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FINAL REV 1.1

GENERAL WORK PLAN ADDENDUM

DOT&PF Statewide PFAS Addendum 001-AKN-01 Initial Site Characterization

KING SALMON, ALASKA

SHANNON & WILSON

June 2021

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Submitted To: Alaska Department of Transportation & Public Facilities
2301 Peger Road
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Attn: Mr. Marcus Zimmerman and Ms. Sammy Cummings

Subject: FINAL REV 1.1 GENERAL WORK PLAN ADDENDUM, DOT&PF STATEWIDE PFAS
ADDENDUM 001-AKN-01
INITIAL SITE CHARACTERIZATION , KING SALMON, ALASKA

Shannon & Wilson prepared this revised Work Plan Addendum on behalf of the Alaska Department of Transportation & Public Factifies (DOT&PF). This Addendum is a supplement to the *FINAL Revision 1 DOT&PF Statewide PFAS General Work Plan* (GWP), submitted July 2020. The services proposed in this GWP Addendum, 001-AKN-01, describes the DOT&PF planned activities for site characterization associated with per- and polyfluorinated substances (PFAS) for the King Salmon Airport (AKN). The recommendations supersede those provided in the previous version of this Work Plan Addendum.

The scope of services was initially specified in the proposal dated May 7, 2019 and authorized on May 31, 2019 by DOT&PF under Professional Services Agreement Number 25-19-013 *Per- and Polyfluorinated Substances (PFAS) Related Environmental & Engineering Services*. A revised scope of services and additional funding to implement this Work Plan Addendum was specified in the proposal dated December 23, 2020 and approved by DOT&PF on March 26, 2021. The final Work Plan Addendum will be submitted to the Alaska Department of Environmental Conservation (DEC) for approval.

This GWP Addendum was prepared and reviewed by:

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Associate, Statewide Project Manager

RLW:MXJ:KRF:CBD/rlw

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ACRONYMS

AAC	Alaska Administrative Code
AFCEC	Air Force Civil Engineering Center
AFFF	aqueous film forming foam
ARFF	aircraft rescue and firefighting
AKN	King Salmon Airport
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
COPC	contaminant of potential concern
CSM	Conceptual Site Model
DEC	Alaska Department of Environmental Conservation
DOT&PF	Alaska Department of Transportation & Public Facilities
DRO	diesel range organics
DVPP	Data-Validation Program Plan
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GAC	granular activated carbon
GRO	gasoline range organics
GWP	General Work Plan
IDW	investigative-derived waste
KSD	King Salmon Divert
LHA	Lifetime Health Advisory
LOD	limit of detection
mg/kg	milligram per kilogram
mg/L	milligram per liter
PAH	polycyclic aromatic hydrocarbons
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
POC	point of contact
PPE	personal protective equipment
ppm	parts per million
ppt	parts per trillion
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan

ACRONYMS

QC	quality control
RL	reporting limit
RRO	residual range organics
SIM	selective ion monitoring
SSHP	Site Safety and Health Plan
TCLP	Toxicity Characteristic Leaching Procedure
USACE	United States Army Corps of Engineers
USAF	United States Air Force

1 INTRODUCTION

This revised Addendum, 001-AKN-01, is a supplement to the *DOT&PF Statewide PFAS General Work Plan* (GWP). In collaboration with the GWP, this Addendum provides guidance for per- and polyfluoroalkyl substances (PFAS) site characterization activities near the King Salmon Airport (AKN) in King Salmon, Alaska (Figure 1, Exhibit 1-1). This document was revised to address comments received from the Alaska Department of Environmental Conservation (DEC) on August 26, 2020 and to update the scope of work. Updates include efforts to target source areas and affected properties and reduce drilling costs.

Shannon & Wilson prepared the GWP and this Addendum in accordance with Alaska Department of Environmental Conservation's (DEC) March 2017 *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* and DEC's October 2019 *Field Sampling Guidance* document. This Addendum also includes a Site Safety and Health Plan (SSHP). Shannon & Wilson will follow their internal *Guidance for Field Work During the COVID-19 Pandemic* (April 2020) guidelines for field work conducted during the COVID-19 outbreak. If additional site characterization activities are required that are not covered in the GWP or are deviations from the GWP, they are described in this addendum.

Exhibit 1-1: Airport Information

Airport Name:	King Salmon Airport
Airport Code:	AKN
DEC File No. / Hazard ID:	2569.38.033 / 26981
Airport Address:	1 King Salmon Airport Road, King Salmon, Alaska 99613
DOT&PF Region:	Southcoast
DOT&PF Regional POC:	Marcus Zimmerman
DOT&PF PFAS POC:	Sammy Cummings
Airport Type:	Current Part 139 Airport and Former DoD
Airport Coordinates (Lat/Long):	56.6767, -156.6492

POC = point of contact

Site characterization efforts for this Addendum are focused on the Alaska Department of Transportation and Public Facilities (DOT&PF) AKN property not leased to the United States Air Force (USAF). Shannon & Wilson understands the United States Army Corps of Engineers (USACE), the Air Force Civil Engineer Center (AFCEC) and their contractors have performed environmental investigations on the King Salmon Divert (KSD), a former

USAF installation located on DOT&PF leased land north and north east of the AKN. The USACE and AFCEC investigations are focused on characterizing their leased parcels.

1.1 Background

General background information relating to sites covered under the GWP is included in Section 1.1 of the GWP. Background information specific to the AKN is detailed below.

The AKN property was an active USAF installation known as the KSD during the 1930s through the 1950s. During the 1940s, the land was used for aircraft storage and fuel stops during World War II. Ownership transferred to the Federal Aviation Administration (FAA) following World War II and remained a federal property until transferred to Alaska upon statehood in 1959. The USAF withdrew remaining permanent military personnel and aircraft from the KSD in 1994 but continues to lease multiple parcels of land surrounding the existing runway.

The airport meets the requirements defined in Title 14, Code of Federal Regulations (CFR), Part 139, which requires specific certification through the FAA. This certification requires in part that the airport provide aircraft rescue and firefighting (ARFF) services to ensure safety during air transportation. As part of this certification, Part 139 Airports are required to conduct annual ARFF training for emergency response situations using aqueous film forming foam (AFFF) in order to demonstrate compliance with the regulations. The FAA lifted the requirement to use AFFF during training exercises beginning in 2019 and alternate FAA approved testing units have been implemented to test fire apparatus systems without discharging AFFF.

PFAS-containing AFFF was first reportedly used on AKN property in the 1970's. AFFF has been known to be stored and used for training purposes at the AKN runway and at additional locations on DOT&PF property. CH2M's March 2018 *Preliminary Assessment Report for Perfluorinated Compounds, King Salmon Divert, Alaska* summarized 11 known AFFF-release locations from old training areas located on the KSD. Discussions with DOT&PF staff revealed additional sites near the AKN runway where AFFF has been used for DOT&PF training and emergency response purposes. The precise locations of the DOT&PF training areas are unknown.

1.1.1 USAF Subsurface Investigations

The King Salmon area is underlain by glacial outwash plain sediments (Feulner 1963). Known areas of permafrost exist along Eskimo Creek and west of the confluence of Eskimo Creek and the Naknek river. Multiple USAF reports between 1985 and 2006 describe and

characterize three aquifers beneath King Salmon, denoted as A, B, and C. CH2M provided the following discussion of the hydrogeology in the area surrounding the King Salmon AFS in their document *Final Uniform Federal Policy – Quality Assurance Project Plan for Site Inspections of Aqueous Film Forming Foam Areas,KSD, Alaska*, dated July 2019. Some sections are provided below:

Intense glaciation occurred during the Pleistocene period over much of the Alaska Peninsula, which produced the outwash sediment underlying much of KSD. At least three aquifer units are known to be present in the King Salmon area. These aquifers consist of unconsolidated, well-sorted to poorly sorted silty and gravelly sands, separated by aquitard units consisting of silty sands, silts, and clays. The aquitards separating these aquifers may be discontinuous (Science Applications International Corporation [SAIC], 1992).

*The shallowest aquifer, the A-Aquifer, is unconfined and comprised of moderately well-sorted sands and silty sands with discontinuous lenses of medium- to coarse-grained gravel at the base. The A-Aquifer outcrops in many areas within KSD, and the total depth to the A-Aquifer ranges from ground surface at water bodies and wetlands, to 45 feet below ground surface (bgs) along the northern margin of KSD. The saturated thickness ranges from 0 to 15 feet. Groundwater movement is generally toward local topographic lows and surface drainages such as wetlands, rivers, creeks, and ditches, and is most likely recharged by precipitation and surface water. Major drainages such as the Eskimo and Red Fox Creeks have eroded through the A-Aquifer. At the base of the A-Aquifer is a zone of lower hydraulic conductivity, consisting of a gravelly clayey silt and sandy silt, referred to as the A-Aquitard. The underlying A-Aquitard is from 7 to 22 feet thick (USAF, 2017b). The A-Aquitard has previously been reported to locally disrupt and modify the regional unconfined groundwater flow pattern (A-Aquifer) in some areas when encountered at its thickest points (*SAIC, *1992). Some drinking water wells downgradient of the KSD may be screened in the A-Aquifer.*

The top of the B-Aquifer has been encountered at depths ranging from 50 to 80 feet bgs. The known thickness of this aquifer ranges from 15 to 40 feet. The B-Aquifer is situated in interbedded sequences of silty sands, sandy gravels, and silty sandy gravels. A second aquitard (the B-Aquitard) is present at the base of the B-Aquifer. The thickness of this B-Aquitard is estimated at between 10 and 120 feet (USAF, 2017b). This unit is comprised of predominantly sandy clay (SAIC, 1992). Groundwater in the B-Aquifer is probably in equilibrium with the A-Aquifer; similar piezometric surface has been measured in adjacent A-Aquifer and B-Aquifer monitoring wells. Groundwater flow direction in the B-Aquifer is south towards the Naknek River. Numerous residential drinking water-supply wells are screened in this aquifer.

