SUBMITTED TO:
Alaska Department of Transportation & Public Facilities
2301 Peger Road
Fairbanks, Alaska 99709

BY:
Shannon & Wilson, Inc.
2355 Hill Road
Fairbanks, Alaska 99709

(907) 479-0600
www.shannonwilson.com

FINAL

WORK PLAN

DOT&PF Deadhorse Airport Preliminary PFAS Investigation

DEADHORSE, ALASKA

SHANNON & WILSON

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Submitted To: Alaska Department of Transportation & Public Facilities
2301 Peger Road
Fairbanks, Alaska 99709
Attn: Dan Phillips

Subject: FINAL WORK PLAN, DOT&PF DEADHORSE AIRPORT
PRELIMINARY PFAS INVESTIGATION, DEADHORSE, ALASKA

Stantec subcontracted Shannon & Wilson to prepare this Work Plan for the Alaska Department of Transportation & Public Factifies (DOT&PF). The services proposed in this Work Plan describe initial per- and polyfluorinated substances (PFAS) investigation associated with soil disturbing activities anticipated during the Deadhorse Airport (SCC) Fence Installation Project NFAPT00549 (AIP 3-02-0339-XXX-20XX). This Work Plan is not intended to characterize any specific known contaminated site or AFFF release area. Rather, this Work Plan is intended to provide preliminary PFAS information at proposed excavation areas to support the development and implementation of a mitigation plan during construction and project planning.

The scope of services to prepare this Work Plan was specified in our proposal dated October 14, 2021 and authorized on December 1, 2021 by Stantec under Agreement Number 25-21-01-16 Amendment 2.

This Work Plan was prepared and reviewed by:

Michael Jaramillo
Senior Chemist

MXJ:AMJ:WAP/msc

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ACRONYMS

AAC	Alaska Administrative Code
AFFF	aqueous film forming foam
BTEX	benzene, toluene, ethylbenzene, xylene
COC	chain of custody
COPC	contaminant of potential concern
CSM	Conceptual Site Model
DRO	diesel range organics
DEC	Alaska Department of Environmental Conservation
°C	degrees Celsius
DOT&PF	Alaska Department of Transportation & Public Facilities
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GRO	Gasoline Range Organics
IDW	investigative-derived waste
mg/kg	milligram per kilogram
PAH	polynuclear aromatic hydrocarbons
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PPE	personal protective equipment
POC	point of contact
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RL	reporting limit
SCC	Deadhorse Airport
SGS	SGS North America, Inc.
SSHP	Site Safety and Health Plan

1 INTRODUCTION

This Work Plan provides guidance for per- and polyfluoroalkyl substances (PFAS) preliminary site investigation activities at and near the Alaska Department of Transportation & Public Facilities (DOT&PF) owned Deadhorse Airport (SCC) in Deadhorse, Alaska (Figure 1, Exhibit 1-1). This work was requested by DOT&PF to provide preliminary PFAS information associated with soil disturbing activities anticipated for the SCC Fence Installation Project NFAPT00549 (AIP 3-02-0339-XXX-20XX). This project includes:

- Constructing drainage improvements at Deadhorse Airport, including Deadhorse Drive;
- Re-locating utilities impacted by drainage improvements along Deadhorse Drive;
- Re-grading and filling in-fields for wildlife control and drainage;
- Constructing wildlife fence and fence service roads (includes security fence improvements as may be identified); and
- Other airport improvements as requested (i.e., filling areas of poor drainage near taxiways.

Based on our understanding of the project, ground disturbing activities are planned for areas along Deadhorse Drive. Depths of ground disturbance are approximately two feet below grade at culvert replacement areas, utility relocates, and drainage improvements. Installation of the fencing will be driven into fill material and is not anticipated to disturb native soils.

Shannon & Wilson prepared this work plan in accordance with Alaska Department of Environmental Conservation's (DEC's) March 2017 *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* and DEC's October 2019 *Field Sampling Guidance* document. Exhibit 1-1 provides site specific information associated with the SCC.

Exhibit 1-1: Airport Information

Airport Name:	Deadhorse Airport
Airport Code:	SCC
DEC File No. / Hazard ID:	Not Applicable
Airport Address:	1 Airport Way, Prudhoe Bay, AK 99734
DOT&PF Region:	Northern Region
DOT&PF Regional POC:	Dan Phillips
DOT&PF PFAS POC:	Sammy Cummings
Airport Type:	Current Part 139 Airport
Airport Coordinates (Lat/Long):	70.1992° North and 148.4555° West

POC = point of contact

1.1 Background

The Deadhorse Airport is located on Alaska's North Slope and serves as the only large public airport for the oil field complex in the Prudhoe Bay vicinity. Deadhorse is located approximately 380 air miles north of Fairbanks.

The airport is owned and operated by the DOT&PF. The airport has a 6,500-foot-long paved runway, with a 6,500-foot-long paved parallel taxiway, several other connecting taxiways, a paved terminal apron, and several other aprons. The airport has a Federal Aviation Administration (FAA) Flight Service Station and is fenced on the apron side to control access. Airport leaseholders include aviation and other industrial-related businesses.

DOT&PF Aircraft Rescue and Firefighting (ARFF) services used aqueous film forming foam (AFFF) for training and systems testing for many years. Part 139 Airports, like the SCC, are required to conduct annual AFFF systems testing to maintain their certification through the FAA. Prior to 2019, FAA inspections required the release of AFFF to the ground surface. The FAA would require a small amount of AFFF be discharged so the FAA inspector could visually confirm that foam can be made, and water is used for the remainder of the inspection. AFFF training activities likely occurred twice per year at four AFFF training areas (Figure 1) beginning in the 1970s, and at least once per year at various locations along the SCC runways. There are no known emergency response incidents at the SCC where AFFF was used. The precise timeline and locations of AFFF use are unknown.

2 SITE AND PROJECT DESCRIPTION

The following sections provide a site and project description.

2.1 Site Location and Boundaries

Deadhorse is in northern Alaska to the south of Prudhoe Bay. The SCC is located at 1 Airport Way in Deadhorse. The geographic coordinates of the SCC are 70.1992° North and 148.4555° West. For the purposes of this investigation, the project site will be limited to the areas of soil disturbance anticipated for the Deadhorse Airport Improvements Project 25-21-1-016.

There DEC contaminated sites website lists several active or cleanup complete with institutional controls contaminated sites near the project areas. Exhibit 2-1 presents the summary of the information for the various sites and Figure 1 presents the locations of the various sites.

Exhibit 2-1: COPCs, Regulatory and Laboratory Reporting Limits

ADEC Site Name (Location)	DEC File Number	Status	Description
NANA Oilfield Services Tank Farm (Block 303)	300.38.296	Active	During liner replacement activities in September 2010, petroleum-contaminated soil was discovered beneath Tank 3 at the NANA Oilfield Services tank farm on Block 303, Lot 1 of the Deadhorse Airport. Site investigation activities in April 2011 determined that gasoline range organics (GRO), diesel range organics (DRO), and xylenes were present above DEC cleanup levels. Soil and surface water had concentrations for fuels above DEC CULs.
NANA Oilfield Services Fuel Station (Block 301 Lot 2B)	300.38.298	Active	On December 27, 2010, a stain was observed at the NANA Oilfield Services fuel station at the Deadhorse airport. Over the course of the year, as the snow melted, it became apparent that multiple releases had occurred. Soil sampled near each of the fueling areas indicated petroleum contamination above cleanup levels was present. Soil had concentrations for fuels above DEC CULs but surface water samples were below DEC CULs.

