-6	Water	Benzyl Alcohol	8270D	A2LA
7440-41-7	Soil	Beryllium and compounds	6020A	A2LA
7440-41-7	Water	Beryllium and compounds	6020A	A2LA
111-44-4	Soil	Bis(2-chloroethyl)ether	8270D	A2LA
111-44-4	Water	Bis(2-chloroethyl)ether	8270D	A2LA
117-81-7	Soil	Bis(2-ethylhexyl)phthalate (DEHP)	8270D	A2LA
117-81-7	Water	Bis(2-ethylhexyl)phthalate (DEHP)	8270D	A2LA
108-86-1	Soil	Bromobenzene	8260C	A2LA
108-86-1	Water	Bromobenzene	8260C	A2LA
75-27-4	Soil	Bromodichloromethane	8260C	A2LA
75-27-4	Water	Bromodichloromethane	8260C	A2LA
75-25-2	Soil	Bromoform	8260C	A2LA
75-25-2	Water	Bromoform	8260C	A2LA
74-83-9	Soil	Bromomethane	8260C	A2LA
74-83-9	Water	Bromomethane	8260C	A2LA
85-68-7	Soil	Butyl Benzyl Phthalate	8270D	A2LA
85-68-7	Water	Butyl Benzyl Phthalate	8270D	A2LA
104-51-8	Soil	Butylbenzene, n-	8260C	A2LA
104-51-8	Water	Butylbenzene, n-	8260C	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
135-98-8	Soil	Butylbenzene, sec-	8260C	A2LA
135-98-8	Water	Butylbenzene, sec-	8260C	A2LA
98-06-6	Soil	Butylbenzene, tert-	8260C	A2LA
98-06-6	Water	Butylbenzene, tert-	8260C	A2LA
7440-43-9	Soil	Cadmium	6020A	A2LA
7440-43-9	Water	Cadmium	6020A	A2LA
75-15-0	Soil	Carbon Disulfide	8260C	A2LA
75-15-0	Water	Carbon Disulfide	8260C	A2LA
56-23-5	Soil	Carbon Tetrachloride	8260C	A2LA
56-23-5	Water	Carbon Tetrachloride	8260C	A2LA
5103-71-9	Soil	Chlordane, α -	8270D-SIM	A2LA
5103-71-9	Water	Chlordane, α -	8270D-SIM	A2LA
5103-74-2	Soil	Chlordane, γ -	8270D-SIM	A2LA
5103-74-2	Water	Chlordane, γ -	8270D-SIM	A2LA
12789-03-6	Soil	Chlordane, Total	8270D-SIM	A2LA
12789-03-6	Water	Chlordane, Total	8270D-SIM	A2LA
106-47-8	Soil	Chloroaniline, p-	8270D	A2LA
106-47-8	Water	Chloroaniline, p-	8270D	A2LA
108-90-7	Soil	Chlorobenzene	8260C	A2LA
108-90-7	Water	Chlorobenzene	8260C	A2LA
67-66-3	Soil	Chloroform	8260C	A2LA
67-66-3	Water	Chloroform	8260C	A2LA
74-87-3	Soil	Chloromethane	8260C	A2LA
74-87-3	Water	Chloromethane	8260C	A2LA
91-58-7	Soil	Chloronaphthalene, Beta-	8270D	A2LA
91-58-7	Water	Chloronaphthalene, Beta-	8270D	A2LA
95-57-8	Soil	Chlorophenol, 2-	8270D	A2LA
95-57-8	Water	Chlorophenol, 2-	8270D	A2LA
7440-47-3	Soil	Chromium (Total)	6020A	A2LA
7440-47-3	Water	Chromium (Total)	6020A	A2LA
218-01-9	Soil	Chrysene	8270D	A2LA
218-01-9	Water	Chrysene	8270D	A2LA
218-01-9	Soil	Chrysene	8270D-SIM	A2LA

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218-01-9	Water	Chrysene	8270D-SIM	A2LA
7440-50-8	Soil	Copper	6020A	A2LA
7440-50-8	Water	Copper	6020A	A2LA
N/A	Soil	Cresol, m- (3-Methylphenol) + Cresol, p- (4-Methylphenol)	8270D	A2LA
N/A	Water	Cresol, m- (3-Methylphenol) + Cresol, p- (4-Methylphenol)	8270D	A2LA
95-48-7	Soil	Cresol, o- (2-Methylphenol)	8270D	A2LA
95-48-7	Water	Cresol, o- (2-Methylphenol)	8270D	A2LA
-	Soil	Cresols, Total	8270D	A2LA
-	Water	Cresols, Total	8270D	A2LA
98-82-8	Soil	Cumene (Isopropylbenzene)	8260C	A2LA
98-82-8	Water	Cumene (Isopropylbenzene)	8260C	A2LA
72-54-8	Soil	DDD, 4,4'-	8270D-SIM	A2LA
72-54-8	Water	DDD, 4,4'-	8270D-SIM	A2LA
72-55-9	Soil	DDE, 4,4'-	8270D-SIM	A2LA
72-55-9	Water	DDE, 4,4'-	8270D-SIM	A2LA
50-29-3	Soil	DDT, 4,4'-	8270D-SIM	A2LA
50-29-3	Water	DDT, 4,4'-	8270D-SIM	A2LA
53-70-3	Soil	Dibenz[a,h]anthracene	8270D	A2LA
53-70-3	Water	Dibenz[a,h]anthracene	8270D	A2LA
53-70-3	Soil	Dibenz[a,h]anthracene	8270D-SIM	A2LA
53-70-3	Water	Dibenz[a,h]anthracene	8270D-SIM	A2LA
132-64-9	Soil	Dibenzofuran	8270D	A2LA
132-64-9	Water	Dibenzofuran	8270D	A2LA
124-48-1	Soil	Dibromochloromethane	8260C	A2LA
124-48-1	Water	Dibromochloromethane	8260C	A2LA
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8260B-SIM	A2LA
106-93-4	Soil	Dibromoethane, 1,2- (Ethylene Dibromide)	8260C	A2LA
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8260C	A2LA
106-93-4	Water	Dibromoethane, 1,2- (Ethylene Dibromide)	8260C-SIM	A2LA
74-95-3	Soil	Dibromomethane (Methylene Bromide)	8260C	A2LA
74-95-3	Water	Dibromomethane (Methylene Bromide)	8260C	A2LA
84-74-2	Soil	Dibutyl Phthalate	8270D	A2LA
84-74-2	Water	Dibutyl Phthalate	8270D	A2LA

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95-50-1	Soil	Dichlorobenzene, 1,2-	8260C	A2LA
95-50-1	Water	Dichlorobenzene, 1,2-	8260C	A2LA
95-50-1	Soil	Dichlorobenzene, 1,2-	8270D	A2LA
95-50-1	Water	Dichlorobenzene, 1,2-	8270D	A2LA
541-73-1	Soil	Dichlorobenzene, 1,3-	8260C	A2LA
541-73-1	Water	Dichlorobenzene, 1,3-	8260C	A2LA
541-73-1	Soil	Dichlorobenzene, 1,3-	8270D	A2LA
541-73-1	Water	Dichlorobenzene, 1,3-	8270D	A2LA
106-46-7	Soil	Dichlorobenzene, 1,4-	8260C	A2LA
106-46-7	Water	Dichlorobenzene, 1,4-	8260C	A2LA
106-46-7	Soil	Dichlorobenzene, 1,4-	8270D	A2LA
106-46-7	Water	Dichlorobenzene, 1,4-	8270D	A2LA
91-94-1	Soil	Dichlorobenzidine, 3,3'-	8270D	A2LA
91-94-1	Water	Dichlorobenzidine, 3,3'-	8270D	A2LA
75-71-8	Soil	Dichlorodifluoromethane (Freon-12)	8260C	A2LA
75-71-8	Water	Dichlorodifluoromethane (Freon-12)	8260C	A2LA
75-34-3	Soil	Dichloroethane, 1,1-	8260C	A2LA
75-34-3	Water	Dichloroethane, 1,1-	8260C	A2LA
107-06-2	Soil	Dichloroethane, 1,2-	8260C	A2LA
107-06-2	Water	Dichloroethane, 1,2-	8260C	A2LA
75-35-4	Soil	Dichloroethylene, 1,1-	8260C	A2LA
75-35-4	Water	Dichloroethylene, 1,1-	8260C	A2LA
156-59-2	Soil	Dichloroethylene, 1,2-cis-	8260C	A2LA
156-59-2	Water	Dichloroethylene, 1,2-cis-	8260C	A2LA
156-60-5	Soil	Dichloroethylene, 1,2-trans-	8260C	A2LA
156-60-5	Water	Dichloroethylene, 1,2-trans-	8260C	A2LA
120-83-2	Soil	Dichlorophenol, 2,4-	8270D	A2LA
120-83-2	Water	Dichlorophenol, 2,4-	8270D	A2LA
78-87-5	Soil	Dichloropropane, 1,2-	8260C	A2LA
78-87-5	Water	Dichloropropane, 1,2-	8260C	A2LA
542-75-6	Soil	Dichloropropene, 1,3- (cis + trans)	8260C	A2LA
542-75-6	Water	Dichloropropene, 1,3- (cis + trans)	8260C	A2LA
60-57-1	Soil	Dieldrin	8270D-SIM	A2LA

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60-57-1	Water	Dieldrin	8270D-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	8270D	A2LA
84-66-2	Water	Diethyl Phthalate	8270D	A2LA
105-67-9	Soil	Dimethylphenol, 2,4-	8270D	A2LA
105-67-9	Water	Dimethylphenol, 2,4-	8270D	A2LA
131-11-3	Soil	Dimethylphthalate	8270D	A2LA
131-11-3	Water	Dimethylphthalate	8270D	A2LA
51-28-5	Soil	Dinitrophenol, 2,4-	8270D	A2LA
51-28-5	Water	Dinitrophenol, 2,4-	8270D	A2LA
121-14-2	Soil	Dinitrotoluene, 2,4- (2,4-DNT)	8270D	A2LA
121-14-2	Water	Dinitrotoluene, 2,4- (2,4-DNT)	8270D	A2LA
606-20-2	Soil	Dinitrotoluene, 2,6- (2,6-DNT)	8270D	A2LA
606-20-2	Water	Dinitrotoluene, 2,6- (2,6-DNT)	8270D	A2LA
123-91-1	Soil	Dioxane, 1,4-	8260C	A2LA
123-91-1	Water	Dioxane, 1,4-	8260C	A2LA
123-91-1	Soil	Dioxane, 1,4-	8260C-SIM	A2LA
123-91-1	Water	Dioxane, 1,4-	8260C-SIM	A2LA
115-29-7	Soil	Endosulfan (Endosulfan I + Endosulfan II)	8270D-SIM	A2LA
115-29-7	Water	Endosulfan (Endosulfan I + Endosulfan II)	8270D-SIM	A2LA
959-98-8	Soil	Endosulfan I	8270D-SIM	A2LA
959-98-8	Water	Endosulfan I	8270D-SIM	A2LA
33213-65-9	Soil	Endosulfan II	8270D-SIM	A2LA
33213-65-9	Water	Endosulfan II	8270D-SIM	A2LA
1031-07-8	Soil	Endosulfan sulfate	8270D-SIM	A2LA
1031-07-8	Water	Endosulfan sulfate	8270D-SIM	A2LA
72-20-8	Soil	Endrin	8270D-SIM	A2LA
72-20-8	Water	Endrin	8270D-SIM	A2LA
75-00-3	Soil	Ethyl Chloride	8260C	A2LA
75-00-3	Water	Ethyl Chloride	8260C	A2LA
100-41-4	Soil	Ethylbenzene	8260C	A2LA
100-41-4	Water	Ethylbenzene	8260C	A2LA