The C-Aquifer underlies the B-Aquitard at a depth of approximately 205 feet bgs. KSD water-supply wells are reported to terminate in the C-Aquifer, which is thought to be a confined aquifer. The aquifer thickness and flow direction are unknown for the C-Aquifer (Paug-Vik Services [PVS], 2009a). Limited data from water supply well No. 5 suggest that the thickness of C-Aquifer is at least 20 feet (SAIC, 1992).

1.1.2 Water Supply Well PFAS Monitoring

DEC collected water supply well samples from nine locations around AKN in December 2018. In response to the detections for PFAS compounds, Shannon & Wilson was contracted by the DOT&PF to conduct a preliminary water supply well search for the areas near AKN. The initial water supply well search was conducted in March 2019 and was focused on the area hydraulically downgradient from AFFF training areas at the AKN. During the initial well search, Shannon & Wilson sampled 21 private wells within the well search area. Several of the buildings along the Naknek River were determined to be dry structures that are occupied seasonally. Shannon & Wilson conducted quarterly sampling in July 2019, October 2019, January 2020, and July 2020 within 500 feet of affected properties. DEC defines affected properties as those having private wells with at least one sample result above the U.S. Environmental Protection Agency (EPA) published a Lifetime Health Advisory (LHA) level of 70 parts per trillion (ppt) for the sum of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). The well search boundary and affected properties are shown in Figure 2.

The following list presents the affected properties associated with the AKN PFAS plume:

1. [redacted] – AKNPW-204)
2. [redacted] – AKNPW-003)

Specific information regarding temporary alternative water for the affected properties is presented below. Permanent solutions for affected properties are being investigated. A summary of the analytical results for the quarterly monitoring near the AKN is presented in Table 1 and Figure 2.

1.1.2.1 [redacted]

According to a boring log, the [redacted] well is installed to a depth of 60 feet below ground surface (bgs). Adjacent properties are suspected to have deeper wells, installed to 80-100 feet bgs. The depths of the adjacent wells are only approximate, and well-depth information is based on private property owners' knowledge. The highest concentration for the sum of PFOS and PFOA at the [redacted] was 120 ppt collected in March 2019. PFAS at adjacent,

presumably deeper wells did not have detections greater than the LHA. Shannon & Wilson suspects the [redacted] well is the shallowest well in the surrounding area and most likely to be impacted by PFAS contamination.

The [redacted] used their water supply well for the deli and ice machine. Johnson Drilling Company was subcontracted disconnect the [redacted] from their existing well and to purchase the necessary materials to connect the [redacted] to the nearby [redacted] water supply well. The connection to the inn's water supply well was completed in April 2019. The PFAS results for [redacted] water supply well have been less than the LHA.

1.1.2.2 [redacted]

A well log is not available for [redacted] water supply well. Based on conversations with the business owner and local residents, the water supply well for [redacted] is believed to be shallower than adjacent wells. The highest concentration for the sum of PFOS and PFOA at [redacted] was 87 ppt collected in October 2019. PFAS at adjacent, presumably deeper wells did not have detections greater than the LHA.

[redacted] used their water supply well for drinking, cooking, bathing, and similar domestic uses. The water supply well was also used to fill the non-potable water tanks for fishing vessels during the commercial fishing season. The water supply well is no longer used for drinking and cooking water, but [redacted] continues to use the well to fill the non-potable water tanks for fishing vessels. The owner of [redacted] notifies the fishing vessel captains that the water supply well is for non-drinking and cooking water. DOT&PF is providing bottled water to [redacted] for distribution to fishing vessels for drinking and cooking water during the 2021 commercial fishing season.

1.2 Project Objective and Scope

The project objective is to better understand the extent of PFAS contamination resulting from the historic use of AFFF by the DOT&PF at the AKN. This Addendum describes our methods used to identify PFAS source areas and evaluate the horizontal and vertical extent of PFAS contamination on and off the airport property. Refer to Section 2.3 for contaminants of potential concern (COPCs) and Exhibit 4-1 for proposed samples and analyses.

The revised scope for this initial site characterization effort includes:

- installing seven monitoring wells at five locations and collecting analytical groundwater samples;
    - each location will have one well screened to span the groundwater table;
    - locations near the two affected properties will have a monitoring well installed in the lower portion of the B-Aquifer to assist with providing information regarding potential alternate water sources for these properties;
- collecting analytical soil samples from monitoring well soil borings during the installations;
- collecting analytical surface water samples from Eskimo Creek and Red Fox Creek; and
- collecting analytical surface water, if available, and surface soil samples within the drainage surround the AKN near suspected source areas.

The proposed locations for soil, surface water, and groundwater samples are presented in Figures 3 and 4.

2 SITE AND PROJECT DESCRIPTION

The following sections provide a site and project description.

2.1 Site Location and Boundaries

The AKN is located at 1 King Salmon Airport Road in King Salmon, Alaska. King Salmon sits north of the Naknek River in the Bristol Bay Borough (Figure 1). The geographic coordinates of the AKN terminal are latitude 58.6767, longitude -156.6492. Characterization efforts for this Addendum are focused on DOT&PF AKN property, and not parcels leased to the USAF.

2.2 Potential Sources of Contamination

General information regarding potential sources of contamination at DOT&PF sites are included in Section 2.1 of the GWP. Specific potential sources of contamination at the AKN, are included as part of this Addendum and summarized below.

The four onsite areas identified by DOT&PF as potential AFFF fire training or emergency response sites along the AKN runways are depicted in Figure 2. Site characterization activities will be focused on these areas, excluding the northern most site which is located on DOT&PF property leased to the USAF. Additional AFFF fire training or emergency

response areas used by DOT&PF may exist but have not been identified by the DOT&PF staff at AKN.

DOT&PF reportedly responded to a mutual aid request to assist with extinguishing a structure fire west of Eskimo Creek with AFFF (Figure 2). This potential source area is not included in the current scope of services and is not addressed in this initial site characterization Addendum.

2.3 Contaminants of Potential Concern and Regulatory Levels

General information regarding COPCs and regulatory levels is included in Section 2.2 of the GWP. The primary COPCs for this project are the PFOS and PFOA. DEC's *Field Sampling Guidance* (2019) also identifies gasoline range organics (GRO), diesel range organics (DRO), residual range organics (RRO), benzene, toluene, ethylbenzene, and xylenes (BTEX), and polynuclear aromatic hydrocarbons (PAHs) as COPCs at AFFF training areas and emergency response sites.

King Salmon has an annual average precipitation of approximately 20 inches per year, per the Western Region Climate Center database (https://wrcc.dri.edu/). To evaluate analytical data, soil results will be compared to the most conservative of either migration to groundwater or human health cleanup levels listed in 18 Alaska Administrative Code (AAC) 75.341 *Tables B1 Method Two and B2, Method Two – Under 40-Inch Zone*. Groundwater and surface water samples will be compared to Alaska's 18 AAC 75.341 *Table C, Groundwater Human Health Cleanup Level*. The current cleanup levels and analytical reporting limits for the site COPCs are summarized below in Exhibit 2-1.