ADEC Site Name (Location)	DEC File Number	Status	Description
ADOT&PF Deadhorse Airport Block 304 Lot 1B (Block 304 Lot 1B)	300.38.287	Active	On August 24,2009, DOT&PF staff discovered DRO contamination during installation of a culvert in a gravel driveway on Lot 1B, Block 304 Deadhorse Airport. A tanker trailer used as a fueling station was observed directly adjacent to where the contaminated soil was found. When notified, Carlile immediately had the trailer towed to Fairbanks and secured on their lot. DOT&PF treated the contaminated water and soil that were removed during the culvert installation. Soils had concentrations for fuels above DEC CULs.
ADOT&PF Deadhorse Airport Block 304 Lot 2A (Block 304 Lot 2A)	300.38.318	Active	In June 2015 two test pits were advanced on Lot 2A of Block 304 at the Deadhorse airport to verify the presence or absence of contamination from onsite and offsite sources. Results of the investigation revealed that contamination was present in the soils on the southwestern portion of the property, in the in the vicinity of one or more former above ground storage tanks (ASTs) removed in 2009. DRO was identified at 1,540 mg/kg, which exceeds DEC cleanup levels. The extent of this contamination has not been fully delineated.
ERA Aviation Deadhorse Spill (ERA Aviation Terminal; Block 900 Lot 5A)	300.38.151	Active	In 1997, 10 to 12 gallons of Jet-B fuel released into the subsurface soil from the fuel hydrant piping system leak between the west and east hangers. Elevated levels of GRO, DRO, and BTEX (benzene, toluene, ethylbenzene, and xylenes) were encountered in groundwater and soil collected from soil borings during the release investigation.
Former Sea Air Motive Pad (Block 900 Lots 2 and 3)	300.38.015	Cleanup Complete – Institutional Controls	In 1991, eleven borings drilled on lots 3 and 4. All of the borings had some petroleum hydrocarbon contamination. Several underground storage tanks (USTs) were noted on site. A partially buried oil water separator with petroleum hydrocarbons was noted on site. Several areas of hydrocarbon staining were observed. Lease holder was AIDEA, site assessment requested by ERA Aviation. In 2004, approximately 2,378 cy of petroleum contaminated soil was removed from the site and land farmed nearby. Based on the information provided, DEC has determined that no further remedial action is required for the former Sea Air Motive site (Lease Lots 2 and 3, Block 900). This decision evaluated the contaminant concentrations remaining on site and determined there is no unacceptable risk to human health or the environment. Any proposal to transport soil off site requires DEC approval in accordance with 18 AAC 75.325(i).

ADEC Site Name (Location)	DEC File Number	Status	Description
Arctic Utilities, Inc., Nana, TDX (Block 301 Lot 2A)	300.38.157	Cleanup Complete – Institutional Controls	The subject site located on the Deadhorse Airport (under lease from DOT&PF) has been used as an electrical generating facility and oil field service support area since the 1970's. It has reportedly been impacted by petroleum hydrocarbons over the years from the storage and use of diesel fuel product. NANA Oilfield Services, Inc. also operated a maintenance shop on site that may have contributed to the contamination. The NANA pad (Lot 2, Block 301) was split into Lot 2A and 2B. Lot 2A was the electric power generator site and transferred to TDX North Slope Generating Inc. in January 2003. The following institutional controls will be recorded in the DEC database: (1) hazardous substance contamination remains on site above the established cleanup (or target) levels. Soil samples were collected from the limits of the excavation in areas B10 and D11 and from soil borings around the buildings. The contaminant concentrations remaining on site ranged from 2140 to 5730 mg/kg DRO and 87 to 173 mg/kg xylene. (2) Any proposal to transport soil off site requires DEC approval in accordance with 18 AAC 75.325(i).
ADOT&PF Deadhorse Blk 700 Lots 7A & 8 (Block 700 Lots 7A & 8)	300.38.177	Cleanup Complete – Institutional Controls	DOT&PF currently occupies the subject lease lots. Lot 7A supports a maintenance facility for State vehicles, airport services, and heavy equipment storage. Lot 8 borders the western portion of the gravel pad supporting the maintenance shop facilities. During AGRA's 1992 Phase I Assessment of this property, heavily stained surface soils were observed both inside and around the shop facilities. In addition, AGRA noted that some pond surface waters on Lot 8 exhibited a petroleum-type sheen. The phase I pointed to the following areas of concern: drum and materials storage area on the eastern side of the warm storage building, the subsurface soils surrounding the on-site ASTs, the area surrounding the fuel dispensing station, and the maintenance shop floor. During the phase II assessment, AGRA advanced 33 soil borings throughout Lots 7A and 8. The analytical results found no benzene present in any of the samples. Elevated levels of xylene (up to 130 mg/kg) were found as well as DRPH samples (up to 17,000 mg/kg) were found on-site. The elevated DRPH samples were found inside the two shop buildings. Tetrachloroethene (PCE) was found at a concentration of 3.2 mg/kg. Site Characterization Report dated June 19, 2009. Four soil borings were advanced inside the Shop Building to evaluate contaminant concentrations detected in the 1994 investigation. Soil borings were advanced to a depth of 15 feet bgs and two soil samples were collected from each borehole and analyzed for DRO, RRO, GRO, VOCs, PAHs, and PCBs. DRO was detected up to 3,760 mg/kg in borehole 2 at 8.5 to 11 feet bgs and benzene was detected up to 0.0238 mg/kg borehole 5 at 6-10.5 feet bgs. PCBs were not detected in any sample and PAHs were not detected above cleanup levels. The chlorinated solvents initially detected in the 1994 samples were not detected in 2009 samples.

2.2 Contaminants of Concern and Regulatory Levels

The primary contaminants of potential concern (COPCs) for this investigation are PFAS analytes, specifically perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) as recommended for AFFF release areas in Appendix E of the DEC's *Field Sampling Guidance* (2022). This preliminary investigation and overall improvement project will not include ground disturbances at AFFF training areas, although several culvert replacements are adjacent to or along the drainage system associated with the AFFF training areas. In addition, GRO, DRO, BTEX, and PAHs To evaluate analytical data, soil results will be compared to the migration to groundwater cleanup levels listed in 18 Alaska Administrative Code (AAC) 75.341 *Tables B1 Method Two*. The current cleanup levels and analytical reporting limits for the site contaminants of concern are summarized in Exhibit 2-1.