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206-44-0	Soil	Fluoranthene	8270D	A2LA
206-44-0	Water	Fluoranthene	8270D	A2LA
206-44-0	Soil	Fluoranthene	8270D-SIM	A2LA
206-44-0	Water	Fluoranthene	8270D-SIM	A2LA
86-73-7	Soil	Fluorene	8270D	A2LA
86-73-7	Water	Fluorene	8270D	A2LA
86-73-7	Soil	Fluorene	8270D-SIM	A2LA
86-73-7	Water	Fluorene	8270D-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	8270D-SIM	A2LA
76-44-8	Water	Heptachlor	8270D-SIM	A2LA
1024-57-3	Soil	Heptachlor Epoxide	8270D-SIM	A2LA
1024-57-3	Water	Heptachlor Epoxide	8270D-SIM	A2LA
118-74-1	Soil	Hexachlorobenzene	8270D	A2LA
118-74-1	Water	Hexachlorobenzene	8270D	A2LA
87-68-3	Soil	Hexachlorobutadiene	8260C	A2LA
87-68-3	Water	Hexachlorobutadiene	8260C	A2LA
87-68-3	Soil	Hexachlorobutadiene	8270D	A2LA
87-68-3	Water	Hexachlorobutadiene	8270D	A2LA
319-84-6	Soil	Hexachlorocyclohexane, Alpha- (α -BHC)	8270D-SIM	A2LA
319-84-6	Water	Hexachlorocyclohexane, Alpha- (α -BHC)	8270D-SIM	A2LA
319-85-7	Soil	Hexachlorocyclohexane, Beta- (β -BHC)	8270D-SIM	A2LA
319-85-7	Water	Hexachlorocyclohexane, Beta- (β -BHC)	8270D-SIM	A2LA
319-86-8	Soil	Hexachlorocyclohexane, Delta- (δ -BHC)	8270D-SIM	A2LA
319-86-8	Water	Hexachlorocyclohexane, Delta- (δ -BHC)	8270D-SIM	A2LA
58-89-9	Soil	Hexachlorocyclohexane, Gamma- (Lindane)	8270D-SIM	A2LA
58-89-9	Water	Hexachlorocyclohexane, Gamma- (Lindane)	8270D-SIM	A2LA
77-47-4	Soil	Hexachlorocyclopentadiene	8270D	A2LA
77-47-4	Water	Hexachlorocyclopentadiene	8270D	A2LA
67-72-1	Soil	Hexachloroethane	8270D	A2LA
67-72-1	Water	Hexachloroethane	8270D	A2LA
591-78-6	Soil	Hexanone, 2-	8260C	A2LA

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591-78-6	Water	Hexanone, 2-	8260C	A2LA
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270D	A2LA
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270D	A2LA
193-39-5	Soil	Indeno[1,2,3-cd]pyrene	8270D-SIM	A2LA
193-39-5	Water	Indeno[1,2,3-cd]pyrene	8270D-SIM	A2LA
78-59-1	Soil	Isophorone	8270D	A2LA
78-59-1	Water	Isophorone	8270D	A2LA
7439-92-1	Soil	Lead, Total	6020A	A2LA
7439-92-1	Water	Lead, Total	6020A	A2LA
72-43-5	Soil	Methoxychlor	8270D-SIM	A2LA
72-43-5	Water	Methoxychlor	8270D-SIM	A2LA
78-93-3	Soil	Methyl Ethyl Ketone (2-Butanone)	8260C	A2LA
78-93-3	Water	Methyl Ethyl Ketone (2-Butanone)	8260C	A2LA
108-10-1	Soil	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260C	A2LA
108-10-1	Water	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8260C	A2LA
1634-04-4	Soil	Methyl tert-Butyl Ether (MTBE)	8260C	A2LA
1634-04-4	Water	Methyl tert-Butyl Ether (MTBE)	8260C	A2LA
75-09-2	Soil	Methylene Chloride	8260C	A2LA
75-09-2	Water	Methylene Chloride	8260C	A2LA
90-12-0	Soil	Methylnaphthalene, 1-	8270D	A2LA
90-12-0	Water	Methylnaphthalene, 1-	8270D	A2LA
90-12-0	Soil	Methylnaphthalene, 1-	8270D-SIM	A2LA
90-12-0	Water	Methylnaphthalene, 1-	8270D-SIM	A2LA
91-57-6	Soil	Methylnaphthalene, 2-	8270D	A2LA
91-57-6	Water	Methylnaphthalene, 2-	8270D	A2LA
91-57-6	Soil	Methylnaphthalene, 2-	8270D-SIM	A2LA
91-57-6	Water	Methylnaphthalene, 2-	8270D-SIM	A2LA
91-20-3	Soil	Naphthalene	8260C	A2LA
91-20-3	Water	Naphthalene	8260C	A2LA
91-20-3	Soil	Naphthalene	8270D	A2LA
91-20-3	Water	Naphthalene	8270D	A2LA
91-20-3	Soil	Naphthalene	8270D-SIM	A2LA
91-20-3	Water	Naphthalene	8270D-SIM	A2LA

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7440-02-0	Soil	Nickel, Total	6020A	A2LA
7440-02-0	Water	Nickel, Total	6020A	A2LA
98-95-3	Soil	Nitrobenzene	8270D	A2LA
98-95-3	Water	Nitrobenzene	8270D	A2LA
62-75-9	Soil	Nitrosodimethylamine, N-	8270D	A2LA
62-75-9	Water	Nitrosodimethylamine, N-	8270D	A2LA
621-64-7	Soil	Nitroso-di-N-propylamine, N-	8270D	A2LA
621-64-7	Water	Nitroso-di-N-propylamine, N-	8270D	A2LA
86-30-6	Soil	Nitrosodiphenylamine, N-	8270D	A2LA
86-30-6	Water	Nitrosodiphenylamine, N-	8270D	A2LA
117-84-0	Soil	Octyl Phthalate, di-N-	8270D	A2LA
12674-11-2	Soil	PCB - Aroclor-1016	8082A	A2LA
12674-11-2	Water	PCB - Aroclor-1016	8082A	A2LA
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
N/A	Soil	PCB – Total	8082A	A2LA
N/A	Water	PCB – Total	8082A	A2LA
87-86-5	Soil	Pentachlorophenol	8270D	A2LA
87-86-5	Water	Pentachlorophenol	8270D	A2LA
85-01-8	Soil	Phenanthrene	8270D	A2LA
85-01-8	Water	Phenanthrene	8270D	A2LA
85-01-8	Soil	Phenanthrene	8270D-SIM	A2LA
85-01-8	Water	Phenanthrene	8270D-SIM	A2LA

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108-95-2	Soil	Phenol	8270D	A2LA
108-95-2	Water	Phenol	8270D	A2LA
103-65-1	Soil	Propyl benzene	8260C	A2LA
103-65-1	Water	Propyl benzene	8260C	A2LA
129-00-0	Soil	Pyrene	8270D	A2LA
129-00-0	Water	Pyrene	8270D	A2LA
129-00-0	Soil	Pyrene	8270D-SIM	A2LA
129-00-0	Water	Pyrene	8270D-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	6020A	A2LA
7782-49-2	Water	Selenium	6020A	A2LA
7440-22-4	Soil	Silver	6020A	A2LA
7440-22-4	Water	Silver	6020A	A2LA
100-42-5	Soil	Styrene	8260C	A2LA
100-42-5	Water	Styrene	8260C	A2LA
630-20-6	Soil	Tetrachloroethane, 1,1,1,2-	8260C	A2LA
630-20-6	Water	Tetrachloroethane, 1,1,1,2-	8260C	A2LA
79-34-5	Soil	Tetrachloroethane, 1,1,2,2-	8260C	A2LA
79-34-5	Water	Tetrachloroethane, 1,1,2,2-	8260C	A2LA
127-18-4	Soil	Tetrachloroethylene	8260C	A2LA
127-18-4	Water	Tetrachloroethylene	8260C	A2LA
7440-28-0	Soil	Thallium, Total	6020A	A2LA
7440-28-0	Water	Thallium, Total	6020A	A2LA
108-88-3	Soil	Toluene	8260C	A2LA
108-88-3	Water	Toluene	8260C	A2LA
N/A	Soil	Total Organic Carbon	9060A	A2LA
N/A	Water	Total Organic Carbon	9060A	A2LA
8001-35-2	Soil	Toxaphene	8270D-SIM	A2LA
8001-35-2	Water	Toxaphene	8270D-SIM	A2LA
76-13-1	Soil	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260C	A2LA
76-13-1	Water	Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	8260C	A2LA
87-61-6	Soil	Trichlorobenzene, 1,2,3-	8260C	A2LA

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87-61-6	Water	Trichlorobenzene, 1,2,3-	8260C	A2LA
120-82-1	Soil	Trichlorobenzene, 1,2,4-	8260C	A2LA
120-82-1	Water	Trichlorobenzene, 1,2,4-	8260C	A2LA
120-82-1	Soil	Trichlorobenzene, 1,2,4-	8270D	A2LA
120-82-1	Water	Trichlorobenzene, 1,2,4-	8270D	A2LA
71-55-6	Soil	Trichloroethane, 1,1,1-	8260C	A2LA
71-55-6	Water	Trichloroethane, 1,1,1-	8260C	A2LA
79-00-5	Soil	Trichloroethane, 1,1,2-	8260C	A2LA
79-00-5	Water	Trichloroethane, 1,1,2-	8260C	A2LA
79-01-6	Soil	Trichloroethylene	8260C	A2LA
79-01-6	Water	Trichloroethylene	8260C	A2LA
75-69-4	Soil	Trichlorofluoromethane	8260C	A2LA
75-69-4	Water	Trichlorofluoromethane	8260C	A2LA
95-95-4	Soil	Trichlorophenol, 2,4,5-	8270D	A2LA
95-95-4	Water	Trichlorophenol, 2,4,5-	8270D	A2LA
88-06-2	Soil	Trichlorophenol, 2,4,6-	8270D	A2LA
88-06-2	Water	Trichlorophenol, 2,4,6-	8270D	A2LA
96-18-4	Soil	Trichloropropane, 1,2,3-	8260C	A2LA
96-18-4	Water	Trichloropropane, 1,2,3-	8260C	A2LA
95-63-6	Soil	Trimethylbenzene, 1,2,4-	8260C	A2LA
95-63-6	Water	Trimethylbenzene, 1,2,4-	8260C	A2LA
108-67-8	Soil	Trimethylbenzene, 1,3,5-	8260C	A2LA
108-67-8	Water	Trimethylbenzene, 1,3,5-	8260C	A2LA
7440-62-2	Soil	Vanadium, Total	6020A	A2LA
7440-62-2	Water	Vanadium, Total	6020A	A2LA
108-05-4	Soil	Vinyl Acetate	8260C	A2LA
108-05-4	Water	Vinyl Acetate	8260C	A2LA
75-01-4	Soil	Vinyl Chloride	8260C	A2LA
75-01-4	Water	Vinyl Chloride	8260C	A2LA
N/A	Soil	Xylene, m+p-	8260C	A2LA
N/A	Water	Xylene, m+p-	8260C	A2LA
95-47-6	Soil	Xylene, o-	8260C	A2LA
95-47-6	Water	Xylene, o-	8260C	A2LA

Scope of Approval

CAS Number	Matrix	Hazardous Substance	Method	Accreditation Body
1330-20-7	Soil	Xylene, Total	8260C	A2LA
1330-20-7	Water	Xylene, Total	8260C	A2LA
7440-66-6	Soil	Zinc, Total	6020A	A2LA
7440-66-6	Water	Zinc, Total	6020A	A2LA



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

**Department of Environmental
Conservation**

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

555 Cordova Street
Anchorage, Alaska 99501
Main: 907.465.5390
Fax: 907.269.7649
cs.lab.cert@alaska.gov

February 20, 2020

Charles Homestead
SGS North America – Anchorage
200 W. Potter Drive
Anchorage, AK 99518

RE: Amendment 1 to Contaminated Sites Laboratory Approval **17-021**

Dear Mr. Homestead,

On January 13, 2020, SGS North America – Anchorage received an approval letter from the Alaska Department of Environmental Conservation's Contaminated Sites Laboratory Approval Program (CS-LAP). That approval inadvertently omitted the following compounds:

- Mercury (elemental) by method 6020A in soil and water
- Mercury (elemental) by method 7470A in water
- Mercury (elemental) by method 7471A in soil

This letter adds those compounds to your existing approval. Please note that for the compounds added to your approval, the effective date is January 13, 2020. These compounds are retroactively added to cover the period between December 30, 2019, and February 20, 2020.

Please attach this letter to your original approval letter and Scope of Approval issued January 13, 2020. The two combined letters and the Scope of Approval are the documentation of your approval through the CS-LAP.

If you have any questions, please contact me at (907) 269-7526, or by email at brian.englund@alaska.gov.

Respectfully,

A handwritten signature in blue ink that reads "Brian Englund".

Brian Englund
Alaska CS Lab Approval Officer