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

Method	Analyte	Soil Limit[a] (mg/kg)	Water Limit[b] (mg/L)	Laboratory LODs/RLs[c]	
				Soil (mg/kg)	Water (mg/L)
PFAS Analytes					
537.1[d]	PFOS	0.0030	0.40	0.000200	0.00000200
	PFOA	0.0017	0.40	0.000500	0.00000200
Petroleum Analytes					
AK101	GRO	300	2,200	1.25	0.050
AK102	DRO	250	1,500	10	0.300
AK103	RRO	11,000	1,100	50	0.250
EPA 8260 (BTEX)	Benzene	0.022	4.6	0.00625	0.0002
	Toluene	6.7	1,100	0.0125	0.0005
	Ethylbenzene	0.13	15	0.0125	0.0005
	Xylenes Total	1.5	190	0.0375	0.0015
PAH Analytes					
EPA 8270D-SIM (PAH)	1-Methylnaphthalene	0.41	11	0.0125	0.000025
	2-Methylnaphthalene	1.3	36	0.0125	0.000025
	Acenaphthene	37	530	0.0125	0.000025
	Acenaphthylene	18	260	0.0125	0.000025
	Anthracene	390	43	0.0125	0.000025
	Benzo(a)anthracene	0.70	0.30	0.0125	0.000025
	Benzo[a]pyrene	1.9	0.25	0.0125	0.00001
	Benzo[b]fluoranthene	15*	2.5	0.0125	0.000025
	Benzo[g,h,i]perylene	2,300*	0.26	0.0125	0.000025
	Benzo[k]fluoranthene	150*	0.80	0.0125	0.000025
	Chrysene	600	2.0	0.0125	0.000025
	Dibenzo[a,h]anthracene	1.5*	0.25	0.0125	0.00001
	Fluoranthene	590	260	0.0125	0.000025
	Fluorene	36	290	0.0125	0.000025
	Indeno [1,2,3-c,d] pyrene	15*	0.19	0.0125	0.000025
	Naphthalene	0.038	1.7	0.0100	0.00005
	Phenanthrene	39	170	0.0125	0.000025
	Pyrene	87	120	0.0125	0.000025

Notes:

a. 18 AAC 75 *Table B2. Method Two - Petroleum Hydrocarbon Soil Cleanup Levels – Under 40-Inch Zone* or *Table B1. Method Two - Soil Cleanup Levels Table*. The most stringent between Human Health and Migration to Groundwater cleanup levels are reported. Migration to Groundwater cleanup level reported unless otherwise identified.

b. 18 AAC 75 *Table C. Groundwater Cleanup Levels*.

c. February 2020 LODs from SGS North America, Inc. for petroleum and PAH analyses. February 2020 RLs from Eurofins TestAmerica, Inc. for PFAS analyses.

d. All available PFAS analytes will be requested for analytical reports. However, only PFOS and PFOA have DEC Cleanup Levels and are reported in this table.

* 18 AAC 75 Table B1 Human Health cleanup level reported.

BTEX = benzene, toluene, ethylbenzene, and total xylenes; DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics, LOD = limit of detection, mg/kg = milligram per kilogram; mg/L = milligram per liter, PAH = polynuclear aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, PFOA = perfluorooctanoic acid PFOS = perfluorooctanesulfonic acid, RL = reporting limit, RRO = residual range organics, SIM = selective ion monitoring

2.4 Conceptual Site Models and Site Safety and Health Plans

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 Addendum.

Potentially affected media include contaminated soil/sediment, surface water, and groundwater. Potential human exposure pathways include inhalation of fugitive dust, direct contact with contaminated soil/sediment, and ingestion of soil, surface water, and groundwater. Additionally, ingestion of wild foods may be a human exposure pathway as PFOS and PFOA are bioaccumulative. Potential receptors are described below:

- Site investigations and excavation activities at the site may result in incidental ingestion of soil, direct contact with soils and sediment, groundwater, and inhalation of outdoor air by commercial workers, visitors, or construction workers.
- Contaminated surface soil may result in fugitive dust that could be an exposure pathway for commercial workers, visitors, construction workers, and nearby residents.
- Two water supply wells near the AKN have PFAS contamination at concentrations greater than the LHA. Ingestion of groundwater is a potential pathway for these locations. Alternative water is being provided to the owners of these two water supply wells to avoid this potential pathway. However, one of these water supply wells is still operational. Refer to Section 1.1.2 for details.
- Incidental ingestion of contaminated surface water is a potential human exposure pathway to commercial workers, visitors, construction workers, and nearby residents. Direct contact with surface water is unlikely to be an exposure pathway because PFAS is not readily absorbed through the skin.
- Wildlife, including fish, are known to use the area where PFAS contamination has been identified in groundwater. Eskimo Creek and Red Fox Creek are adjacent to areas of known AFFF use. It is unlikely that subsistence users rely on AKN property for harvesting terrestrial biota but the King Salmon/Bristol Bay region supports a commercial fishery with global reach. Since PFAS can bioaccumulate, subsistence and recreational harvesting of the biota are potential exposure pathways for visitors and residents of the area. However, the lack of data on the nature and extent of PFAS contamination in the project area prevents ruling out this exposure pathway.

2.5 Project Team

Chris Darrah is Shannon & Wilson's Principal-in-Charge and Kristen Freiburger is Project Manager for this DOT&PF Statewide PFAS contract. Michael Jaramillo will serve as the Environmental Lead for the AKN 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 below.

Exhibit 2-2: Project Team

Affiliation	Responsibility	Representative	Contact Number
DOT&PF	Client – Regional POC	Marcus Zimmerman	(907) 456-4655
	Client – Statewide PFAS POC	Sammy Cummings	(907) 888-5671
DEC	Regulatory agency POC	Sammi Castle	(907) 269-0298
Shannon & Wilson	Principal-in-charge	Christopher Darrah	(907) 458-3143
	Project Manager	Kristen Freiburger	(907) 458-3146
	Environmental Lead POC	Michael Jaramillo	(907) 458-3156
Eurofins/ TestAmerica, Inc.	PFAS analytical laboratory services	David Alltucker	(916) 374-4383
SGS North America, Inc.	Additional analytical laboratory services	Jennifer Dawkins	(907) 474-8656
GeoTek Alaska	Soil-boring and monitoring well installations	Glen Rawson	(907) 569-5900
Coastal Surveyors	Surveyor subcontractor	POC	(907) 246-4408

POC = point of contact

2.6 Project Schedule and Submittals

Section 2.5 of the GWP provides general information regarding project schedules (i.e. the general order of occurrence of site characterization activities) and associated submittals.

Once DEC approval is received for the proposed scope of services outlined in this Addendum, Shannon & Wilson will coordinate with DOT&PF staff to collect samples of groundwater, surface water, and soils. Field activities are tentatively scheduled for late July to early August 2021. This schedule is subject to change following guidance by the U.S. Centers for Disease Control and Prevention, Alaska Department of Health and Social Services, and the Bristol Bay Borough regarding the COVID-19 pandemic. Laboratory analysis will be requested on a standard 14-day turn-around time. After field work is

complete, a Site Characterization Report will be prepared documenting the results of the sampling event. The report will include summarized field observations, analytical results with a discussion of data quality, photo documentation, figures showing sample locations, description of deviations from the approved Addendum, if any, and conclusions and recommendations. The report will also include an updated CSM.

The following is the anticipated schedule:

- Work Plan Implementation (field activities) – July/August 2021
- Draft Report Submittal - within 60 days of receipt of analytical results
- Final Report Submittal - within 30 days of receiving DEC comments on the Draft Report

3 SITE CHARACTERIZATION ACTIVITIES

The following sections describe the site characterization activities to be conducted at AKN. Sampling procedures and analytical methods are described in Section 4. A Quality Assurance Program Plan (QAPP) is included in Section 5. General information regarding site characterization activities are described in Section 3.2 of the GWP. A Site Safety and Health Plan (SSHP) is provided in Appendix B.

3.1 Pre-investigation Activities

Pre-investigation tasks for this project are outlined in the following sections. These tasks include obtaining access to AFFF fire training and emergency response areas near active AKN runways and checking for utilities in areas proposed for drilling activities.

3.1.1 Site Access

The AKN is an active airport that will require coordination to access AFFF fire training and emergency response sites prior to field activities. The AKN airport manager will be responsible for coordinating with the FAA to obtain approval to access these areas. Documentation (i.e. permits) of the FAA/DOT&PF-approved dates, times, and locations will be maintained on-site during field activities conducted on or near runways at the AKN.

3.1.2 Utility Locates

Utility clearance will be coordinated by contacting the State of Alaska Dig Line at 811 and the AKN airport manager. A map of anticipated drilling locations will be provided to the Alaska Digline and the AKN airport manager, no later than one week prior to planned activities. Shannon & Wilson assumes the Digline and AKN airport manager will provide

information regarding utilities in the proposed investigation areas and mark utilities that are close to drilling activities.

3.2 Soil Characterization Activities

Soil characterization activities for this project include field screening and sample collection from soil borings and surface soils, as described in the following sections. General information regarding soil characterization activities are described in Section 3.2.2 of the GWP.

Field personnel will document field activities with field notes and photographs using the applicable field forms (Appendix B of GWP), as detailed in Section 5.2. Analytical laboratories and methods employed as a part of this Addendum are identified in Section 4.10. Field screening and soil sampling procedures are presented in Section 4.2 and 4.3, respectively. Proposed sampling locations are presented in Figure 3.

3.2.1 Soil Borings

The drilling subcontractor will drill seven soil borings for the purpose of collecting soil samples and installing monitoring wells. These monitoring-well soil borings will be drilled as follows:

- Three on-site locations will target areas of known AFFF use, with soil boring/well-screen depths targeted to span the groundwater table;
- One on-site and one off-site location (near the two affected properties) will target shallow and deep groundwater zones. At each location, one soil boring/well screen depth will be targeted to span the shallow groundwater table and a second, deeper soil boring/well will target the lower portion of the B-Aquifer.

The monitoring wells will be installed to target the source areas on the airport and the affected properties during site characterization activities (Figure 4). We will collect soil samples from each soil boring. For the two pairs of collocated shallow and deep borings, we will collect soil samples from the deeper boring only and not from the adjacent shallow boring.