Exhibit 2-2: COPCs, Regulatory and Laboratory Reporting Limits

Method	Analyte	Soil Limit[a] (mg/kg)	Laboratory RLs/LODs Soil (mg/kg)
PFAS Analytes			
QSM 5.3 Table B-15[b]	PFOS	0.0030	0.000200
	PFOA	0.0017	0.000200
Fuel Analytes			
AK101	GRO†	1,400	1.25
AK102	DRO†	12,500	10
SW8260D	Benzene	0.022	0.00625
	Toluene	6.7	0.0125
	Ethylbenzene	0.13	0.0125
	Xylenes	1.5	0.0375
SW8270D-SIM PAHs	1-Methylnaphthalene	0.41	0.0125
	2-Methylnaphthalene	1.3	0.0125
	Acenaphthene	37	0.0125
	Acenaphthylene	18	0.0125
	Anthracene	390	0.0125
	Benzo (a) anthracene	0.70	0.0125
	Benzo (a) pyrene‡	1.5	0.0125
	Benzo (b) fluoranthene‡	15	0.0125
	Benzo (g,h,i) perylene‡	2,300	0.0125
	Benzo(k) fluoranthene‡	150	0.0125
	Chrysene	600	0.0125
	Dibenzo (a,h) anthracene‡	1.5	0.0125
	Fluoranthene	590	0.0125
	Fluorene	36	0.0125
	Indeno (1,2,3-c,d) pyrene‡	15	0.0125
	Naphthalene	0.038	0.0100
	Phenanthrene	39	0.0125
	Pyrene	87	0.0125

Notes:

a. The most stringent Cleanup Level from 18 AAC 75 *Table B1. Method Two - Soil Cleanup Levels Table* and *Table B2. Method Two – Arctic Zone* cleanup levels. Migration to groundwater limits reported unless otherwise noted.

b. A full list of PFAS analytes for the analytical method will be requested for analytical reports. However, only PFOS and PFOA have DEC Cleanup Levels and are reported in this table.

† Regulatory limit from 18 AAC 75 *Table B2. Method Two Arctic Zone (Ingestion)* Cleanup Level is used for GRO and DRO.

‡ Regulatory limit from 18 AAC 75 Table B1. Method Two – Human Health Cleanup Level.

EPA = U.S. Environmental Protection Agency, mg/kg = milligram per kilogram, PFAS = per- and polyfluoroalkyl substances, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid, QSM 5.3 = Department of Defense Quality Services Manual version 5.3, RL = reporting limit.

2.3 Conceptual Site Model

A conceptual site model (CSM) describes potential pathways between a contaminant source and possible receptors (i.e., people, animals, and plants) and is used to determine who may be at risk of exposure to those contaminants. A DEC *Human Health Conceptual Site Model Graphic Form and Human Health Conceptual Site Model Scoping Form* was completed based on the preliminary understanding of site conditions. These forms are included in Appendix A of this Work Plan.

Very little is known about potential PFAS-affected media at and near the SCC. Potentially affected media include contaminated soil, groundwater, surface water, sediment, and biota. However, several fuel related contaminants have been identified in soil, groundwater, and surface water media. Potential human exposure pathways include:

- incidental soil, groundwater, or surface water ingestion;
- dermal absorption of contaminants from soil, groundwater, or surface water;
- ingestion of fugitive dust or groundwater;
- outdoor air;
- direct contact with sediment; and
- ingestion of wild or farmed foods.

2.4 Project Team

Chris Darrah will be Shannon & Wilson's Principal-in-Charge and Wendy Presler is Project Manager. Michael Jaramillo will serve as the Environmental Lead for the SCC site and be Shannon & Wilson's primary point of contact (POC). Shannon & Wilson's project team also includes other State of Alaska Qualified Environmental Professionals to support the various field and reporting tasks required to achieve the project objectives. The project team and their associated responsibilities are summarized in Exhibit 2-2.

Exhibit 2-3: Project Team

Affiliation	Responsibility	Representative	Contact Number
DOT&PF	Client – Regional POC	Dan Phillips	(907) 451-2926
	Client – Statewide PFAS POC	Sammy Cummings	(907) 888-5671
Stantec	Prime Contractor POC	Andrew Niemiec	(907) 343-5263
	Prime Contractor Secondary Contact	Russell Kraemer	(509) 340-1728
Shannon & Wilson	Principal-in-charge	Chris Darrah	(907) 458-3143
	Project Manager	Wendy Presler	(907) 458-3126
	Environmental Lead POC	Michael Jaramillo	(907) 458-3156
Eurofins/ TestAmerica, Inc.	PFAS analytical laboratory services	David Alltucker	(916) 374-4383
SGS North America, Inc.	GRO, DRO, BTEX, and PAH analytical laboratory services	Jennifer Dawkins	(907) 474-8656

DEC = Alaska Department of Environmental Conservation, DOT&PF = Alaska Department of Transportation & Public Facilities, POC = point of contact, TBD = To be determined

2.5 Project Schedule and Submittals

Once DEC approval is received for the proposed scope of services outlined in this Work Plan, Shannon & Wilson will coordinate with DOT&PF staff to collect soil samples. Field activities are anticipated to occur during one sampling event in early 2022.

Laboratory analysis will be requested on a standard 14-day turn-around time. After field work is complete, a Preliminary Site Investigation Report will be prepared documenting the results of the sampling event. The report will include summarized field observations, original field notes and forms, analytical results and discussion of data quality, photo documentation, figures showing sample locations, description of deviations from the approved Work Plan, if any, and conclusions and recommendations. The report will also include an updated CSM.

The following is the anticipated schedule for the SCC PFAS investigation activities:

- Work Plan Implementation (field activities) – Early 2022
- Draft Report Submittal - within 30 days of receipt of analytical results
- Final Report Submittal - within 30 days of receiving DEC comments on the Draft Report

3 FIELD ACTIVITIES

The following sections describe the field activities to be conducted as a part of PFAS investigation activities for this project. Sampling procedures and analytical methods are described in Section 4. A quality assurance project plan (QAPP) is included in Section 5, below.

This Work Plan includes Shannon & Wilson's internal, SCC specific, Site Safety and Health Plan (SSHP, Appendix B). SSHPs are used to protect the health and safety of field personnel from physical and chemical hazards associated with work at this site.

3.1 PFAS Investigation Activities

SCC PFAS and fuels investigation activities are described in the following sections.

3.1.1 Pre-investigation Activities

Pre-investigation tasks for this project include, obtaining site access, acquiring site/airport specific permitting, and utility locates.

3.1.1.1 Site Access and Permitting

SCC access will be coordinated with DOT&PF. Shannon & Wilson is not aware of required permits or authorizations for conducting this field effort.

3.1.1.2 Utility Locates

Utility clearance will be coordinated by contacting the Alaska Digline, Inc. and the SCC Airport Manager. A map of anticipated sampling locations will be provided to the Alaska Digline and SCC Airport Manager, no later than 10 days prior to planned activities. Shannon & Wilson assumes the Digline and SCC Airport Manager will provide information regarding utility locations in the proposed investigation areas and mark utilities that are close to drilling activities.

3.1.2 Soil Investigation Activities

Soil investigation activities at the SCC include collection of near surface soil samples. Based on the proposed excavation areas for the project, this PFAS investigation will include sampling inlets/outlets for each of the nine culverts within the secure area and 7 culverts along Deadhorse Drive (Figure 1). A total of 32 primary PFAS samples will be collected with an additional four field-duplicate samples collected for QC purposes. Of the primary

samples, 24 sample locations are near contaminated sites or along the drainage from contaminated sites and will require sampling for GRO, DRO, BTEX, and PAHs (Figure 1).

4 SAMPLING AND ANALYSIS PLAN

This section describes the analytical sampling approach for investigating PFAS in soil at the SCC. A DEC-qualified sampler will collect and handle the samples for this project and collect required quality control (QC) samples in accordance with DEC's *Field Sampling Guidance*. Field personnel will document field activities with field notes and photographs as well as applicable field forms. Soil sampling procedures are defined in Section 4.1. Special considerations for PFAS sampling are summarized in Section 4.2. An analytical sample summary is detailed in Section 4.3. Analytical laboratories and methods employed as a part of this project are identified in Section 4.4. Sample containers, preservation methods, and holding times are included in Section 4.5. Sample custody, storage, and transport will be followed as described in Section 4.6. Equipment decontamination procedures are outlined in Section 4.7. Investigative-derived waste (IDW) management is described in Section 4.8. Field personnel will document field activities with field notes and photographs as well as applicable field forms, as detailed in Section 5.2.