An experienced field professional will observe and log the soil borings, describe samples in the field based on visual observations, collect analytical samples for testing, and prepare a descriptive log of soil conditions encountered during drilling. Upon completion of the logging and sample collection, the drilling contractor will install a monitoring well as described in Section 4.4.1.

For the proposed borings, Shannon & Wilson will collect analytical soil samples from the soil boring locations at the following horizons and analyses. Soil samples will be collected from the deepest proposed boring at each well location.

- Onsite Locations:
    - surface soil samples roughly 6-inches bgs for the analysis of GRO, DRO, RRO, BTEX, PAH, and PFAS.
    - subsurface soil sample near the water-table smear zone for the analysis of GRO, DRO, RRO, BTEX, PAH, and PFAS.
    -
- Offsite Locations:
    - subsurface soil sample near the water-table smear zone for the analysis of PFAS.
    - subsurface soil samples near the bottom of the A-Aquifer for the analysis of PFAS;
    - subsurface soil samples near the top of the B-Aquifer for the analysis of PFAS, and
    - subsurface soil samples in the lower portion of the B-Aquifer (deeper for nests near affected properties) for the analysis of PFAS.

One field duplicate will be collected for GRO, DRO, RRO, BTEX, and PAH analyses. Two field duplicates will be collected for PFAS analysis. The A-Aquitard is expected to be approximately 100 feet bgs but will be measured in the field during drilling. Depths will be identified for each analytical sample on the field form.

3.2.2 Field Screening

Soil borings will be field screened for petroleum compounds using a photoionization detector (PID) at a frequency of one every 5 feet, down to the groundwater table. Since petroleum compounds are only expected to be encountered at AFFF fire training and emergency response areas, field screening will only occur for soil boring activities conducted onsite.

Onsite soils will be drummed for temporary storage pending analytical results. These results will be used to determine waste disposal requirements, as described in Section 4.12.

3.2.3 Surface Soil

Due to the potential for surface water migration of PFAS, Shannon & Wilson staff has identified drainage areas surrounding the AKN airport runway and AFFF fire training and emergency response sites. Shannon & Wilson propose collecting 20 surface soil samples for analysis of PFAS from these drainage areas. Priority will be given to locations near culverts or visible pooling areas along the runway, where observed during the time site characterization activities are conducted. Two field duplicates will be collected for surface soil sample locations. Approximate surface soil sample locations are shown in Figure 3. PFAS surface soil samples will be collected just below vegetation.

3.3 Groundwater Characterization

Groundwater characterization activities for this project include sample collection from permanent monitoring wells, as described in the following sections. General information regarding groundwater characterization activities are described in Section 3.2.3 of the GWP. Field personnel will document field activities with field notes and photographs using the applicable field forms (Appendix B of GWP), as detailed in Section 5. Analytical laboratories and methods employed as a part of this Addendum are identified in Section 4.5. Monitoring well installations, development, and sampling procedures are presented in Section 4.4.

3.3.1 Monitoring Wells

The drilling subcontractor will install seven monitoring wells at five locations (Figure 4). Each location will have one monitoring well screened to span the groundwater table In addition, the locations near the affected properties will have the deeper monitoring wells installed into the lower portion of the B-Aquifer to assist with providing information regarding a final solution for these properties. The anticipated depths for the wells are approximately 40 and 150-200 feet bgs.

Monitoring wells will be developed prior to sampling to remove sediment and to verify proper hydraulic connection with the aquifer. To allow time for annular-seal materials to set, field staff will begin development no sooner than 24 hours after installation is complete. The drilling subcontractor will develop the well using a combination of surging and purging. Development water will be treated and disposed of in accordance with Section 4.12.

Analytical groundwater samples will generally be collected from the monitoring wells for the following analyses. Note that fuel contaminants are not expected to be observed in

deeper portions of the aquifer so these analyses will only be collected from monitoring wells spanning the groundwater table.

- Onsite Locations:
    - Monitoring wells spanning groundwater table will be sampled for GRO, DRO, RRO, BTEX, PAH, and PFAS analyses.
- Offsite Locations:
    - Monitoring wells will be sampled for PFAS analysis.

3.4 Surface Water Characterization

General information regarding surface water characterization activities are described in Section 3.2.4 of the GWP. Field personnel will document field activities with field notes and photographs using the applicable field forms (Appendix B of GWP), as detailed in Section 5.2. Analytical laboratories and methods employed as a part of this Addendum are identified in Section 4.8. Surface water sampling procedures are presented in Section 4.5.

Shannon & Wilson will collect four surface water samples for analysis of PFAS from Eskimo Creek and Red Fox Creek. Approximate sampling locations are shown in Figure 4. Eskimo Creek is located northwest of the AKN runway and flows southwest to the confluence of the Naknek River. Shannon & Wilson will collect two samples from Eskimo Creek: one upstream and one downstream from the [redacted], an affected property located next to the Eskimo Creek. One field duplicate will be collected from the downstream location. Prior to sampling, Shannon & Wilson will consult the USACE study results to avoid redundant samples between the two studies.

The Red Fox Creek flows south to the Naknek river and is diverted under the AKN runway. Shannon & Wilson will collect two samples from the Red Fox Creek: one upstream and one downstream from the AKN runway. One field duplicate will be collected from the downstream location.

Standing surface water in drainage ditches along the runways and downgradient from source areas will also be sampled for PFAS. Shannon & Wilson anticipates collecting two additional surface water samples along the drainage ditches. One field duplicate will be collected from the drainage ditches.

4 SAMPLING AND ANALYSIS PLAN

This section describes the analytical sampling approach for investigating contamination associated with the AKN. A DEC-qualified sampler will collect and handle the samples for projects covered under this Addendum and collect required quality control (QC) samples in accordance with DEC's *Field Sampling Guidance*. A general Sampling and Analysis Plan is included as Section 4 of the GWP. Field personnel will document field activities with field notes and photographs using applicable field forms (Appendix B of GWP), as detailed in Section 5.2. Analytical laboratories and methods employed as a part of this Addendum are identified in Section 4.8. Sample containers, preservation methods, and holding times are included in Section 4.9. Sample custody, storage, and transport will be followed as described in Section 4.10. Equipment decontamination procedures are outlined in Section 4.11. Investigative-derived waste management is described in Section 4.12.

4.1 Methods for Soil Sample Retrieval

Soil sample retrieval methods for this project include hand tools and soil borings, as described in the following sections. General information regarding methods for soil sample retrieval are described in Section 4.2 of the GWP.

4.1.1 Hand Tools

Clean, stainless-steel spoons or trowels will be used for collection of surface soil samples. Surface soil samples will be collected just below vegetation for PFAS samples and at least 6 inches below the ground surface for volatile analyses (GRO and BTEX). Hand tools may also be used to collect soil samples from drill rig cuttings as described in the following section. Hand tools will be decontaminated between each sample point following procedures outlined in Section 4.11.

4.1.2 Soil Borings/Monitoring Wells

The drilling contractor, GeoTeck Alaska, will use their Geoprobe 8040DT drill rig to advance soil borings using a combination of air rotary and down-the-hole-hammer drilling methods. We will collect soil samples during drilling by the Modified Standard Penetration Test (MSPT) method, using a 2.5-inch inside diameter split spoon for soil characterization purposes. The MSPT will be driven 18 inches into the soil at the base of the augers with a 340-pound automatic hammer. Each MSPT will consist of three, six-inch runs for a total MSPT run of 18 inches

Soil samples will be collected at a frequency of one every 10 feet for onsite wells, and one every 25 feet for offsite wells, with special care to characterize the A-Aquitard. Modifications to the sampling frequency may be required if large boulders or cobbles are encountered and prevent drillers and Shannon & Wilson field-staff from obtaining samples for a given interval. Any modifications to the sampling frequency will be noted in the field logs.

We will create a soil boring log for each well installation. Soil characterization will be completed consistent with the Unified Soil Classification System. Drilling activities will be observed by a Shannon & Wilson geotechnical staff member. The soil characterizations conducted in the field are based on visual-manual procedures from ASTM D2488.

4.2 Field Screening

Field screening procedures are described in Section 4.3 of the GWP.

4.3 Soil Sampling

Soil sampling procedures are outlined in Section 4.4 of the GWP.

4.4 Monitoring Well Groundwater Sampling

Monitoring well groundwater sampling is described in Section 4.6 of the GWP.

4.4.1 Monitoring Well Construction and Installation

MW construction and installation procedures are described in Section 4.6.1 of the GWP. The MWs screened to span the groundwater table will be constructed with 2-inch inside-diameter schedule 40 PVC material with 0.010-inch slotted screen and threaded caps. The deeper monitoring wells at affected properties will be constructed with 6-inch inside diameter schedule 40 PVC material with 0.010-inch slotted screen and treaded caps. These MWs will be completed with a 5-foot-long screen. The anticipated depths for the two deeper wells are approximately 150-200 feet bgs. Onsite wells will be completed as flush mount wells and offsite nests will be completed as aboveground monuments, unless plowing/traffic concerns are an issue.

4.4.2 Monitoring Well Development

MW development procedures are described in Section 4.6.2 of the GWP. Wells will be developed by the drillers 24 hours after installation and development water will be treated and disposed of in accordance with Section 4.12.

4.4.3 Monitoring Well Sampling

MW sampling procedures are described in Section 4.6.3 of the GWP. A Proactive submersible water pump (or similar) with new PFAS-free tubing will be used to collect groundwater samples from each well. Purge water will be treated and disposed of in accordance with Section 4.12.

4.5 Surface Water Sampling

Surface water sampling procedures are detailed in Section 4.7 of the GWP. Samples will be collected with a new, PFAS-free disposable transfer container.

4.6 Analytical Sample Summary

An analytical sample summary is detailed in Exhibit 4-1 below.

Exhibit 4-1: Analytical Sample Summary

	Matrix	Location Type	PFAS (EPA 537.1)	GRO / DRO / RRO (AK101 / AK102 / AK103)	BTEX (EPA 8260)	PAH (EPA 8270D-SIM)
Number of Samples	Soil Borings	Onsite	6 + 1 QC	6 + 1 QC	6 + 1 QC	6 + 1 QC
		Offsite	8 + 1 QC	-	-	-
	Surface Soils	Drainage Ditches	20 + 2 QC	-	-	-
	Groundwater	Onsite	3 + 1 QC	3 + 1 QC	3 + 1 QC	3 + 1 QC
		Offsite	4 + 1 QC	-	-	-
	Surface Water	Creeks	4 + 2 QC	-	-	-
		Drainage Ditches	2 + 1 QC	-	-	-

Notes:

BTEX = benzene, toluene, ethylbenzene, and total xylenes; DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics, PAH = polynuclear aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, QC = quality control samples; RRO = residual range organics, SIM = selective ion monitoring

4.7 Special Considerations for PFAS Sampling

Special considerations for PFAS sampling are outlined in Section 4.9 of the GWP.

4.8 Analytical Laboratories and Methods

Samples for the analysis of petroleum and PAH analytes will be submitted to SGS North America, Inc. of Anchorage, Alaska. Samples for the analysis of PFAS will be submitted to Eurofins TestAmerica, Inc. Laboratory of Sacramento, California. Based on the DEC Technical Memorandum issued on October 2, 2019, PFAS analysis will report the 18 PFAS compounds defined in the EPA 537.1 method. Other analytical samples will be submitted for the analyses listed in Exhibit 4-2.

SGS North America, Inc. of Anchorage, Alaska and Eurofins TestAmerica, Inc. of Sacramento, California are DEC Contaminated Sites approved laboratories for the requested methods (SGS Certificate number 17-021 expires 01/2022; TestAmerica Certificate number 17-020 expires 02/2024).

4.9 Sample Containers, Preservation, and Holding Times

General information regarding sample containers, preservation, and holding times described in Section 4.11 of the GWP. This information is provided in Exhibit 4-2, below, for the analytical methods employed for this project.

Exhibit 4-2: Sample Containers, Preservation, and Holding Time Requirements

Analyte	Method	Media	Container and Sample Volume	Preservation	Holding Time
PFAS	EPA 537.1	Water	2 x 250 mL polycarbonate	0 °C to 6 °C	14 days to extraction
		Soil	4-oz polycarbonate	0 °C to 6 °C	
GRO	AK101	Water	3 x 40-mL VOA vials (no headspace)	HCl to <4 0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
		Soil	Pre-weighed 4-oz amber glass jar with septa	25mL MeOH 0 °C to 6 °C	
DRO	AK102	Water	2 x 250-mL amber glass	HCl to <4 0 °C to 6 °C	7 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz amber glass jar	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
RRO	AK103	Water	2 x 250-mL amber glass	HCl to <4 0 °C to 6 °C	7 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz amber glass jar	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
BTEX	EPA 8260	Water	3 x 40-mL VOA vials (no headspace)	HCl to <4 0 °C to 6 °C	14 days
		Soil	Pre-weighed 4-oz amber glass jar with septa	25mL MeOH 0 °C to 6 °C	
PAHs	EPA 8270D-SIM	Water	2 x 250-mL amber glass	0 °C to 6 °C	7 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz amber glass jar		14 days to extraction, analyzed within 40 days of extraction

NOTES:

1 The appropriate EPA method for PFAS analysis will be predicated on the type of samples to be collected (e.g. drinking water, groundwater, soil, etc.) and what EPA methods are available from the laboratory at the time of sampling. The exact method or methods to be used will be identified in the site-specific addendum.

BTEX = benzene, toluene, ethylbenzene, and total xylenes; °C = degrees Celsius, DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics, HDPE - high density polyethylene, HCl = hydrochloric acid, mL = milliliter, oz = ounce, PAH = polynuclear aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, RRO = residual range organics, SIM = selective ion monitoring, VOA = volatile organic analysis

4.10 Sample Custody, Storage, and Transport

Sample custody, storage, and transport procedures are described in Section 4.12 of the GWP.

4.11 Equipment Decontamination

Equipment decontamination procedures are described in Section 4.13 of the GWP.

4.12 Investigative-Derived Waste Management

Investigation-derived waste (IDW) will consist of soil cuttings, decontamination rinsate water, and monitoring well development and purge water.

Soil cuttings will be spread in the immediate surroundings of the boring location unless field observations (i.e. visual staining, odor, or PID readings greater than 20 ppm) suggest the presence of contamination. If contaminants are suspected to be present in soil cuttings, the soil cuttings will be combined and placed in 55-gallon drums or other appropriate containment and temporarily stored onsite at the DOT&PF maintenance building. DEC approval to dispose of the drums at the Bristol Bay Borough Landfill (between the City of Naknek and King Salmon) will be coordinated prior to field activities.

Liquids will be passed through a granular activated carbon (GAC) filter, containerized, and sampled for all requested analyses, and stored onsite to await analytical results.

- If the analytical results are below the DEC Groundwater Cleanup Levels, the contents will be discharged to the ground surface.
- If the analytical results are above the DEC Groundwater Cleanup Levels, the contents will be passed through the GAC filter again (during subsequent site visits such as water supply well monitoring events), resampled, and stored until results are below the regulatory limits. Alternative means of disposal will be evaluated if GAC filtration is insufficient following the second attempt.

Used granular activated carbon will be sampled for Toxicity Characteristic Leaching Procedure (TCLP) benzene, TCLP Resource Conservation Recovery Act metals, and PFAS analyses and stored onsite until analytical results are received.

- If the analytical results are below the regulatory limits, Shannon & Wilson will obtain written approval from the DEC to dispose of the contents at the Bristol Bay Borough Landfill.
- If the analytical results are above the regulatory limits, alternative means of disposal will be evaluated.

Other IDW will primarily consist of disposable sampling equipment (nitrile gloves, pump tubing, etc.). These items will be disposed of at dumpsters onsite and ultimately be disposed of at the Bristol Bay Borough Landfill between the city of Naknek and King Salmon.

4.13 Deviations from the General Work Plan

There are no anticipated deviations from the GWP.

5 QUALITY ASSURANCE PROJECT PLAN

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. A general QAPP is provided as Section 5 of the GWP. Additionally, a Data-Validation Program Plan (DVPP) describing the procedures for qualifying analytical data in a consistent manner is included as Appendix C to the GWP. The following sections describe specific procedures to be followed during sampling at the AKN, to ensure sampling and decontamination are effective, laboratory data are usable, and the information acquired is of high quality and reliable.

5.1 Quality Assurance Objectives

Data quality objectives are detailed in Section 5.1 of the GWP. Numeric quality assurance (QA) objectives for this project are presented in Exhibit 5-1 below.

Exhibit 5-1: Quality Assurance Objectives for Analytical Samples[1]

Analyte	Method	Matrix	Precision	Accuracy	Completeness
PFAS	EPA 537.1[2]	Water	±30%	(analyte dependent)	85%
		Soil	±50%	(analyte dependent)	85%
GRO	AK101	Water	±30%	60-120%	85%
		Soil	±50%	60-120%	85%
DRO	AK102	Water	±30%	60-120%	85%
		Soil	±50%	60-120%	85%
RRO	AK103	Water	±30%	60-120%	85%
		Soil	±50%	60-120%	85%
BTEX	8260	Water	±30%	(analyte dependent)	85%
		Soil	±50%	(analyte dependent)	85%
PAHs	8270D-SIM	Water	±30%	(analyte dependent)	85%
		Soil	±50%	(analyte dependent)	85%

NOTES:

1 The primary COPCs are PFAS, specifically PFOS and PFOA, for projects conducted under this GWP. However, Appendix F of DEC's *Field Sampling Guidance* (DEC 2019) identifies the following additional COPCs for sites associated with fire training facilities, fires, and facilities where AFFF was used: GRO, DRO, RRO, BTEX, and PAHs. The exact COPCs for each project completed under this GWP will be identified in a GWP Addendum.

2 The appropriate EPA method for PFAS analysis will be predicated on the type of samples to be collected (e.g. drinking water, groundwater, soil, etc.) and what EPA methods are available from the laboratory at the time of sampling. The exact method or methods to be used will be identified in the site-specific addendum.