4.1 Soil Sampling Methodology

PFAS analytes are the primary contaminants of concern for this preliminary investigation are highly water soluble and have an affinity for organics in the soils. Due to the fact that the areas for this investigation are in areas and depths anticipated to be historical fill material that is not likely to have organics below the vegetative matte, the PFAS investigation will focus within the first twelve inches of the soil column. PFAS soil samples will be collected below vegetation (if present) or within the first twelve inches at the approximate sample locations outlined in Figure 1.

In addition, since the sampling areas are anticipated to be in the drainage areas that may be saturated due to standing water, soil field screening will not be used since moisture can dramatically affect field screening results. Visual and olfactory observations will be used to select analytical samples to a maximum depth of 24-inches below grade, the estimated depth of the culvert excavations.

Hand tools will be decontaminated between each sample point following procedures outlined in in Section 4.7. We will dig to just below any vegetative mat with a shovel or hand trowel and collect the analytical samples using a new stainless-steel spoon, quickly placing the soil into new, laboratory-supplied jars appropriate for the analysis to be

performed. PFAS samples will be collected in individual jars. Field personnel will change nitrile gloves before collecting each sample to prevent cross-contamination and exposure.

Sample jars will be labeled in the field, using permanent waterproof ink, including the following information: unique sample number, date and time of sampling, initials of collector, laboratory analysis, and preservation method. Field staff will make sure the jar rims and threads are free of soil particles to ensure a good seal.

4.2 Special Considerations for PFAS

Because PFAS is found in numerous everyday items, the following special precautions will be taken during sampling activities:

- No use of Teflon®-containing materials (e.g., Teflon® tubing, bailers, tape, sample container lid liners, or plumbing paste).
- No Tyvek® clothing will be worn on-site.
- Clothes treated with stain-, flame-, or rain-resistant coatings will be avoided or go through several washings prior to use on-site.
- No Post-It® notes will be brought on-site.
- No fast food wrappers, disposable cups, or microwave popcorn will be brought on-site.
- After handling the above items, field personnel will wash their hands thoroughly with soap and water prior to sampling activities.
- No use of foil.
- No use of chemical (blue) ice packs.
- Change nitrile gloves between each sample location.
- No preservative, other than chilling is required for PFAS analysis.
- Label jars using permanent, waterproof ink.

4.3 Analytical Sample Summary

A total of 32 primary samples will be analyzed for PFAS by the Eurofins TestAmerica, Inc. (Eurofins TestAmerica) of Sacramento, California DEC approved LCMSMS method compliant with QSM 5.3 Table B-15. An additional four field-duplicate samples collected for QC purposes. Approximate sample locations are shown in Figure 1. More information regarding QC samples can be found in Section 5.4 and 5.5.

4.4 Analytical Laboratories and Methods

The PFAS soil samples will be submitted to Eurofins TestAmerica, Inc. (Eurofins TestAmerica) of Sacramento, California. Based on the DEC Technical Memorandum issued on October 2, 2019, PFAS analysis will report the full list of PFAS compounds defined in the Eurofins TestAmerica LCMSMS method compliant with QSM 5.3 Table B-15. The GRO, DRO, BTEX, and PAHs soil samples will be submitted to SGS North America, Inc. (SGS) of Anchorage, Alaska.

Samples will be shipped for analysis via air courier to a DEC approved lab for the analyses being requested. Upon receipt of the samples, authorized laboratory personnel will store and prepare the samples for analysis, taking into consideration sample holding times for the analysis. A summary of laboratory methods, preservation methods, sample containers, and holding times is presented in Exhibit 4-1, below. Analytical deliverables will be provided as described in Section 5.5.

4.5 Sample Containers, Preservation, and Holding Times

Prior to field sampling efforts, Shannon & Wilson will request necessary sample containers from the laboratory. The containers will not be opened until samples are to be collected. Sample containers, preservation, and holding times are shown in Exhibit 4-1 for soil samples for the primary COPCs (PFAS). Samples will be placed in an insulated cooler containing frozen ice-substitute immediately after collection.

Exhibit 4-1: Sample Containers, Preservation, and Holding Time Requirements

Analyte	Method	Media	Container and Sample Volume	Preservation	Holding Time
PFAS	QSM 5.3 Table B-15	Soil	4-oz polypropylene	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
GRO/ BTEX	AK101/ SW8260C	Soil	4-oz pre-weighed amber	Methanol 0 °C to 6 °C	28 days for GRO 14 days for BTEX
DRO/ PAH	AK102/ SW8270D-SIM	Soil	4-oz amber	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction

BTEX = benzene, toluene, ethylbenzene, xylenes, °C = degrees Celsius, DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics, PAH = polynuclear aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, QSM 5.3 = Department of Defense Quality Systems Manual Version 5.3

4.6 Sample Custody, Storage, and Transport

After collection, samples will be wrapped in bubble wrap and placed in a hard-plastic cooler with adequate quantities of frozen gel ice to maintain sample temperatures between 0 °C and 6°C until the samples reach the laboratory, using packing material as necessary to prevent bottle breakage. A temperature blank (Section 5.3.2) will be packed with the samples in each cooler. Custody of the samples will be maintained at all times prior to being submitted to the laboratory for analysis. At the end of each field day, if not transported to the laboratory, field personnel will transfer the samples to the designated sample refrigerator in a secure area at Shannon & Wilson's Fairbanks office or at the jobsite.

Shannon & Wilson will complete Chain of Custody (COC) records at the time each cooler is packed; COC records will be placed in plastic bags taped to the inside lid of the cooler. The COC records document sample possession from the point of collection to the time of receipt by the laboratory sample-control center. A copy of the COC records will be kept to allow sample accountability between field and laboratory.

4.7 Equipment Decontamination

All reusable equipment introduced into sample collection must be decontaminated prior to use and reuse. Decontamination procedures will be as follows:

- non-phosphate detergent wash;
- tap water rinse;
- distilled-water rinse; and
- PFAS-free water rinse (only when PFAS samples are being collected).

4.8 Investigative-Derived Waste Management

Excess soil IDW is not anticipated to be generated for this project. Decontamination solutions will be discharged to the ground surface of the site once the work is completed. Other IDW will primarily consist of disposable sampling equipment (nitrile gloves, etc.). These items will be disposed of at an onsite dumpster.

5 QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) presents the quality assurance (QA) and QC activities designed to achieve data quality goals for this project. The QAPP is intended to guide activities during assessment and review of resulting data. Shannon & Wilson will be responsible for conducting data reduction, evaluation, and reporting under this QAPP.

QA is defined as the total integrated program for assuring reliability of screening and measuring data. QC is defined as the routine use of procedures to effectively achieve defined goals and standards for sampling and analysis. The following sections describe specific procedures to be followed during sampling at each site, so sampling and documentation are effective, laboratory data are usable, and the information acquired is of high quality and reliable.