BTEX = benzene, toluene, ethylbenzene, and 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 RRO = residual range organics, SIM = selective ion monitoring

5.2 Field Documentation

Field documentation is described in Section 5.2 of the GWP. Field forms to be used for this project are included in Appendix B of GWP.

5.3 Field Instrument Calibration

Field instrument calibration is discussed in Section 5.3 of the GWP.

5.4 Field Quality Control Samples

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

5.4.1 Field Duplicate Sample

Field duplicate sample collection procedures are described in Section 5.4.1 of the GWP. Field duplicates will be collected at a minimum of one per 10 primary samples. Refer to Exhibit 4-1 for number of field duplicates for each matrix.

5.4.2 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike and matrix spike duplicate samples will not be collected for this project. However, the laboratories may report these QC samples collected from projects not associated with this Addendum to meet their reporting requirements.

5.4.3 Trip Blank Samples

Trip blank samples are described in Section 5.4.3 of the GWP.

5.4.4 Equipment Blank Samples

Equipment blank sample collection procedures are described in Section 5.4.4 of the GWP.

5.4.5 Field Blank Samples

Field blank sample collection procedures are described in Section 5.4.5 of the GWP.

5.4.6 Temperature Blank Samples

Temperature blanks are described in Section 5.4.6 of the GWP.

5.5 Laboratory Quality Control Samples

Laboratory quality control samples are described in Section 5.5 of the GWP.

5.6 Laboratory Data Deliverables

Laboratory data deliverables are described in Section 5.6 of the GWP.

5.7 Data Reduction, Evaluation and Reporting

Data reduction, evaluation and reporting are discussed in Section 5.7 of the GWP.

6 REFERENCES

Alaska Department of Environmental Conservation (DEC), 2019a, 18 AAC 75, Oil and Other Hazardous Substances Pollution Control: Juneau, Alaska, Alaska Administrative Code (AAC), Title 18, Chapter 75, January available: http://dec.alaska.gov/commish/regulations/.

Alaska Department of Environmental Conservation (DEC), 2019b, Technical Memorandum – Action Levels for PFAS in Water and Guidance on Sampling Groundwater and Drinking Water: 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), 2019c, 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), 2017, 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.

CH2M Hill, 1989, Installation Restoration Program Stage 1 Final Technical Report – Appendices A-J, August.

CH2M Hill, 2019, Final Uniform Federal Police – Quality Assurance Project Plan for Site Inspections of Aqueous Film Forming Foam Areas, KSD, Alaska, July.

Table 1 - PFAS Results for Supply Well Sampling

Sample Location	Sample Date	Perfluorohexanesulfonic acid (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorobutanesulfonic acid (PFBS)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeA)	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)[1]	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)[1]	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	Hexafluoropropylene oxide dimer acid (HFPO-DA)	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	LHA Combined (PFOS + PFOA)
AKNPW-001	12/18/2018	1.2 J	7.5	0.87 J	<1.7	3.4	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	---	---	---	---	<1.7	2.4	2.4 ‡
	03/15/2019	2.5	---	1.5 J	<2.0	3.5	---	---	---	---	---	---	---	---	---	---	---	2.3	2.6	4.9
AKNPW-003	12/18/2018	75	110	17	<1.7	56	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	---	---	---	---	1.4 J	62	63 J
	03/15/2019	58	---	13	<2.0	45	---	---	---	---	---	---	---	---	---	---	---	<2.0	53	53 ‡
	10/29/2019	100	130	19	<1.7	58	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	0.46 J	2.0	**85**	**87**
	01/16/2020	56	77	11	<1.7	34	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	0.98 J	47	48 J
AKNPW-005	12/18/2018	1.8	2.1	0.77 J	<1.7	0.96 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	---	---	---	---	<1.7	2.0	2.0 ‡
	03/15/2019	1.9 J	---	0.95 J	<2.0	1.1 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	1.5 J	1.5 J‡
	07/25/2019	1.9 J	---	<2.0	<2.0	1.1 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	1.8 J	1.8 J‡
AKNPW-006	12/18/2018	<1.7	1.6 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	---	---	---	---	<1.7	2.0	2.0 ‡
	03/18/2019	<2.0	---	<2.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	1.7 J	1.7 J‡
AKNPW-007	12/18/2018	2.1	3.1	3.3	<1.7	0.55 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	---	---	---	---	<1.7	2.9	2.9 ‡
	03/15/2019	2.3 I	---	3.4	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	2.4	2.4 ‡
	07/25/2019	2.4	---	3.1	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	2.2	2.2 ‡
	10/29/2019	2.4	3.2	3.3	<1.6	0.86 J	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	2.5	2.5 ‡
	01/16/2020	2.2	2.5	2.8	<1.7	0.79 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	2.3	2.3 ‡
	07/09/2020	3.0	4.1	3.5	<1.8	0.77 J	<1.8	<1.8	<1.8	<1.8	<1.8	<18	<18	<1.8	<1.8	<1.8	<3.7	4.2	3.0	7.2
AKNPW-008	12/18/2018	2.4	5.3	1.1 J	<1.8	1.5 J	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	---	---	---	---	<1.8	5.0	5.0 ‡
	03/15/2019	2.1	---	1.1 J	<2.0	2.4 I	---	---	---	---	---	---	---	---	---	---	---	<2.0	3.4	3.4 ‡
	07/26/2019	1.5 J	---	<2.0	<2.0	1.6 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	2.8	2.8 ‡
	10/29/2019	1.4 J	3.5	0.64 J	<1.8	1.3 J	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	0.83 J	<1.8	<1.8	<1.8	<1.8	2.6	2.6 ‡
	01/16/2020	1.5 J	2.8	0.63 J	<1.7	0.88 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	2.5	2.5 ‡
	07/09/2020	2.0 JH*	4.8	0.90 J	<1.9	1.6 J	<1.9	<1.9	<1.9	<1.9	<1.9	<19	<19	<1.9	<1.9	<1.9	<3.8	<1.9	3.5	3.5 ‡
AKNPW-009	12/18/2018	2.0	4.6	0.99 J	<1.8	0.73 J	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	---	---	---	---	<1.8	5.7	5.7 ‡
	03/15/2019	1.9 J		1.4 J I	<2.0	1.8 J I	---	---	---	---	---	---	---	---	---	---	---	<2.0	4.8	4.8 ‡
AKNPW-010	12/18/2018	<1.7	0.50 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	---	---	---	---	<1.7	0.55 J	0.55 J‡
	03/15/2019	<2.0	---	<2.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	n/a
AKNPW-011	12/19/2018	2.3	4.9	0.87 J	<1.8	0.76 J	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	---	---	---	---	<1.8	6.0	6.0 ‡
	03/15/2019	2.3	---	1.1 J	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	4.9	4.9 ‡
	07/24/2019	2.1	---	<2.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	4.2	4.2 ‡
	10/29/2019	1.7	3.6	0.70 J	<1.7	0.54 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	4.2	4.2 ‡
	01/16/2020	2.3	4.2	0.88 J	<1.7	0.72 J	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	5.1	5.1 ‡
	07/08/2020	2.8 JH*	5.4	1.0 J	<1.9	1.0 J	<1.9	<1.9	<1.9	<1.9	<1.9	<19	<19	<1.9	<1.9	<1.9	<3.8	<1.9	5.8	5.8 ‡

Table 1 - PFAS Results for Supply Well Sampling

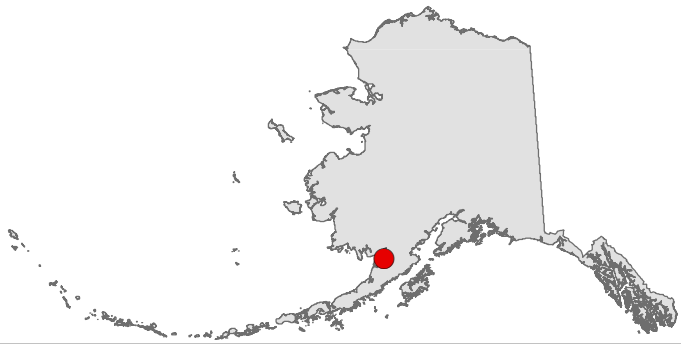
Sample Location	Sample Date	Perfluorohexanesulfonic acid (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorobutanesulfonic acid (PFBS)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeA)	N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)[1]	N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)[1]	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	Hexafluoropropylene oxide dimer acid (HFPO-DA)	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	LHA Combined (PFOS + PFOA)
AKNPW-012	03/14/2019	6.4	---	2.3	<2.0	1.8 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	12	12 ‡
	03/14/2019	6.3	---	2.2	<2.0	1.7 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	12	12 ‡
	07/24/2019	6.7	---	2.6	<2.0	2.5	---	---	---	---	---	---	---	---	---	---	---	<2.0	13	13 ‡
	10/29/2019	8.0	11	2.6	<1.6	2.0	<1.6	<1.6	<1.6	<1.6	<1.6	0.55 J	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	16	16 ‡
	01/16/2020	6.1	8.8	2.0	<1.8	1.6 J	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	11	11 ‡
	07/09/2020	7.4	11	2.5	<1.8	2.1	<1.8	<1.8	<1.8	<1.8	0.43 J	<18	<18	<1.8	<1.8	<1.8	<3.6	<1.8	14	14 ‡
AKNPW-013	03/15/2019	8.2	---	5.2	<2.0	2.8 I	---	---	---	---	---	---	---	---	---	---	---	<2.0	4.1	4.1 ‡
AKNPW-014	03/15/2019	<2.0	---	3.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	1.4 J	1.4 J‡
AKNPW-015	03/15/2019	<2.0	---	<2.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	n/a
AKNPW-016	03/16/2019	4.1 I	---	1.4 J I	<2.0	1.6 J I	---	---	---	---	---	---	---	---	---	---	---	<2.0	6.5	6.5 ‡
AKNPW-017	03/16/2019	<2.0	---	<2.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	n/a
AKNPW-018	07/24/2019	<2.0	---	<2.0	<2.0	<2.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	n/a
AKNPW-020	03/18/2019	1.6 J I	---	<2.0	<2.0	3.6	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	n/a
AKNPW-204	03/15/2019	120	---	21	<2.0	31	---	---	---	---	---	---	---	---	---	---	---	10	**110**	**120**
AKNPW-208	03/18/2019	9.9	---	3.2	<2.0	4.4	---	---	---	---	---	---	---	---	---	---	---	<2.0	21	21 ‡
	07/25/2019	9.7	---	3.9	0.93 J	4.3	---	---	---	---	---	---	---	---	---	---	---	2.7	23	26
AKNPW-422	03/15/2019	1.6 J	---	<2.0	<2.0	1.0 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	3.0	3.0 ‡
	07/25/2019	1.7 J	---	<2.0	<2.0	1.1 J	---	---	---	---	---	---	---	---	---	---	---	<2.0	3.1	3.1 ‡
AKNPW-424	03/15/2019	42	---	7.2	1.7 J	39	---	---	---	---	---	---	---	---	---	---	---	<2.0	10	10 ‡
	07/25/2019	6.4	---	1.2 J	<2.0	8.0	---	---	---	---	---	---	---	---	---	---	---	<2.0	2.4	2.4 ‡

NOTES:
Highest reported result is reported for field-duplicate samples.
The reported units, ppt, are equivalent to nanograms per liter.
† EPA LHA level is 70 ppt for PFOS and PFOA
‡ Minimum concentration, the LHA combined concentration includes one or more result that is not detected greater than the MDL.
< Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.
I The reported value represents the estimated maximum possible concentration. Flag applied by the laboratory.
J Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.
N/A Not applicable. The sum of PFOS and PFOA concentration could not be calculated because one or more PFAS was not detected in the project sample.
JH* Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.
BOLD Detected concentration exceeds the regulatory limit.
EPA = Environmental Protection Agency; LHA = Lifetime Health Advisory; ppt = parts per trillion

Legend

Well Search Area and Project Vicinity

King Salmon, Alaska



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 1 2

Miles

N

DOT&PF Statewide PFAS
Addendum 001-AKN-01
King Salmon, Alaska

Vicinity Map

June 2021

102582-008

SHANNON & WILSON, INC.
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Figure 1

LEGEND

Wells sampled after April 2019; compared to EPA health advisory

- ≤17 parts per trillion (ppt)
- 18-69 ppt
- ≥70 ppt (over LHA)

Wells sampled before April 2019; compared to former DEC action level*

- ≤17 parts per trillion (ppt)
- 18-65 ppt
- ≥65 ppt (over ADEC action level)

AFFF Type

- DOT&PF AFFF Use Area
- Air Force AFFF Use Area
- Mutual Aid AFFF Response

* Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA

0 0.3 0.6

Miles

DOT&PF Statewide PFAS
Addendum 001-AKN-01
King Salmon, Alaska

Highest Reported Anlytical Results

June 2021 102582-008

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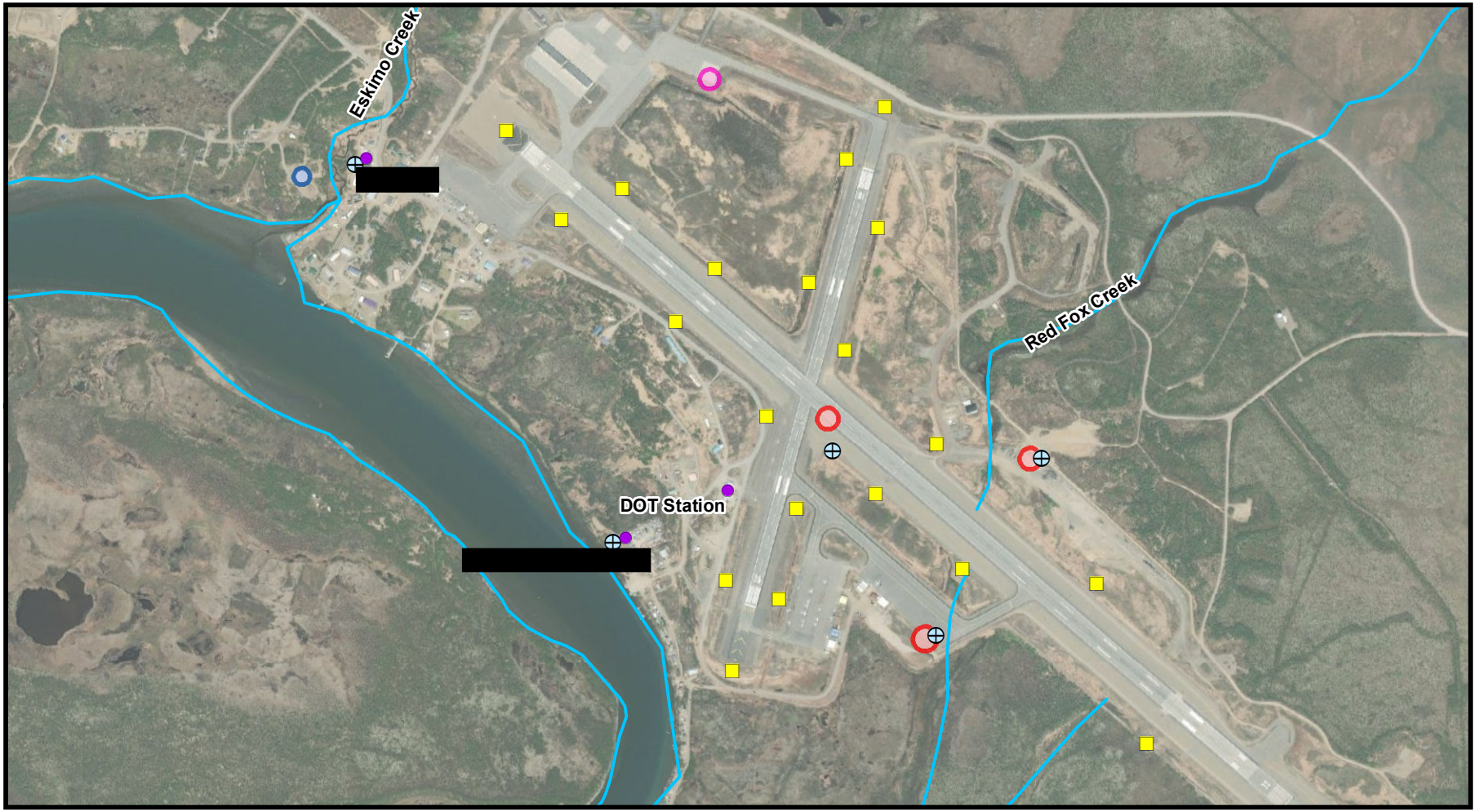
Figure 2



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- Building
- Soil Boring
- Surface Soil
- Stream