5.1 Quality Assurance Objectives

For measurement data, the QA objective is to assure environmental-monitoring data are of known and acceptable quality. For analytical data, the objective is to meet acceptable QA standards of precision, accuracy, representativeness, comparability, and completeness. These terms are defined below:

- Precision: is a measure of agreement among replicate or duplicate results of the same analyte. The laboratory objective for precision is to equal or exceed the precision demonstrated for similar samples and shall be within the established control limits for the methods as published by the EPA. Precision will be measured as the relative percent difference between project and duplicate samples.
- Accuracy: is a measure of bias in a measurement system. Accuracy will be expressed as the percent recovery of an analyte from a surrogate or matrix spike sample, or a standard reference material. The laboratory objective for accuracy is to equal or exceed accuracy demonstrated for these analytical methods on similar samples and shall be within the established control limits for the methods as published by the EPA.
- Representativeness: is a quality characteristic attributable to the type and number of samples to be taken to be representative of the medium/environment (e.g., soil or water). Sample locations will be selected in the field to be representative of the soils or water at that location, within the constraints of sample-location guidelines in the regulations.
- Comparability: is a qualitative parameter expressing the confidence with which one data set can be compared to another. The sampling method employed, methods used for the transfer of samples to the analytical laboratory, and analytical techniques implemented at the laboratory shall be performed in a uniform manner.
- Completeness: is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. The objective of completeness is to generate an adequate database to successfully achieve the goals of the investigation.

Numeric QA objectives for the primary COPCs (PFAS), are presented in Exhibit 5-1 below. The rationale for the QA program is to obtain data that are representative of environmental conditions at the project site. Comparability among samples will be maintained by consistency in sampling procedures, sample-preservation methods, analytical methods, and

data-reporting units. Analytical reporting-limit goals for this project will be less than the applicable DEC cleanup and/or action levels.

Numeric QA objectives for this project are presented in Exhibit 5-1 below.

Exhibit 5-1: Quality Assurance Objectives for Analytical Samples

Analyte	Method	Matrix	Precision	Accuracy	Completeness
PFAS	QSM 5.3 Table B-15	Soil	±50%	(analyte dependent)	85%
GRO	AK101	Soil	±20%	60% – 120%	85%
DRO	AK102	Soil	±20%	75% – 125%	85%
BTEX	SW8260C	Soil	±20%	(analyte dependent)	85%
PAH	SW8270D-SIM	Soil	±20%	(analyte dependent)	85%

BTEX = benzene, toluene, ethylbenzene, xylenes, COPC = contaminant of potential concern, DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics; PAH = polynuclear aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, PFOA = perfluorooctanoic acid, PFOS = perfluorooctanesulfonic acid.

5.2 Field Documentation

A combination of field forms and a field notebook will be used to record field documentation, including, but not limited to, the following:

- field screening and sampling personnel;
- names and affiliations of pertinent field contacts;
- weather and other salient observations;
- documentation of instrument calibration;
- location of activity and site conditions;
- field measurements, observations and comments;
- Unusual/unexpected problems, including observations of leaks, releases, signs of soil contamination, or other unusual items;
- changes to sampling protocol;
- sample ID;
- sample date and time;
- site photographs;
- site sketches;
- location of sampling points; and
- distances to nearest permanent site features.

Information will be recorded in permanent ink. Deletions will be crossed out with one line, initialed, and dated.

Sample identification numbers (sample ID) will consist of unique identification numbers. Field personnel will enter the sample ID and corresponding sample location (boring, monitoring well number, etc.) to indicate where the samples were collected.

COC records will accompany samples to the laboratory. The forms will be signed by persons collecting, handling, or delivering samples to the laboratory; delivery dates and times will also be recorded. The laboratory personnel receiving the samples will sign the forms and record the date and time. The original forms will accompany the shipment and a copy will be retained in project records.

5.3 Field Quality Control Samples

The field QA/QC program includes the collection of the following QA/QC samples as described below.

5.3.1 Field Duplicate Sample

Four field duplicate samples will be collected as a part of this project. If possible, duplicates will be collected from locations most likely to be contaminated based on field observations, and/or site-specific information, as applicable, since calculation of duplicate precision is not possible for samples with contaminants below detection limits. Duplicates will be assigned a separate sample number and submit them "blind" to the laboratory. Duplicate sample results will be used to test the comparability of analytical data.

QC field duplicate samples will be collected from the same location and using the same procedure as the primary sample. Two complete sets of sample containers will be filled, and the field duplicate samples will be submitted using a unique, "blind" identifier to the laboratory. The duplicate location and identifier will be identified on the sampling log. Duplicates will be analyzed using the same analytical method used for the primary sample.

5.3.2 Temperature Blank Samples

Temperature blanks enable the receiving laboratory to estimate the samples' temperature on their arrival at the laboratory. Each sample cooler will be submitted to the laboratory with a temperature blank. Temperature blanks will consist of a jar filled with water and packed with the other samples in each cooler. Artificial ice will be added as necessary to maintain an interior cooler temperature within the range of 0 °C to 6 °C. The water temperature in the blank will be measured at the laboratory upon arrival. The laboratory will document sample

and cooler conditions, including temperature, and whether any sample containers are broken.

5.4 Laboratory Quality Control Samples

The analytical laboratory will perform QC measurements to determine the precision and accuracy of the entire measurement system, including initial and continuing calibration checks, analysis of method blanks, analysis of spiked samples, duplicate analyses, and evaluation of surrogate and/or isotope dilution analyte recoveries.

5.5 Laboratory Data Deliverables

Analytical data obtained from this project will be reviewed and validated by conducting what the EPA refers to as a Stage 2a Validation (EPA 2009). Accordingly, Shannon & Wilson will request Stage 2a laboratory data deliverables and electronic data deliverables. These deliverables generally include the following items.

- A Cover Sheet, Table of Contents, and Laboratory Case Narrative;
- Sample results forms, COC and supporting records, and laboratory receipt checklist; and
- QC data and QC acceptance criteria linked to corresponding field samples (e.g. method blanks, matrix duplicates, surrogates, etc.).

5.6 Data Reduction, Evaluation, and Reporting

Laboratory tests will be validated by the laboratory supervisor or other responsible party and include evaluation for precision and accuracy of the data set. The laboratory QC officer or other responsible party will review and sign analytical data before release. Data reporting will be completed in the laboratory reports submitted to Shannon & Wilson. Individual laboratory reports will be included with the final report. Shannon & Wilson will check analytical data generated by the laboratory for precision, accuracy, and completeness as well as complete the DEC laboratory data-review checklists as part of the data-review process.

The Environmental Lead will review field data, including sample descriptions and pertinent observations. Data-evaluation procedures will include QA checks to see holding times have been met, duplicate samples have been collected, and checks for other QA parameters have been performed. The Shannon & Wilson Environmental Lead will also review field data during preparation of a final report.

Implemented efforts will be summarized in a Preliminary PFAS Investigation Report. Generally, this report will include summarized field observations, analytical results and

discussion of data quality, photo documentation, figures showing sample locations, description of unplanned deviations from the approved Work Plan, if any, and conclusions and recommendations. The report will also include an updated CSM based on received analytical results.

6 REFERENCES

Alaska Department of Environmental Conservation (DEC), 2017a, Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, March, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

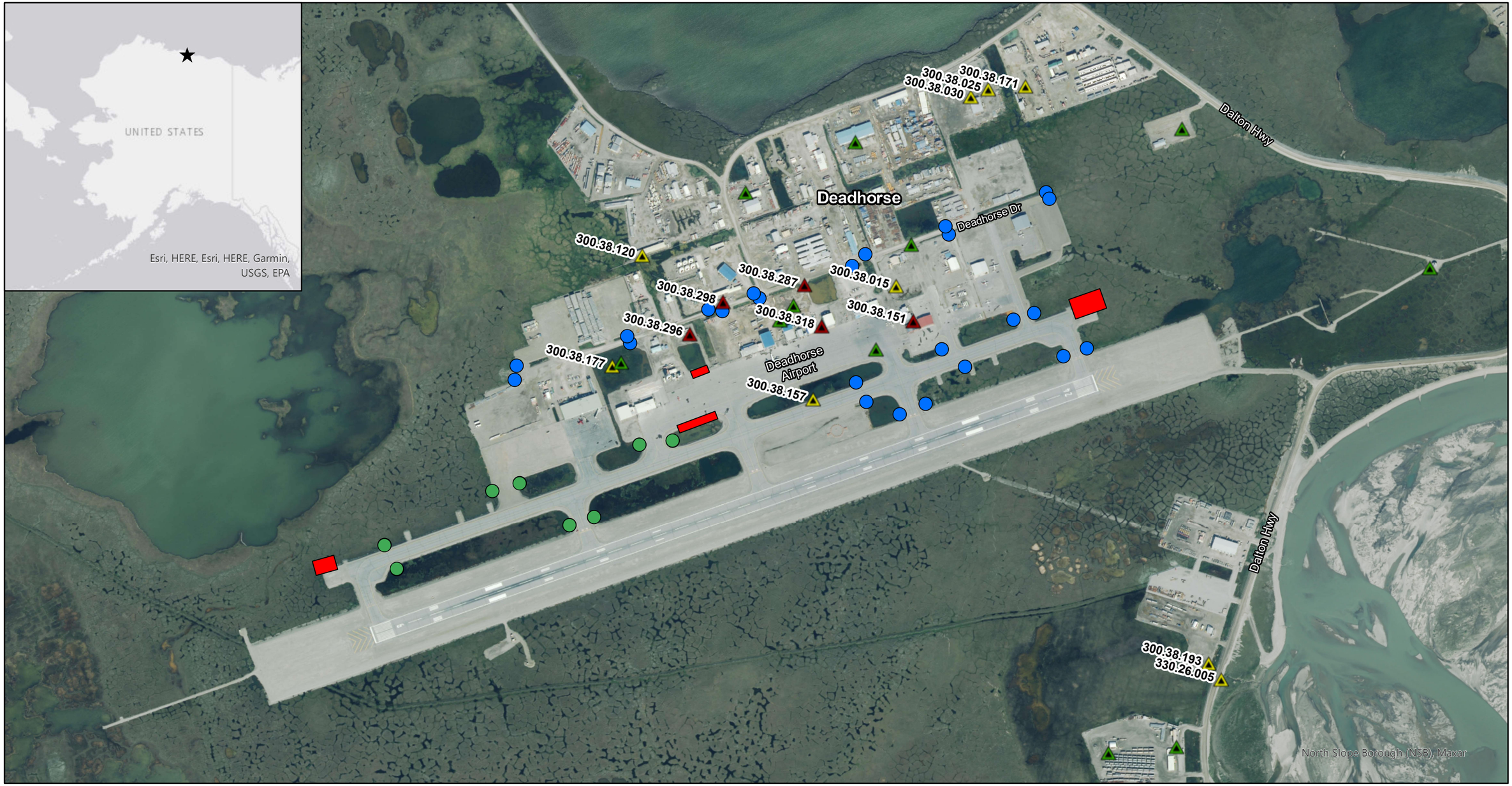
Alaska Department of Environmental Conservation (DEC), 2017b, Guidance on Developing Conceptual Site Models. DEC Division of Spill Prevention and Response, Contaminated Sites Program, July, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Alaska Department of Environmental Conservation (DEC), 2019a, Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tanks: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, October, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Alaska Department of Environmental Conservation (DEC), 2019b, Technical Memorandum, Action Levels for PFAS in Water and Guidance on Sampling Groundwater and Drinking Water, October, available: https://dec.alaska.gov/.

Alaska Department of Environmental Conservation (DEC), 2021, 18 AAC 75, Oil and Other Hazardous Substances Pollution Control: Juneau, Alaska, June, available: http://dec.alaska.gov/commish/regulations/.

United States Environmental Protection Agency (EPA), 2009, Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, OSWER No. 9200.1-85 EPA 540-R-08-005: Washington, DC, UPA Office of Solid Waste and Emergency Response, January.



LEGEND

ADEC Contaminated Sites

- Active
- Cleanup Complete
- Cleanup Complete - Institutional Controls

- Sample Locations
- PFAS Only Samples Locations
- AFFF Release Areas

0 1,000 2,000

Feet

N

DO&PF Deadhorse Airport Preliminary PFAS Investigation

Deadhorse, Alaska

Proposed Sample Locations

May 2022

106427-001

Figure 1

APPENDIX A: CONCEPTUAL SITE MODEL

Appendix A

Conceptual Site Model

Scoping and Graphics Forms

CONTENTS

Print Form

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

Site Name: Deadhorse Airport

File Number:

Completed by: Shannon & Wilson, Inc.

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

- ☒ USTs
- ☒ ASTs
- ☒ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: AFFF Release Areas and fuel spills

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

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

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

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

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

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

* bgs - below ground surface

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

a) Direct Contact -

1. Incidental Soil Ingestion

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

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

Comments:

There are known releases of PFAS containing AFFF and fuels contamination; therefore, PFAS and fuel contamination is likely in the soil immediately surrounding the known release areas.

2. Dermal Absorption of Contaminants from Soil

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

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

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

Comments:

There are known releases of PFAS containing AFFF and fuel contamination; therefore, PFAS and fuel contamination are likely in the soil immediately surrounding the known release areas. PFOS, PFOA, and PAHs are listed in Appendix B as permeable through the skin. However, according to the Alaska Department of Health and Social Services, PFOS and PFOA are not appreciably absorbed through the

b) Ingestion -

1. Ingestion of Groundwater

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

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

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

Comments:

PFAS is expected to be detected in the groundwater. Currently, drinking water is drawn from surface water outside the project area; however, there is the potential that groundwater may be used in the future.

2. Ingestion of Surface Water

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

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

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

Comments:

Due to runoff, PFAS and fuels could potentially be found in the surface water, which are also used for drinking water. However, the drinking water is not drawn from the project area.

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

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

Comments:

BTEX and PAHs are listed in Appendix D and have been identified in the project area.

2. Inhalation of Indoor Air

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

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

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

Comments:

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

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

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

Comments:

Surface water is currently used for household purposes. Future construction could expose workers to the groundwater.

Inhalation of Volatile Compounds in Tap Water

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

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

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

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

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

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

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

Comments:

PFAS may be present in the top 2 centimeters of soil.

Direct Contact with Sediment

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

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

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

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

Comments:

Subsistence or recreational activities in the project area are not expected. However, drainage ditches that direct runoff from the airport may contain sediment with PFAS and fuel contamination. Construction workers and site investigators may be exposed to PFAS and fuels during airport drainage upgrades.

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

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Deadhorse Airport

Completed By: Shannon & Wilson, Inc.