AFFF Type

- DOT&PF AFFF Use Area
- Air Force AFFF Use Area
- Mutual Aid AFFF Response

0 1,000 2,000 3,000

Feet

N

DOT&PF Statewide PFAS
Addendum 001-AKN-01
King Salmon, Alaska

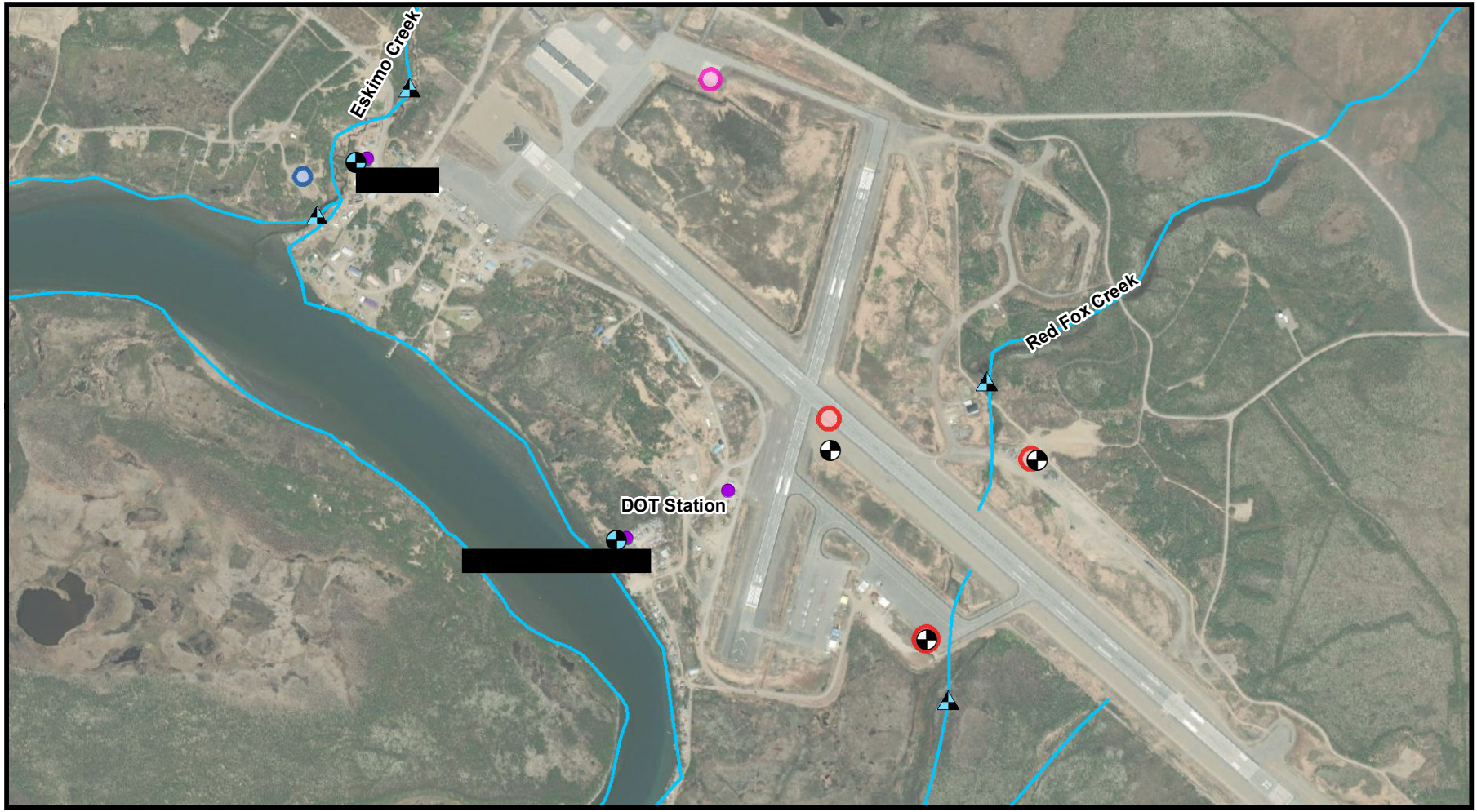
PROPOSED SOIL SAMPLING LOCATIONS

June 2021 102582-008

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 3

Figure 3



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- Monitoring Well Nest
- Monitoring Well
- Building
- Surface Water
- Stream

AFFF Type

- DOT&PF AFFF Use Area
- Air Force AFFF Use Area
- Mutual Aid AFFF Response

0 1,000 2,000 3,000

Feet

N

DOT&PF Statewide PFAS
Addendum 001-AKN-01
King Salmon, Alaska

PROPOSED WATER SAMPLING LOCATIONS

June 2021 102582-008

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 4

Figure 4

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: ADOT&PF King Salmon Airport Sitewide PFAS

File Number: 2569.38.033

Completed by: Michael Jaramillo; 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: Aqueous Film Forming Foam (AFFF) release

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:

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:

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:

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: Incomplete

Comments:

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

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:

Volatiles may be present at DOT&PF fire training and emergency response areas.

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:

Volatiles may be present at DOT&PF fire training and emergency response areas. Buildings are not within 30 horizontal or vertical feet of these petroleum contaminated areas.

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

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

Comments:

Inhalation of Volatile Compounds in Tap Water

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

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

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

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

Comments:

Due to the lack of current groundwater sample analytical results, the box was not checked. However, it may change following the collection of groundwater samples during site characterization activities.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

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

Comments:

Due to the lack of current soil sample analytical results, the box was not checked. However, it may change following the collection of soil samples during site characterization activities.

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:

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

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: ADOT&PF King Salmon Airport Sitewide PFAS

Completed By: Michael Jaramillo

Date Completed: Revised Sept 2020

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

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

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

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

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

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

Media / Transport Mechanisms

Surface Soil (0-2 ft bgs) — 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) — check soil
- ☐ Migration to groundwater — check groundwater
- ☐ Volatilization — check air
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Ground-water — 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 — check surface water
- ☐ Volatilization — check air
- ☐ Sedimentation — check sediment
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Sediment — check sediment
- ☑ Resuspension, runoff, or erosion — check surface water
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Exposure Media / Exposure Pathway/Route

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	I	C/F			
	☑ Dermal Absorption of Contaminants from Soil		C/F	I	C/F			
	☐ Inhalation of Fugitive Dust							
☑ groundwater	☑ Ingestion of Groundwater	C/F	C/F	I	C/F			
	☑ Dermal Absorption of Contaminants in Groundwater		C/F	I	C/F			
	☐ Inhalation of Volatile Compounds in Tap Water							
☑ air	☑ Inhalation of Outdoor Air		C/F	I	C/F			
	☐ Inhalation of Indoor Air							
	☐ Inhalation of Fugitive Dust							
☑ surface water	☐ Ingestion of Surface Water							
	☑ Dermal Absorption of Contaminants in Surface Water		C/F	I	C/F			
	☐ Inhalation of Volatile Compounds in Tap Water							
☑ sediment	☑ Direct Contact with Sediment		C/F	I	C/F			
☑ biota	☑ Ingestion of Wild or Farmed Foods	C/F				C/F	C/F	

Revised, 10/01/2010

APPENDIX B: SITE SAFETY AND HEALTH PLAN

Appendix B

Site Safety and Health Plan

CONTENTS

APPENDIX B: SITE SAFETY AND HEALTH PLAN

SITE SAFETY AND HEALTH PLAN

Shannon & Wilson prepared this Site Safety and Health Plan (SSHP) for the initial site characterization activities at the King Salmon Airport (AKN). 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 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 sign 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.1. 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.1.1 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.1.2 Physical Hazards

Primary physical hazards associated with site characterization activities include drilling equipment; temperature stress; lifting, slipping, tripping, falling; and risk of eye injuries. In addition, wildlife may be a hazard in forested 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 site characterization activities, nor will they enter trenches or excavations greater than four feet in depth.

B.1.2.1 Drilling Activities

Drill rigs have lots of moving parts and are very loud. Field personnel will wear proper PPE including appropriate hearing protection. A safe distance will be kept from the drill rig and field personnel will be aware of drill rig operations and crew movements. Practice good housekeeping around the work areas. Know where the drill rig's emergency shut-off switch(es) are located in order to shut the rig down in an emergency situation.

Underground utilities are present at the site. Utility locates will be requested by Shannon & Wilson prior to conducting any ground penetrating work.

B.1.2.2 Temperature Stress

Wearing PPE may put a worker at risk of developing heat stress; however, since the field screening 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.1.2.1 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.1.2.2 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 personal protective equipment (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.1.2.3 Insects and Animals

During the summer months in Alaska, mosquitoes, no-see-ums, 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.1.2.4 Congested Areas

The site investigation may at times require field personnel to work adjacent to or in roadways. 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.

B.1.3 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.2. 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.2.1 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.2.2 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). Each individual 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.2.3 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.3. 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;
- gloves; and,
- hard hat.

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

B.4. DECONTAMINATION PROCEDURES

Shannon & Wilson will conduct all site characterization activities in Level D PPE. For this reason, personnel will not be decontaminated when leaving the work site unless gross visual contamination of protective clothing is present.

If gross visual contamination of protective clothing is present, brush excess soil from clothes, use paper or cloth towels to absorb oil. Remove grossly contaminated clothing and place in a plastic bag until it can be laundered. If clothing cannot be removed due to lack of privacy, cover the soiled clothing with plastic bags until the employee can return to their lodging or other private facility to change clothes.

Employees will wash their hands and face with soap and water before eating, drinking, smoking, or applying cosmetics. These activities will be restricted to designated rest area(s). Decontaminated items will be visually inspected for residual contamination to determine if decontamination procedures are effective.

B.5. 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 the King Salmon Health Clinic, located at the intersection of Hawk Road and Lake Campl Road in King Salmon, Alaska 99613. The telephone number for the clinic is (907) 589-1077. Field phones will be kept easily accessible in the case of an emergency.

Exhibit B-1: Map Showing CLINIC/HOSPITAL.

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.6. 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.

SITE SAFETY AND HEALTH PLAN PERSONAL ACKNOWLEDGEMENT FORM

DOT&PF STATEWIDE GENERAL WORK PLAN
ADDENDUM 001-AKN-01: KING SALMON INITIAL SITE CHARACTERIZATION

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

IMPORTANT INFORMATION

and your consultant can work together to help reduce their impacts. Retaining 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.

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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 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

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