Date Completed: 03/30/2022

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

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

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

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

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

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

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

Current & Future Receptors

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

APPENDIX B: SITE SAFETY AND HEALTH PLAN

Appendix B

Site Safety and Health Plan

CONTENTS

Exhibits

APPENDIX B: SITE SAFETY AND HEALTH PLAN

B.1. SITE SAFETY AND HEALTH PLAN

Shannon & Wilson prepared this SSHP for the preliminary PFAS site investigation activities at and near the SCC. The purpose of this SSHP is to protect the health and safety of field personnel from physical and chemical hazards associated with work at this site.

The provisions of this plan apply to Shannon & Wilson personnel who will potentially be exposed to safety and/or health hazards during this investigation. Shannon & Wilson employees are also covered under its Corporate Safety and Health Program. General safety and health requirements described in that program will be met. Each Shannon & Wilson employee on the site will complete the personal acknowledgement form documenting they have read and understand this SSHP and agree to abide by its requirements. A copy of this SSHP will be kept on-site throughout the duration of sampling operations.

B.2. SITE HAZARD ANALYSIS

There are two categories of hazards that may occur during the field work: potential chemical exposure hazards and physical hazards associated with site characterization activities. These hazards are discussed below.

B.2.1 Chemical-Exposure Hazards

Contaminated soil and water may be encountered during site exploration activities. PFAS are believed to be the primary contaminants of potential concern and may be encountered in soils and water at unknown concentrations.

Shannon & Wilson personnel will implement skin protection when they are to contact potentially contaminated soil or water. Field personnel will wear work gloves or nitrile gloves as needed, and Level D personal protective equipment. Field personnel will not require respiratory protection based on the current understanding of site conditions and scope of services.

B.2.2 Physical Hazards

Primary physical hazards associated with site characterization activities include pinch points from hand tools; temperature stress; lifting, slipping, tripping, falling; and risk of eye injuries. In addition, wildlife may be a hazard in areas around the airport. The best means of protection against accidents related to physical hazards are careful control of equipment

activities in the planned work area and use of experienced and safety- and health-trained field personnel.

Field personnel will not enter confined spaces for the project activities, nor will they enter trenches or excavations greater than four feet in depth.

B.2.2.1 Hand Auguring

The use of a hand augur may put a worker at risk of pinching hands and fingers, abrasions, and fatigue. Work gloves will be used to protect from pinches and abrasions. Scheduling rest periods, adequate hydration, and self-monitoring physical and mental conditions will guard against fatigue.

B.2.2.2 Temperature Stress

Wearing personal protective equipment (PPE) may put a worker at risk of developing heat stress; however, since the field activities will be conducted in Level D PPE the risk of heat stress is considered low. Cold stress or injury due to hypothermia will be guarded against by wearing appropriate clothing, having warm shelter available, scheduling rest periods, adequate hydration, and self-monitoring physical and mental conditions.

B.2.2.3 Lifting Hazards

Moving coolers of soil samples or other heavy objects presents a lifting hazard. Personnel will use proper lifting techniques and obtain assistance when lifting objects weighing more than 40 pounds.

B.2.2.4 Slips, Trips, and Falls

The most common hazards on a job site are typically slips, trips, and falls. These hazards will be reduced through the following practices:

- Personnel will stay alert.
- All access-ways will be kept free of materials, supplies, and obstructions at all times.
- Tools and other materials will be located so as not to cause tripping or other hazards.
- Personnel should be aware of potential tripping hazards associated with vegetation, debris, and uneven ground.
- Personnel should be aware of limitations imposed by work clothing and PPE.

The project site may be inherently hazardous due to the potential presence of rain, snow, and ice, which can alter the character of the ground surface. The risk for slips, trips, and falls

by site workers is increased due to wet or icy surfaces; therefore, workers will use caution when walking at the site.

B.2.2.5 Insects and Animals

During the summer months in Alaska, mosquitoes and other insects are common in areas predominantly covered with vegetation. Wearing PPE should be sufficient to protect site workers. Animals such as moose and bears are also commonly seen in Alaska. If a large animal approaches the site, workers should keep their distance or seek shelter in their vehicles.

B.2.2.6 Congested Areas

The site investigation may at times require field personnel to work adjacent to or in roadways, taxiways, and airport runways. Field personnel will observe the speed and frequency of traffic proximal to the work site. Appropriate cones, barricades, or signs to secure the work area will be used when required. We will coordinate with airport security and maintenance staff to conduct work at times that will limit risk, with escort, and using airport required signs, cones, barricades, or PPE.

B.2.3 Other Hazards

Biological, ionizing radiation, and other hazards are not expected to be present. However, be aware of the surroundings and maintain safe work practices in accordance with Shannon & Wilson's Corporate Health & Safety Plan.

B.3. PERSONAL RESPONSIBILITIES, TRAINING, AND MEDICAL SURVEILLANCE

Below is a summary of the assignment of responsibilities, training requirements, and medical surveillance information for Shannon & Wilson personnel.

B.3.1 Assignment of Responsibilities

Shannon & Wilson is responsible for understanding and complying with the requirements of this SSHP. Following is a list of responsibilities of all Shannon & Wilson personnel working on the site:

- Review and follow this SSHP.
- Attend and participate in safety meetings.

- Take appropriate action as described in this SSHP regarding accidents, fires, or other emergency situations.
- Take all reasonable precautions to prevent injury to themselves and their fellow workers.
- Perform only those tasks they believe they can do safely, and immediately report any accidents or unsafe conditions to Shannon & Wilson's Project Manager or Office Health and Safety Manager.
- Halt work, by themselves or by others, when they observe an unsafe act or potentially unsafe working condition.
- Report accidents, illnesses, and near-misses to the local contact and to Shannon & Wilson's Fairbanks office Health and Safety Manager.

B.3.2 Personal Training

Shannon & Wilson personnel performing activities on this site and under this plan have completed the appropriate training requirements specified in 29 CFR 1910.120(e). All staff has completed an annual eight-hour refresher-training course and/or initial 40-hour training course within the last year.

A personal acknowledgement form will be completed by field personnel prior to commencing field activities. This acknowledgment form will document that they have read and understand this SSHP.

B.3.3 Medical Surveillance Program

All field personnel performing activities on this site covered by this SSHP have undergone baseline and annual physical/medical examinations as part of Shannon & Wilson's Corporate Health and Safety Program. All field personnel are active participants in Shannon & Wilson's Medical Monitoring Program or in a similar program, which complies with 29 CFR 1910.120(f).

B.4. PERSONAL PROTECTIVE EQUIPMENT

PPE will be required during the course of the field work. PPE selection will be based primarily on work-task requirements and potential exposure. Field personnel will use Level D protective equipment during normal work activities. Personnel are trained in the use of PPE that is, or may be, required. All personnel shall wear Level D PPE as a minimum:

- standard work clothes or cotton overalls;
- reflective, high-visibility safety vest;

- safety-toe boots;
- safety glasses;
- hearing protection;
- work gloves; and,
- hard hat.

Disposable nitrile gloves will be worn during any activity that may require dermal contact with potentially contaminated media.

B.5. DECONTAMINATION PROCEDURES

Equipment decontamination procedures are necessary for any reusable equipment that comes into contact with contaminated soil and/or water. Decontamination procedures will consist of a rinse with non-phosphate-based detergent, a second rinse with plain tap water, a third rinse with distilled water, and a final rinse with PFAS-free water. Sampling equipment and PPE that is expendable will be disposed of at the site or in a landfill off-site.

Shannon & Wilson will conduct all site characterization activities in Level D PPE. Personnel decontamination will consist of the following:

- At the conclusion of site work each day, disposable PPE (likely limited to nitrile gloves) will be placed in trash bags for off-site disposal.
- Employees will wash their hands and face with soap and water before eating, drinking, smoking, or applying cosmetics.

B.6. ACCIDENTS AND EMERGENCIES

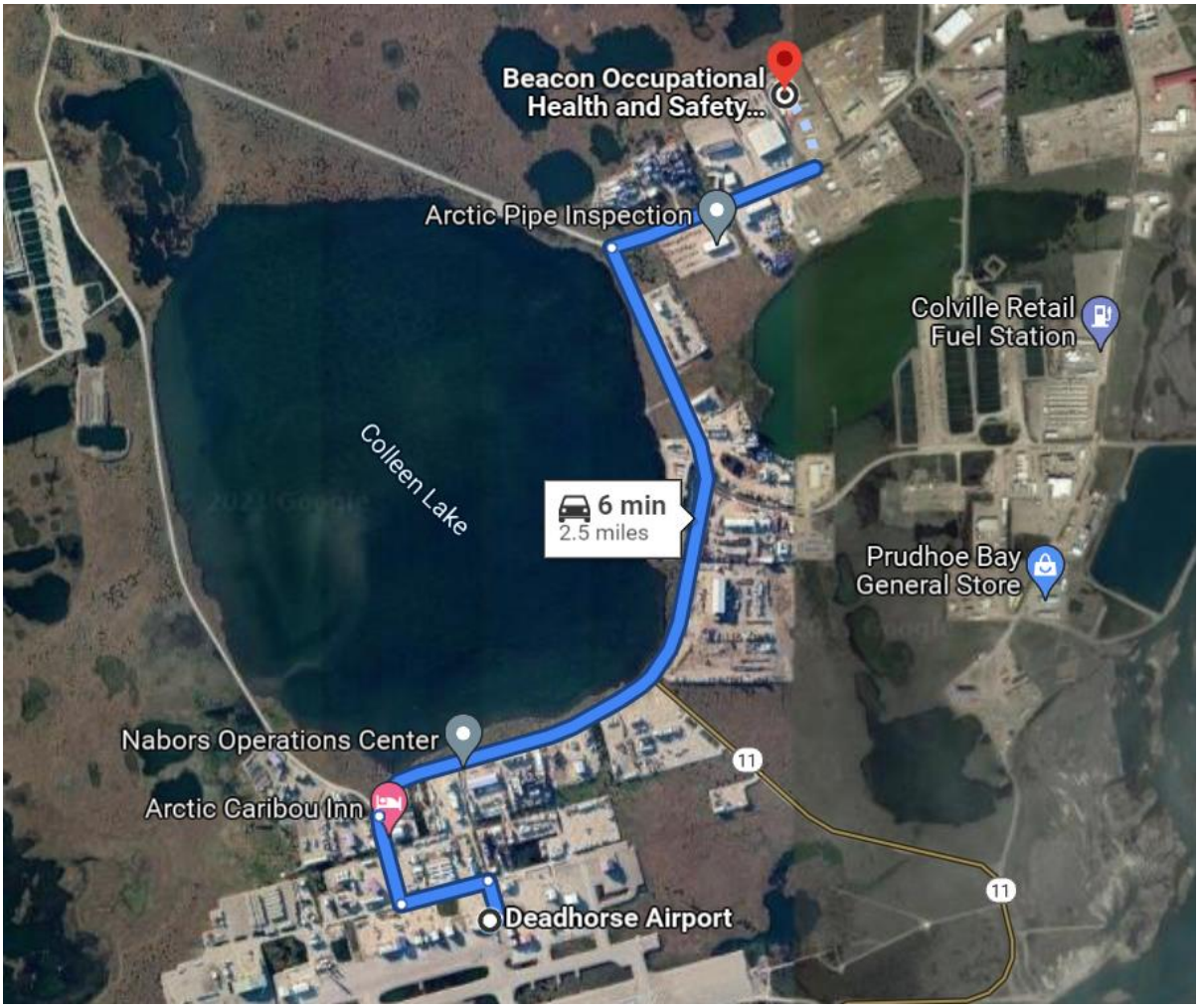
Shannon & Wilson field personnel are current in first aid and cardiopulmonary resuscitation (CPR) training. At a minimum, the following site safety equipment and first aid supplies shall be available in the field:

- PPE and clothing specialized for known site hazards;
- first aid kit, including first aid booklet;
- portable eye wash;
- clean water in portable containers; and
- other decontamination supplies.

The primary emphasis of any health and safety plan is accident prevention. If an injury or illness occurs during the course of field work, the severity of the problem will dictate the

level of response. Minor injuries or illness will be addressed with basic first aid measures as recommended by a registered nurse through Shannon & Wilson's corporate Medcor service (1-800-775-5866). More serious injuries will require assistance from the medical staff at Beacon Occupational Health and Safety Services, located at 1 Spine Road, Prudhoe Bay, Alaska. The telephone number for the Beacon is (907) 659-2699. Field phones will be kept easily accessible in the case of an emergency.

Exhibit 1: Map Showing Directions from the SCC to Beacon Occupational Health and Safety Services



Shannon & Wilson's Corporate Health and Safety Program requires accident reporting when there is a site-related accident, near-miss incident, or medical emergency. If an employee is treated by medical personnel, the medical attendant will complete an Incident Medical Treatment Documentation form. Completion of an Alaska Department of Labor Report of Occupational Injury or Illness is also required within 10 days for any work-related injury or illness.

B.7. GENERAL SITE SAFETY REQUIREMENTS

The following measures are designed to augment the specific health and safety guidelines provided in this plan:

- Field personnel should avoid contact with potentially contaminated surfaces such as: walking through puddles or pools of liquid; kneeling on the ground; or leaning, sitting, or placing equipment on contaminated soil or containers.
- Field personnel will be familiar with procedures for initiating an emergency response.
- Hazard assessment is a continual process; personnel must be aware of their surroundings and any chemical/physical hazards present.
- Personnel in the exclusion area shall be the minimum number necessary to perform work tasks in a safe and efficient manner.
- The use of contact lenses is prohibited; soft lenses may absorb irritants, and all lenses concentrate irritants.
- Equipment contacting potentially contaminated soil or water must be decontaminated or properly discarded before leaving the site.

Field personnel will be familiar with the physical characteristics of the work site including wind direction, site access, and location of communication devices and safety equipment.

B.8. COVID SPECIFIC REQUIREMENTS

Shannon & Wilson has produced guidance documents for conducting field work during the outbreak of the coronavirus disease (COVID-19). These guidance documents are included as an attachment to this appendix. Additionally, DOT&PF has provided guidance to their contractors for work conducted for the State of Alaska during the COVID-19 outbreak. This information is located at the following link: http://dot.alaska.gov/2020.

APPENDIX B: SITE SAFETY AND HEALTH PLAN

SITE SAFETY AND HEALTH PLAN PERSONAL ACKNOWLEDGEMENT FORM

DOT&PF DEADHOURSE AIRPORT
PRELIMINARY PFAS INVESTIGATION WORK PLAN

I have reviewed this document and understand its contents and requirements. A copy of the above-referenced document has been made available to me. I agree to abide by the requirements of this Site Safety and Health Plan.

_____	_____
Signature	Name (printed)
_____	_____
Date	Representing

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

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your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

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being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland