# FINAL
# Site Inspection Report
# Nome Army Aviation Operating Facility
# Nome, Alaska

Site Inspections for Perfluorooctanoic Acid (PFOA), Perfluorooctanesulfonic Acid (PFOS), Perfluorohexanesulfonic Acid (PFHxS), Perfluorononanoic Acid (PFNA), Hexafluoropropylene oxide dimer Acid (HFPO-DA) and Perfluorobutanesulfonic Acid (PFBS)
ARNG Installations, Nationwide

September 2023

Prepared for:

Army National Guard Headquarters
111 S. George Mason Drive
Arlington, VA 22204

UNCLASSIFIED

*This page intentionally left blank*

# TABLE OF CONTENTS

## LIST OF APPENDICES

## LIST OF FIGURES

## LIST OF TABLES

# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| °C | Degrees Celsius |
| °F | Degrees Fahrenheit |
| % | Percent |
| $K_{oc}$ | Organic carbon partition coefficient |
| µg/kg | Microgram(s) per kilogram |
| | |
| AAOF | Army Aviation Operating Facility |
| AECOM | AECOM Technical Services, Inc. |
| AFFF | aqueous film-forming foam |
| AKARNG | Alaska Army National Guard |
| amsl | Above mean sea level |
| AOI | Area of Interest |
| ARNG | Army National Guard |
| | |
| bgs | Below ground surface |
| btoc | Below top of casing |
| | |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CSM | Conceptual site model |
| | |
| DoD | Department of Defense |
| DPT | Direct-push technology |
| DQO | Data Quality Objectives |
| DUA | Data Usability Assessment |
| | |
| EA | EA Engineering, Science, and Technology, Inc., PBC |
| EIS | Extraction internal standards |
| ELAP | Environmental Laboratory Accreditation Program |
| EM | Engineer Manual |
| EB | Equipment blank |
| ff | |
| | |
| FB | Field blank |
| FD | Field duplicate |
| ft | Foot (feet) |
| FTS | Fluorotelomer sulfonate |
| | |
| GAC | Granular activated carbon |
| gal | Gallon(s) |
| | |
| HDPE | High-density polyethylene |
| HFPO-DA | Hexafluoropropylene oxide dimer acid |
| | |
| ID | Identification |

## LIST OF ACRONYMS AND ABBREVIATIONS (continued)

| | |
|---|---|
| IDW | Investigation-derived waste |
| in. | Inch(es) |
| ITRC | Interstate Technology Regulatory Council |
| LC/MS/MS | Liquid chromatography tandem mass spectrometry |
| MIL-SPEC | Military Specification |
| MS | Matrix spike |
| MSD | Matrix spike duplicate |
| NAFD | Nome Airport Fire Department |
| ng/L | Nanogram(s) per liter |
| No. | Number |
| OSD | Office of the Assistant Secretary of Defense |
| PA | Preliminary Assessment |
| PFAS | Per- and polyfluoroalkyl substances |
| PFBS | Perfluorobutanesulfonic acid |
| PFHxS | Perfluorohexanesulfonic acid |
| PFNA | Perfluorononanoic acid |
| PFOA | Perfluorooctanoic acid |
| PFOS | Perfluorooctanesulfonic acid |
| PID | Photoionization detector |
| PVC | Polyvinyl chloride |
| QAPP | Quality Assurance Project Plan |
| QSM | Quality Systems Manual |
| RI | Remedial Investigation |
| SI | Site Inspection |
| SL | Screening level |
| TOC | Total organic carbon |
| TPP | Technical Project Planning |
| UFP | Uniform Federal Policy |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| WWTP | Wastewater Treatment Plant |

*This page intentionally left blank*

# EXECUTIVE SUMMARY

The Army National Guard (ARNG) G-9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) (Assistant Secretary of Defense) dated 6 July 2022. The six compounds listed in the OSD memorandum include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA)[1]. These compounds are collectively referred to as “relevant compounds” throughout the document and the applicable Screening Levels (SLs) are provided below in **Table ES-1**.

The PA identified one Area of Interest (AOI) where PFAS-containing materials may have been stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on a comparison of SI results to SLs for the relevant compounds. This SI was completed at the Nome Army Aviation Operating Facility (AAOF) in Nome, Alaska, and determined further investigation is warranted for AOI 1. AAOF will be referred to as the “Facility” throughout this document.

The Facility lies on a gently sloping coastal plain approximately 0.25 mile inland from Norton Sound, an embayment of the Bering Sea. The coastal plain consists mainly of unconsolidated glacial deposits grading into colluvium at the foothills of the mountains to the northeast and worked into beach deposits along the coast. Loess deposits, along with silty gravel, silt, and peat are present over much of the plain, ranging in thickness from 1 to 36 feet (AECOM Technical Services Inc. 2020). The Nome AAOF is in Nome, Alaska, on the southern coast of the Seward Peninsula, the middle of Alaska’s three western lobes, approximately 130 miles from the Bering Strait. The AAOF is comprised of a single hangar where Prospect Street meets New Center Creek Road, across from Runway 12 near the northeastern end of the airfield. The 1.72-acre lot consists of the AAOF hangar, a section of asphalt pavement, a concrete pad, water and fuel/oil storage tanks, underground piping, and a wash water recycling system. The Alaska Guard acquired aqueous film-forming foam (AFFF) in the mid-1990s, well after AFFF came into wide-spread use by the Department of Defense (DoD) (1970).

The DoD has adopted a policy to retain facilities in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process based on risk-based SLs calculated by the OSD in soil and groundwater (Assistant Secretary of Defense 2022). The ARNG program under which this SI was performed follows this DoD policy.

[1] Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

The PA identified one AOI for investigation during the SI phase. SI sampling results from the AOI were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOI. Based on the results of this SI, and following the CERCLA process, a remedial investigation (RI) is warranted for AOI 1.

**Table ES-1. Screening Levels (Soil and Groundwater)**

| Analyte[1,2] | Residential (Soil) (µg/kg)[1] | Industrial/Commercial Composite Worker (Soil) (µg/kg)[1] | Tap Water (Groundwater) (ng/L)[1] |
|---|---|---|---|
| PFOA | 19 | 250 | 6 |
| PFOS | 13 | 160 | 4 |
| PFBS | 1,900 | 25,000 | 601 |
| PFHxS | 130 | 1,600 | 39 |
| PFNA | 19 | 250 | 6 |

Notes:

1. Assistant Secretary of Defense. July 2022. Risk Based Screening Levels Calculated for Groundwater and Soil using U.S. Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

**Table ES-2. Summary of Site Inspection Findings and Recommendations**

| AOI | Potential Release Area | Soil Potential Source Area | Groundwater Potential Source Area | Groundwater Facility Boundary | Future Action |
|---|---|---|---|---|---|
| 1 | AAOF Hangar | ◐ | ● | ● | Proceed to RI |

Legend:
● = Detected; exceedance of screening levels
◐ = Detected; no exceedance of screening levels
○ = Not detected

# 1. INTRODUCTION

## 1.1 PROJECT AUTHORIZATION

The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) dated 6 July 2022 (Assistant Secretary of Defense 2022). The six components listed in the OSE memorandum will be referred to as "relevant compounds" throughout this document and include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide-dimer acid (HFPO-DA)[2] at ARNG facilities nationwide. The ARNG performed this SI at the Nome Army Aviation Operating Facility (AAOF) in Nome, Alaska. The AAOF will be referred to as the "Facility" throughout this report.

The SI project elements were performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. Environmental Protection Agency [USEPA] 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA 1994), and in compliance with Army requirements and guidance for field investigations.

## 1.2 SITE INSPECTION PURPOSE

A PA was performed at the AAOF (AECOM Technical Services, Inc. [AECOM] 2020) that identified a single potential Area of Interest (AOI) where PFAS-containing materials were used, stored, and/or disposed, or areas where known or suspected releases to the environment occurred. The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on screening levels (SLs) for the relevant compounds.

[2] Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

*This page intentionally left blank*

# 2. FACILITY BACKGROUND

## 2.1 FACILITY LOCATION AND DESCRIPTION

The AAOF is located in Nome, Alaska, on the southern coast of the Seward Peninsula, the middle of Alaska's three western lobes, approximately 130 miles from the Bering Strait (**Figure 2-1**). The AAOF is comprised of a single hangar where Prospect Street meets New Center Creek Road, across from Runway 12 near the northeastern end of the airfield and it is identified as Nome AAOF Parcel B, Tract III, Nome Airport, Camp Nome Recording District. The 1.72-acre lot consists of the AAOF hangar, a section of asphalt pavement, a concrete pad, water and fuel/oil storage tanks, underground piping, and a wash water recycling system.

The Nome AAOF is comprised of approximately 60 percent (%) asphalt surrounded by gravel. The hangar asphalt apron and tarmac extend from the northwest to the southwest and lead to the Nome Airport runways. Adjoining areas to the northeast and southwest are primarily comprised of an asphalt parking lot and gravel-covered unused areas. To the southwest there are additional structures owned by the airport. The AAOF is surrounded by DOT/airport land; these areas are used occasionally by entities other than AKARNG.

## 2.2 FACILITY ENVIRONMENTAL SETTING

The Facility lies on a gently sloping coastal plain approximately 0.25 mile inland from Norton Sound, an embayment of the Bering Sea (**Figure 2-2**). The coastal plain consists mainly of unconsolidated glacial deposits grading into colluvium at the foothills of the mountains to the northeast and worked into beach deposits along the coast. Loess deposits, along with silty gravel, silt, and peat are present over much of the plain, ranging in thickness from 1 to 36 feet (ft) (AECOM 2020).

### 2.2.1 Geology

Nome and its surroundings have undergone many geological studies in the twentieth and twenty-first centuries due to Nome's importance as a gold mining town. Nome's coastal plain is made of placer deposits found in alluvial sands along the Snake River, which are mined using the technique commonly known as "panning for gold."

Regionally, the Seward Peninsula comprises rocks from a large section of geologic history including Precambrian metamorphics and limestone, Paleozoic carbonates, Jurassic volcanics, and sedimentary clastics from the Cretaceous and Tertiary. Felsic and intermediate composition granitic intrusions occur throughout the peninsula and basaltic lava flows are found centrally located overlying large areas of older rock (AECOM 2020). Glaciation played a prominent factor in the shaping of Alaska's current landscape in the Quaternary Period, depositing the till of the coastal plain.

Locally, the sediments of the coastal plain vary greatly in composition and clast size, predominating in angular schist with minor limestone, but also including finer stream sediments (silt and sand), well-rounded gravel, and angular slabs of up to 2 ft (AECOM 2020). Soil encountered during SI activities was consistent with the above expected lithology, mainly ranging from clean gravel-sand mixtures to silty sands and silty clays among each of the borings. Permafrost is prevalent in the area, freezing soils and unconsolidated sediments top to bottom, with ice near the surface in many places preventing or inhibiting infiltration (AECOM 2020). Although permafrost was not observed within 15 feet of the surface in the vicinity of the AAOF, the possible presence of permafrost below 15 feet bgs may affect the direction of groundwater flow.

### 2.2.2 Hydrogeology

Due to the local permafrost, groundwater in the Nome area is generally restricted along coastal areas as permafrost will confine groundwater flow to units above or below the frozen sections. Coastal sections of unfrozen ground may be hydraulically connected to marine water; and therefore, wells typically yield poor quality or insufficient quantities of potable water (AECOM 2020). During the SI, depth to water at Nome AAOF ranged from 6.11 to 11.15 ft below ground surface (bgs). Groundwater elevations calculated using depth to groundwater measurements and survey data collected during the SI indicate groundwater within the shallow aquifer flows primarily from north to the southwest towards the Snake River (**Figures 2-3** through **2-5**).

Drinking water for Nome is provided by the municipal Moonlight Springs, located less than 3 miles to the north (upgradient) at the base of Anvil Mountain. A fractured marble aquifer is accessed by drinking water wells. Its secondary porosity provides variable hydraulic conductivity ranging from $10^{-2}$ to $10^{-8}$ centimeters per second. Static water levels in three spring wells measured 25–30 ft bgs (AECOM 2020), and the wells are completed from approximately 80 to 120 ft. This difference in well depth versus groundwater levels indicates that the aquifer is confined.

A water sample from a potable water source at Moonlight Springs Well Field was collected on 20 November 2019 and analyzed for PFAS by EPA 537.1 REV 1.0 EPA 537. Analytical results for this sample indicated that PFAS was not detected. Additional information is provided in **Section 5.1.4**.

An Environmental Database Report (EDR)™ report included a well search for a 1-mile radius surrounding the Facility. Using additional online resources, such as state and local geographic information system databases, wells were further researched out to a 4-mile radius of the Facility. One unknown well was identified, which appears to be located adjacent to the Anvil City Square, over 1 mile southeast downgradient/cross-gradient of the Facility (AECOM 2020) (**Figure 2-3**).

### 2.2.3 Hydrology

Nome is approximately 0.25 mile from open, navigable marine waters (**Figure 2-4).** These waters of the Norton Sound provide wave action, which works the sediments of the shore into beach deposits. Despite its proximity to the shore, the AAOF is not within the 100-year floodplain (AECOM 2020).

The coastal plane on which Nome is built is classified as a freshwater palustrine wetland, seasonally saturated, and containing woody vegetation, both shrubby and arboreal. This landscape is dotted with freshwater lakes and ponds, tidal marine estuaries, and crosscut by a number of rivers. The lakes and ponds are prone to freezing through if shallower than 6 ft (AECOM 2020).

The unconsolidated sediments of the plain are believed to be hydrologically connected to marine water in the water table where permafrost has not precluded access. This marine water renders local shallow wells unfit for producing potable water (AECOM 2020).

The Snake River flows from the west along the southern border of Nome Airport. Typical discharge for the river from the 1960s to 1991 was 5.3 cubic meters per second (AECOM 2020). General surface water flow at the facility is south/southwest toward the Snake River.

There are no stormwater drains or piping at the facility. Stormwater flow is on the surface in a direction that is generally away from the building. On the airfield side of the building, stormwater flows to the north and south edges of the paved apron. On the east side of the building, stormwater flows to the east into a large ditch at the east edge of the property. Water in this ditch flows south and eventually into the Snake River. Subsistence fishing is allowed in the lower portion of the Snake River.

### 2.2.4 Climate

The climate in Nome is cool during the summer with temperatures in the 50s (degrees Fahrenheit [°F] and extremely cold during the winter with sub-zero temperatures. The warmest month of the year is July with an average maximum temperature of 58.60°F, while the coldest month of the year is February with an average minimum temperature of -2.30°F. The annual average precipitation at Nome is 16.56 inches (in.). Average annual snowfall is 75.70 in. The wettest month of the year is August with an average rainfall of 3.23 in. (AECOM 2020).

### 2.2.5 Current and Future Land Use

The property is currently under lease by the Alaska ARNG (AKARNG) and is operated as an AAOF, which services aircraft for the AKARNG. The AKARNG has leased the property from the Alaska Department of Transportation until 2038. It is unknown if AKARNG will extend or establish a new lease to continue the use of the AAOF footprint into the future. Reasonably anticipated future land use is not expected to change from the current land use described above (AECOM 2020). The Facility has restricted access and is fenced. Access to the Facility must be coordinated with AKARNG.

### 2.2.6 Sensitive Habitat and Threatened/Endangered Species

A wildlife survey has not been conducted at the Facility, and the Facility does not include any significant areas of habitat. The following species have not been identified at the Facility but may be present in the surrounding area.

The following species are listed as federally endangered, threatened, proposed, and/or candidate species in Nome, Alaska (U.S. Fish and Wildlife Service 2021):

- Birds: Short-tailed Albatross, *Phoebastria (=Diomedea) albatrus* (Endangered); Spectacled Eider, *Somateria fischeri* (Threatened); and Steller's Eider, *Polysticta stelleri* (Threatened).

- Marine Mammals: Polar Bear, *Ursus maritimus* (Threatened).

## 2.3 HISTORY OF PFAS USE

One potential PFAS release area (non-Fire Training Area) was identified at the Facility during the PA (AECOM 2020). Interviews and records obtained during the PA indicate that five 5-gallon (gal) buckets of Chemguard 3% AFFF concentrate are stored in the hangar and that a single mobile Tri-Max™ 30 emergency response cart (observed in the west corner of the hanger at the time of the PA) is also on-site at the AAOF (AECOM 2020). No information pertaining to the use or maintenance of the Tri-Max™ 30 was found during the PA interviews and data gathering. Based on the findings/presence of the Tri-Max™ 30 and 3% AFFF concentrate, the SI included the hangar and surrounding leased area as a potential release area for investigation. There is no evidence that HFPO-DA was used on-site. A more detailed description of the AOI is presented in **Section 3**.

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska


# Figure 2-1
# Facility Location


**Facility Data**

Facility Boundary

**Hydrology**

River/Stream

Waterbody

Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

# Figure 2-2
# Facility Topography


**Facility Data**

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

# Figure 2-3
# Groundwater Features


**Facility Data**

Facility Boundary

**Hydrogeology/Hydrology**

Unknown Well
Inferred Groundwater Flow Direction
River/Stream
Waterbody

Data Sources:
ESRI 2020
AECOM 2020
USGS NHD 2021

Date:..........................August 2022
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

## Figure 2-4
## Surface Water Features


**Facility Data**

Facility Boundary

**Hydrology**

Surface Water Flow Direction

River/Stream

Waterbody

Watershed Boundary

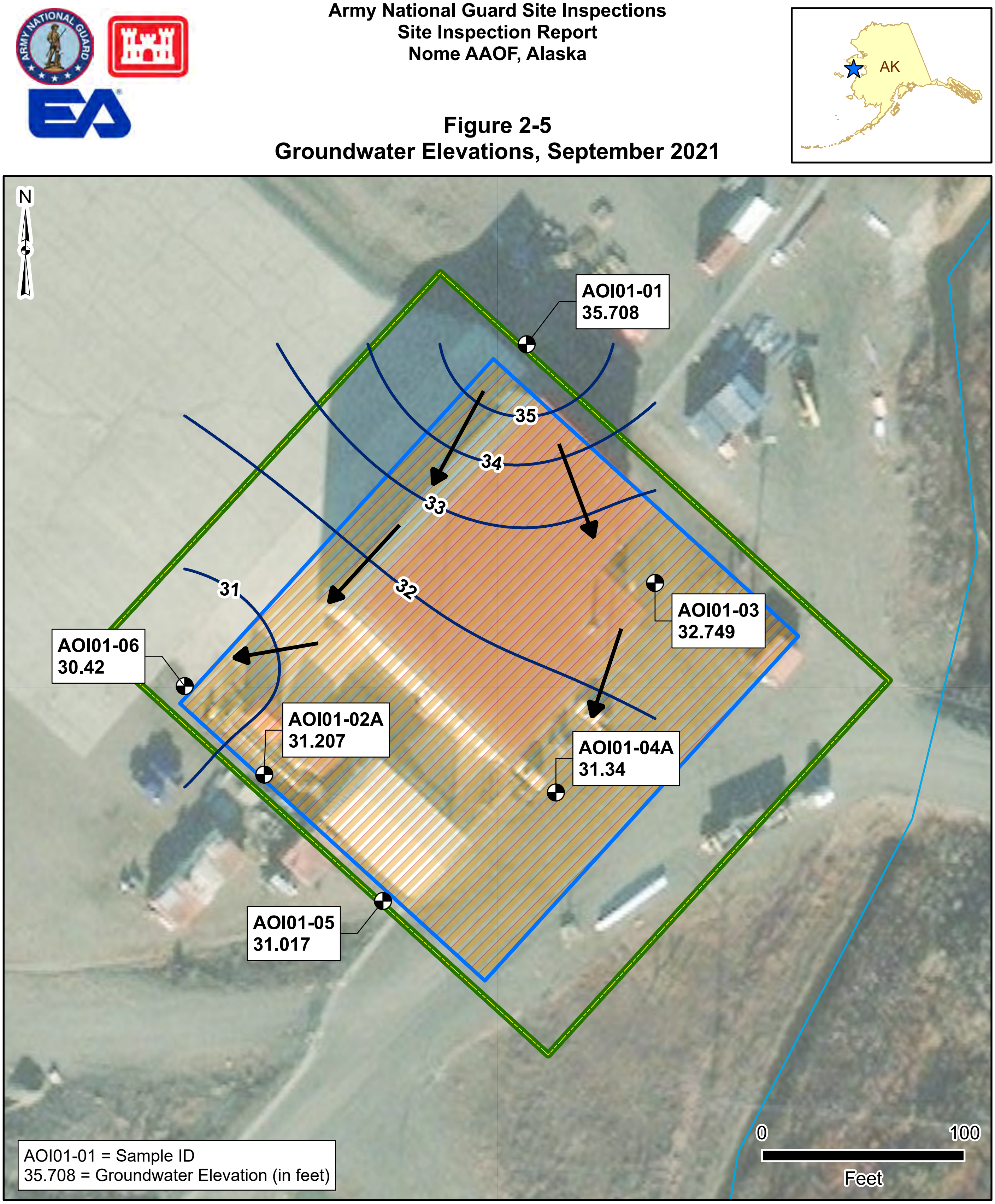
Data Sources:
ESRI 2020
AECOM 2020
USGS NHD 2021

Date:..........................August 2022
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

# Figure 2-5
# Groundwater Elevations, September 2021




**Facility Data**

- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrology/Hydrogeology**

- Temporary Well Location
- Groundwater Flow Direction
- Groundwater Elevation Contour Interval (1 Foot)
- River/Stream

Data Sources:
ESRI 2020
AECOM 2020
USGS NHD 2021

Date:..........................August 2022
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

# 3. SUMMARY OF AREAS OF INTEREST

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, one potential release area was identified at the Facility and grouped into one AOI identified as: AOI 1 Nome AAOF Hangar and surrounding leased area. Additionally, three nearby potential sources have been identified (**Figure 3-1**). The potential AOI is shown on **Figure 3-1**.

## 3.1 AOI 1 – NOME AAOF HANGAR

AOI 1 consists of the Nome AAOF Hangar and surrounding leased area. The AAOF was constructed in 1992, and comprises a hangar, concrete pad, asphalt apron, boiler room, and closed-loop wash water recycling system, with two 100-gal aboveground storage tanks located within the hangar. The geographic coordinates are 64°30'58.25"N and 165°25'33.46"W. There are floor drains within the hangar that drain to a 500-gal holding tank. One underground 2000-gal sewage tank is located southwest of the hangar. Several aboveground storage tanks ranging from 100 to 12,000 gal are located on the facility and store a variety of petroleum products. The hangar is not equipped with an AFFF fire suppression system (AECOM 2020). Approximately 60% of the Facility contains asphalt and some areas (approximately 40%) are covered in gravel.

Five 5-gal buckets of Chemguard 3% AFFF concentrate are stored in the hangar. No AFFF solution has reportedly been mixed or sprayed within the hangar. A single Tri-Max™ 30 emergency response cart is on-site at the AAOF. The AKARNG interviewees do not recall the Tri-Max™ cart being used or discharged at the Facility. The cart is sent to Anchorage, Alaska, for hydrostatic testing and replaced with an upgraded model every couple of years. Based on the storage of AFFF in 5-gal buckets and the presence of the Tri-Max™ cart unit, the AAOF Hangar and surrounding area was identified as an AOI, and it is considered a potential PFAS release area (AECOM 2020).

## 3.2 ADJACENT SOURCES

Three potential off-facility sources of PFAS are adjacent to the Facility and are not under the control of the AKARNG. These facilities are downgradient/cross-gradient of the ARNG Facility. A description of each potential off-facility source is presented below and shown on **Figure 3-1**.

### 3.2.1 Nome Airport Fire Department

The Nome Airport Fire Department (NAFD) (64°30'42.11"N, 165°26'7.20"W) is the primary first responder to the AAOF with supplemental assistance provided by the City of Nome Fire Department. Historically, the NAFD trained with AFFF twice a year on the sand patch in front of the station. The NAFD personnel also train at the City of Kenai periodically. The NAFD emergency trucks contain AFFF and the type, amount, and concentration of AFFF is unknown (AECOM 2020). The identified NAFD sand patch AFFF Spray Area is downgradient/cross-gradient of the Facility; and therefore, poses no risk of cross-contamination.

### 3.2.2 Nome Airport Fire Department AFFF Spray Area

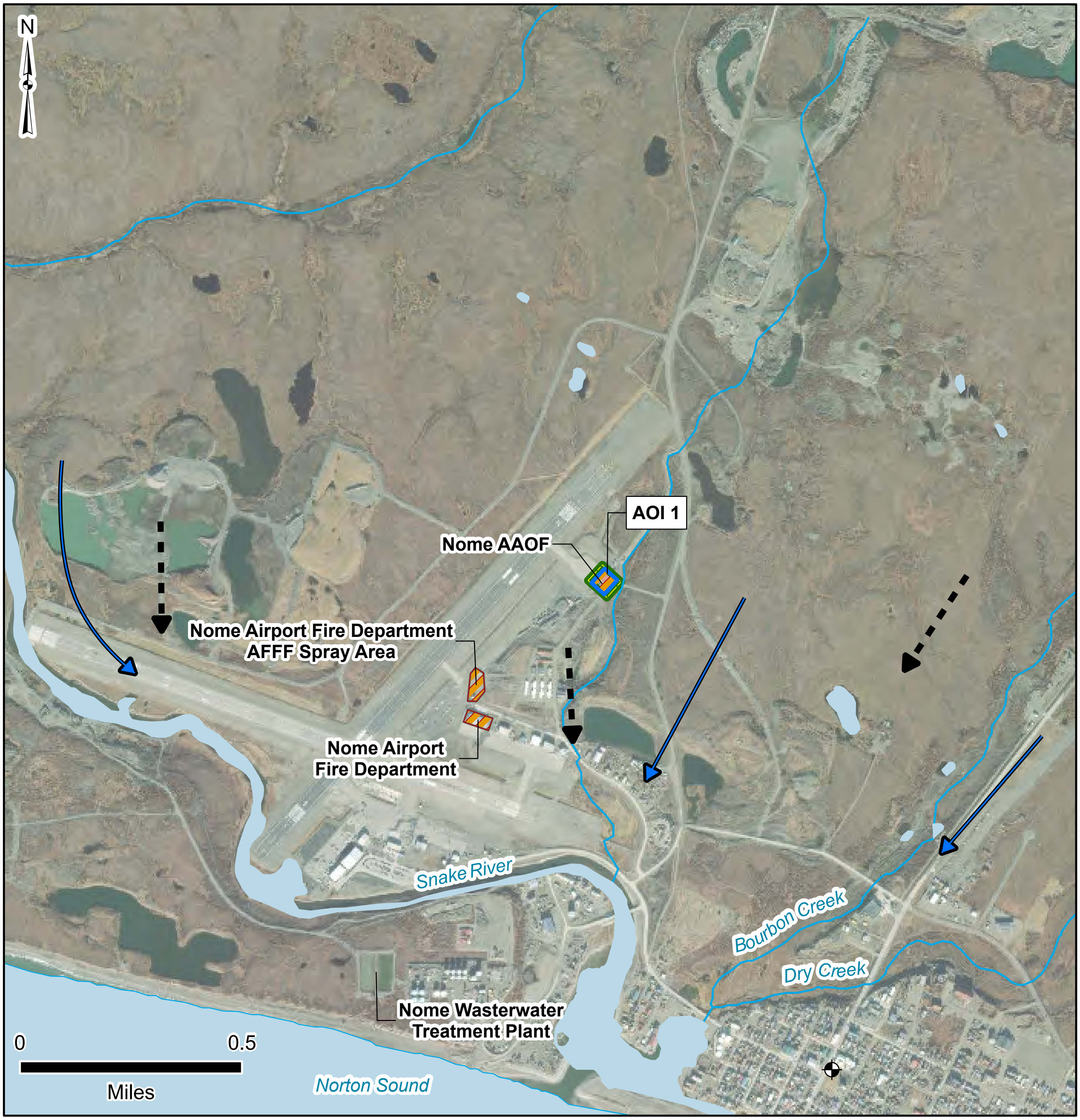
According to interviews with the Assistant Fire Chief, the NAFD trains twice a year with AFFF in the adjacent gravel patch to the north of the NAFD Fire Station (64°30'46.16"N, 165°26'7.54"W). The type, amount, and concentration of AFFF used by the NAFD during its training sessions are unknown (AECOM 2020). The identified NAFD AFFF Spray Area is downgradient/cross-gradient of the Facility; and therefore, poses no risk of cross-contamination.

### 3.2.3 Nome Wastewater Treatment Plant

The Nome Wastewater Treatment Plant (WWTP) is located 1 mile south of the AAOF (64°30'12.12"N, 165°26'34.24"W) on Submarine Beach Road, outside the airport boundary. The WWTP is currently active but is downgradient of the Facility; and therefore, poses no risk of cross-contamination. Although no use of AFFF has been identified here, WWTPs can often be sources of PFAS (AECOM 2020).

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

# Figure 3-1
# Areas of Interest


**Facility Data**
- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrogeology/Hydrology**
- Unknown Well
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- River/Stream

Waterbody

Data Sources:
ESRI 2020
AECOM 2020
USGS NHD 2021

Date:..........................August 2022
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

# 4. PROJECT DATA QUALITY OBJECTIVES

As identified during the data quality objective (DQO) process and outlined in the SI Uniform Federal Policy - (UFP) Quality Assurance Project Plan (QAPP) Addendum (EA 2021a), the objective of the SI is to identify whether there has been a release to the environment at the AOI identified in the PA. For the AOI, ARNG determines if further investigation is warranted, a removal action is required to address immediate threats, or whether no further action is warranted. This SI evaluated groundwater and soil for presence or absence of relevant compounds at the sampled AOI.

## 4.1 PROBLEM STATEMENT

DoD has adopted a policy to retain facilities in the CERCLA process based on exceedances of risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 6 July 2022 (Assistant Secretary of Defense 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the Facility will proceed to the next phase under CERCLA. The SLs are presented in **Section 6.1** of this report.

## 4.2 INFORMATION INPUTS

Primary information inputs for the SI include the following:

- The PA Report for Nome AAOF, Alaska
- Analytical data collected during other environmental sampling efforts at the Nome AAOF
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the UFP-QAPP Addendum (EA 2021a)
- Field data collected including groundwater elevation and water quality parameters measured at the time of sampling.

## 4.3 STUDY BOUNDARIES

The scope of the SI was bounded horizontally by the property limits of the Facility (**Figure 2-1**). Off-Facility sampling was not included in the scope of this SI. If future off-Facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). Temporal boundaries were limited to the earliest available time field resources were available to complete the study.

## 4.4 ANALYTICAL APPROACH

Samples were analyzed by Eurofins Lancaster Laboratories Environmental, LLC (ELLE), accredited under the DoD Environmental Laboratory Accreditation Program (ELAP); Accreditation Number (No.) (1.01). PFAS data underwent 100 % Stage 2B validation in accordance with the DoD General Data Validation Guidelines (2019a) and DoD Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual (QSM) Table B-15 (2020). PFAS data were compared to applicable SLs and decision rules as defined in the UFP-QAPP Addendum (EA 2021a).

## 4.5 DATA USABILITY ASSESSMENT

The Data Usability Assessment (DUA), which is provided in **Appendix A**, is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD 2019a, 2019b).

Based on the DUA, the environmental data collected during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUA and its associated data validation reports. These data are of sufficient quality to meet the objectives and requirements of the UFP-QAPP (EA 2021a).

# 5. SITE INSPECTION ACTIVITIES

This section describes the environmental investigation and sampling activities that occurred as part of the SI. The SI sampling approach was based on the findings of the PA and was implemented in accordance with the following approved documents:

- *Final Preliminary Assessment Report, Nome Army Air Operating Facility, Alaska,* dated August 2020 (AECOM 2020)

- *Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide*, dated December 2020 (EA 2020a)

- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Nome Army Aviation Operating Facility, Nome, Alaska*, dated September 2021 (EA 2021a)

- *Final Programmatic Accident Prevention Plan, Revision 1*, dated November 2020 (EA 2020b)

- *Final Accident Prevention Plan / Site Safety and Health Plan Addendum, Nome Army Aviation Operating Facility, Nome, Alaska Revision 2*, dated September 2021 (EA 2021b).

The SI field activities were conducted from 17 to 21 September 2021 and consisted of hand auger coring, direct-push technology (DPT) drilling, boring advancement, surface and subsurface soil sample collection, temporary monitoring well installation, grab groundwater sample collection, surveying, and site restoration activities. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as noted in **Section 5.8**.

The following samples were collected during the SI and analyzed for a subset of 24 PFAS via liquid chromatography tandem mass spectrometry (LC/MS/MS) compliant with QSM Version 5.3 Table B-15 to fulfill the project DQOs:

- Eighteen (18) primary subsurface soil samples from six soil boring locations
- Six (6) primary grab groundwater samples from six temporary well locations.
- Three (3) field blanks (FBs)
- Five (5) equipment rinsate samples
- Four (4) field duplicate samples

**Figure 5-1** provides the sample locations for all media across the Facility. **Table 5-1** presents the list of samples collected for each medium. Field documentation is provided in **Appendix B**. A log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Field forms are provided in **Appendix B2**. Survey data is provided in **Appendix B3**. A field change request form is provided in **Appendix B4**. Additionally, a photographic log of field activities is provided in **Appendix C**.

## 5.1 PRE-INVESTIGATION ACTIVITIES

In preparation for the SI field activities, project team members participated in Technical Project Planning (TPP) meetings, performed utility clearance, and sampled decontamination source water. Details of these activities are presented below.

### 5.1.1 Technical Project Planning

The U.S. Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (Department of Army 2016) defines four phases to project planning: (1) defining the project phase; (2) determining data needs; (3) developing data collection strategies; and (4) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 3 August 2021, prior to SI field activities with stakeholders. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include ARNG, AKARNG, USACE, and the Alaska Department of Environmental Conservation (ADEC) representatives familiar with the Facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the UFP-QAPP Addendum (EA 2022).

A TPP Meeting 3 was held on 19 May 2023 to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

### 5.1.2 Utility Clearance

EA Engineering, Science, and Technology, Inc., PBC (EA) contacted the Utility Notification Center to notify them of intrusive work at the Facility. Utility clearance was performed at each of the proposed boring locations on 17 September 2021 with input from the EA field team. Hangar as-builts and consultation with the Nome AAOF Hangar Maintenance Manager. Additionally, the top 0-2 ft interval of each boring were pre-cleared by EA's drilling subcontractor, GeoTek Alaska, using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered. Hand augering was not conducted to a depth of 5 ft as outlined in the UFP-QAPP because rocky gravel at several locations made hand augering extremely difficult. This is addressed as a deviation from the Work Plan (EA 2021a) in **Section 5.8.**

### 5.1.3 Site Access

EA applied for and received a building permit for the SI activities conducted at the Facility. The Building Permit Certificate is located in **Appendix E**.

### 5.1.4 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be PFAS-free prior to the start of field activities. A sample from a potable water source at Moonlight Springs Well Field in Nome, Alaska, was collected on 20 November 2019, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15. PFOS and PFOA results for the primary sample and field blank (FB) were both non-detect. It should be noted that PFAS concentrations and general water characteristics in the potable water source may have changed in the approximately 2-year timespan between the November 2019 Moonlight Springs Well Field sampling event and the September 2021 PFAS SI sampling activities. As a final rinse, laboratory-provided PFAS-free water was used for decontamination of drilling equipment.

Materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures appendix to the Programmatic UFP-QAPP (EA 2020a).

## 5.2 SOIL BORINGS AND SOIL SAMPLING

Soil samples were collected via DPT drilling methods in accordance with Standard Operating Procedure 047 *Direct-Push Technology Sampling* (EA 2021a). A Geoprobe® 6620DT drill rig and SP-16® sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top 0-2 ft of the boring. Hand augering was not conducted to a depth of 5 ft for utility clearance as outlined in the UFP-QAPP because rocky gravel at several locations made hand augering extremely difficult. This is addressed as a deviation from the Work Plan (EA 2021a) in **Section 5.8**.

Three discrete soil samples were collected for chemical analysis from each soil boring: one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples. One subsurface soil sample was collected approximately 1 ft above the groundwater table, and one was collected at the mid-point between the surface and the groundwater table (not to exceed 15 ft bgs). Groundwater was encountered at depths ranging from 6.11 to 11.15 ft bgs during drilling. Total boring completion depths, to accommodate temporary well installation, ranged from 11.77 to 17.54 ft bgs. One surface soil sample (0 to 2 ft bgs) was collected at each boring location.

All soil sample locations are shown on **Figure 5-1**, and boring sample depths are provided in **Table 5-2**. The soil boring locations were selected based on the AOI information provided in the PA (AECOM 2020) and as agreed upon by stakeholders during the TPP and review of the UFP-QAPP Addendum (EA 2021a).

During the drilling, the soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System. A photoionization detector (PID) was used to screen the breathing zone during boring activities as a part of personal safety requirements. Observations and measurements were recorded on sampling forms (**Appendix B2**) and in a non-treated/non Rite-in-the-Rain® field logbook. Depth interval, recovery percent, PID concentrations, moisture, relative density, Munsell color, and Unified Soil Classification System texture were recorded. The boring logs are provided in **Appendix F**.

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on PFAS-free gel ice and transported via Federal Express (FedEx) under standard chain-of-custody procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15), total organic carbon (TOC) (USEPA Method 9060A) and pH (USEPA Method 9045D) in accordance with the UFP-QAPP Addendum (EA 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/matrix spike duplicates (MSDs) were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, EBs were collected at a rate of one per day per matrix sampled, and the samples were analyzed for the same parameters as the soil or groundwater samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6 degrees Celsius (°C) during shipment.

DPT borings were converted to temporary wells, which were subsequently abandoned after sampling and surveying in accordance with the UFP-QAPP Addendum (EA 2021a). After removal of the casings, boreholes were abandoned in place using bentonite chips. Borings were installed in grass or gravelly areas to avoid disturbing concrete or asphalt surfaces.

## 5.3 TEMPORARY WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

Six temporary wells were installed using a GeoProbe® 6620DT drill rig with SP-16 tooling. Once the borehole was advanced to the desired depth, stainless steel rods and a 3-ft screen were constructed with sufficient casing rod to reach the ground surface. Stainless steel tooling and screen were decontaminated using a triple rinse process, which finishes with PFAS-free water. Please refer to **Section 5.8** for further detail on this deviation from the UFP-QAPP. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected, after a period of time following well installation (generally a couple hours between installation and sampling, although some periods were longer) to allow groundwater to infiltrate and recharge the temporary well intervals, using a peristaltic pump with PFAS-free HDPE tubing. Each sample was collected in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, and oxidation-reduction potential) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) before each grab sample was collected in a separate container. In addition to groundwater samples, a subsample of each groundwater sample was collected, and shaker test was performed to identify whether any foaming was present. No shaker tests produced foam, although a foamy substance was observed on the bottom of the water level logger in well AOI01-02. Samples were packaged on PFAS-free gel ice and transported via FedEx under standard chain-of-custody procedures to the laboratory and analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA 2021a).

Field duplicate (FD) samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. Three FBs were collected in accordance with the UFP-QAPP Addendum (EA 2021a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment.

## 5.4 SYNOPTIC WATER LEVEL MEASUREMENTS

Groundwater levels were used to monitor Facility-wide groundwater elevations and assess groundwater flow. Synoptic water level elevation measurements were collected from the newly installed temporary monitoring wells, taken from the survey mark on the northern side of the well casing. Groundwater elevation data is provided in **Table 5-3**.

## 5.5 SURVEYING

Each new temporary well's vertical location was calculated using level loop survey techniques and post processing. Since reusable stainless-steel temporary wells points were installed as opposed to polyvinyl chloride (PVC) temporary wells, the temporary well casing was not left in the ground for the level loop survey. Instead, a survey pin was installed at each of the six boring locations and ground surface. Please refer to **Section 5.8** for further detail.

Horizontal locations of each new temporary well were recorded using a Trimble® Geo7x handheld global positioning system. Positions were collected in the applicable Universal Transverse Mercator zone projection with World Geodetic System 1984 datum (horizontal), as specified in the UFP-QAPP Addendum (EA 2021a). Surveying data were collected on 21 September 2021 and are provided in **Appendix B3**. Although level loop survey method is more prone to human error than other survey methods, the precision required by the UFP-QAPP Addendum was met.

## 5.6 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the UFP-QAPP Addendum (EA 2021a).

Soil IDW (i.e., soil cuttings) generated during the SI activities were incorporated as backfill in each boring during site restoration, and liquid IDW (i.e., purge water and decontamination fluids) generated during the SI activities were run through the granular activated carbon (GAC) and discharged to the ground at a designated location at the Facility (**Figure 5-1**). The GAC filter unit was removed from the Facility, and it is awaiting disposition in a Subtitle C landfill.

Other solids such as spent personal protective equipment, plastic sheeting, tubing, rope, unused monitoring well construction materials, and other environmental media generated during the field activities were disposed of at a licensed solid waste landfill.

## 5.7 LABORATORY ANALYTICAL METHODS

Samples were analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at ELLE, in Lancaster, Pennsylvania, a DoD ELAP- and NELAP-certified laboratory.

Soil samples were also analyzed for TOC using USEPA Method 9060A and pH by USEPA Method 9045D.

## 5.8 DEVIATIONS FROM UFP-QAPP ADDENDUM

Deviations from the UFP-QAPP Addendum occurred based on conditions encountered during field investigation activities. These deviations were discussed between EA, ARNG, USACE, and the Alaska Department of Environmental Conservation either during the field activities or post field effort. Six deviations from the UFP-QAPP Addendum are noted below:

- Due to subsurface lithology and semi-frozen coarse gravels and soils, hand auger drilling methods were utilized from 0 to 2 ft bgs in each boring, instead of 0 to 5 ft bgs as proposed in the UFP-QAPP Addendum (EA 2021a).

- PVC screen and well materials provided by GeoTek Alaska was ¾-in. diameter instead of the 1-in. diameter as proposed in the UFP-QAPP Addendum (EA 2021a). After multiple attempts to install PVC wells at boring locations AOI01-05 and AOI01-02 because of subsurface lithology and insufficient PVC screen diameter, the field team decided to move forward using a stainless-steel SP-16 temporary well point setup instead. The stainless-steel screen was decontaminated using a triple rinse process, which included a deionized water rinse, an Alconox® rinse, and a laboratory-provided PFAS-free water rinse between each temporary monitoring well installation.

- Boring AOI01-02 was offset (AOI01-02A) due to issues with well construction/installation activities. The PVC screen during temporary well AOI01-02 installation attempt became clogged with fine silt material, and groundwater was detected downhole but was unable to be purged, even after allowing the well to recharge overnight. The field team decided to offset this temporary well location to reset the screened interval above the fine silt layer to avoid future clogging of the well screen. AOI01-02A was offset approximately 5 ft north and upgradient of the initial boring.

- Boring AOI01-04 was offset (AOI01-04A) due to a potential void (drill rig experienced no resistance during 15–20 ft bgs soil core interval) downhole after encountering soil between 12 and 15 ft bgs that appeared to be contaminated with petroleum. The field team notified ARNG and appropriate on-site Department of Transportation personnel and received approval before proceeding to offset the boring less than 10 ft southwest and downgradient from the initial boring. [Note: A PID reading of 15,000+/- was recorded from soils taken from boring AOI01-04 at 12-15 ft bgs. No samples were analyzed for volatiles/petroleum constituents; however, the suspect spill was issued spill number: 21389926501.]

- Non-dedicated stainless-steel temporary well point casings were not left in the ground for the level loop survey, and survey pins were installed at each of the six boring locations at ground surface. Casing height was measured and recorded from the survey pin (at ground surface) to the top of casing at the time of installation of each temporary well point. Survey pins were left in the ground until the completion of the level loop survey on the afternoon of 21 September 2021. The casing heights for each boring were incorporated in survey post processing calculations to determine groundwater elevations.

- The GAC filter was used during sampling to filter liquid IDW before the treated water was disposed to the ground surface. At the completion of the field work, the intention was to retain the GAC filter for use in future investigations at the Facility. The GAC filter was then transported to Anchorage for storage. However, USACE later decided that the GAC filter was not needed and should be disposed of. The GAC filter was then sampled, and a “Contaminated Media Transport and Treatment or Disposal Approval Form” was prepared. The form was approved by ADEC, and the GAC filter will be disposed of in a Subtitle C landfill.

**Table 5-1. Samples by Medium**
**Nome Army Aviation Operating Facility, Nome, Alaska**
**Site Inspection Report**

| Sample Identification | Sample Collection Date | Sample Depth (ft bgs) | PFAS (USEPA Method 537 Modified) | TOC (USEPA Method 9060A) | pH (USEPA Method 9045D) | Comments |
|---|---|---|---|---|---|---|
| **Soil Samples** | | | | | | |
| AOI01-01-SB-00-02 | 9/19/2021 | 0-2 | X | X | X | |
| AOI01-01-SB-07-10 | 9/19/2021 | 7-10 | X | X | X | |
| AOI01-01-SB-14-15 | 9/19/2021 | 14-15 | X | X | X | |
| AOI01-02-SB-00-02 | 9/18/2021 | 0-2 | X | X | X | |
| AOI01-02-SB-05-10 | 9/18/2021 | 5-10 | X | X | X | |
| AOI01-02-SB-10-13 | 9/18/2021 | 10-13 | X | X | X | |
| AOI01-03-SB-00-02 | 9/20/2021 | 0-2 | X | X | X | |
| AOI01-03-SB-06-08 | 9/20/2021 | 6-8 | X | X | X | |
| AOI01-03-SB-09-11 | 9/20/2021 | 9-11 | X | X | X | |
| NAAOF-SB99-0920 | 9/20/2021 | 0-2 | X | X | X | FD |
| AOI01-04A-SB-00-02 | 9/20/2021 | 0-2 | X | X | X | |
| AOI01-04A-SB-05-08 | 9/20/2021 | 5-8 | X | X | X | |
| AOI01-04A-SB-10-12 | 9/20/2021 | 10-12 | X | X | X | |
| AOI01-05-SB-00-02 | 9/18/2021 | 0-2 | X | X | X | |
| AOI01-05-SB-05-10 | 9/18/2021 | 5-10 | X | X | X | |
| AOI01-05-SB-11-12 | 9/18/2021 | 11-12 | X | X | X | |
| NAAOF-SB99-0918 | 9/18/2021 | 5-10 | X | X | X | FD |
| AOI01-06-SB-00-02 | 9/19/2021 | 0-2 | X | X | X | |
| AOI01-06-SB-05-07 | 9/19/2021 | 5-7 | X | X | X | |
| AOI01-06-SB-14-15 | 9/19/2021 | 14-15 | X | X | X | |
| **Groundwater Samples** | | | | | | |
| AOI01-01-GW | 9/20/2021 | - | X | - | - | |
| AOI01-02A-GW | 9/20/2021 | - | X | - | - | |
| NAAOF-GW99-0920 | 9/20/2021 | - | X | - | - | FD |
| AOI01-03-GW | 9/20/2021 | - | X | - | - | |
| AOI01-04A-GW | 9/20/2021 | - | X | - | - | |
| AOI01-05-GW | 9/18/2021 | - | X | - | - | |
| NAAOF-GW99-0918 | 9/18/2021 | - | X | - | - | FD |
| AOI01-06-GW | 9/19/2021 | - | X | - | - | |
| **Blank Samples** | | | | | | |
| NAAOF-FB-01 | 9/18/2021 | - | X | - | - | FB |
| NAAOF-FB-02 | 9/19/2021 | - | X | - | - | FB |
| NAAOF-FB-03 | 9/20/2021 | - | X | - | - | FB |
| NAAOF-EB-SB-01 | 9/19/2021 | - | X | - | - | EB |
| NAAOF-EB-SB-02 | 9/19/2021 | - | X | - | - | EB |
| NAAOF-EB-SB-03 | 9/20/2021 | - | X | - | - | EB |
| NAAOF-EB-GW-01 | 9/20/2021 | - | X | - | - | EB |
| NAAOF-EB-GW-02 | 9/21/2021 | - | X | - | - | EB |

Notes:
EB = Equipment blank
FB = Field blank
FD = Field duplicate
X = sample collected for analysis

**Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals**
**Nome Army Aviation Operating Facility, Nome, Alaska**
**Site Inspection Report**

| Area of Interest | Boring Location | Soil Boring Depth (ft bgs) | Temporary Well Screen Interval (ft bgs) |
|---|---|---|---|
| 1 | AOI01-01 | 16.91 | 13.5-16.5 |
| | AOI01-02A | 16.77 | 13.5-16.5 |
| | AOI01-03 | 11.77 | 8.5-11.5 |
| | AOI01-04A | 12.73 | 9.5-12.5 |
| | AOI01-05 | 15.01 | 11-14 |
| | AOI01-06 | 17.54 | 13.5-16.5 |

**Table 5-3. Groundwater Elevation**
**Nome Army Aviation Operating Facility, Nome, Alaska**
**Site Inspection Report**

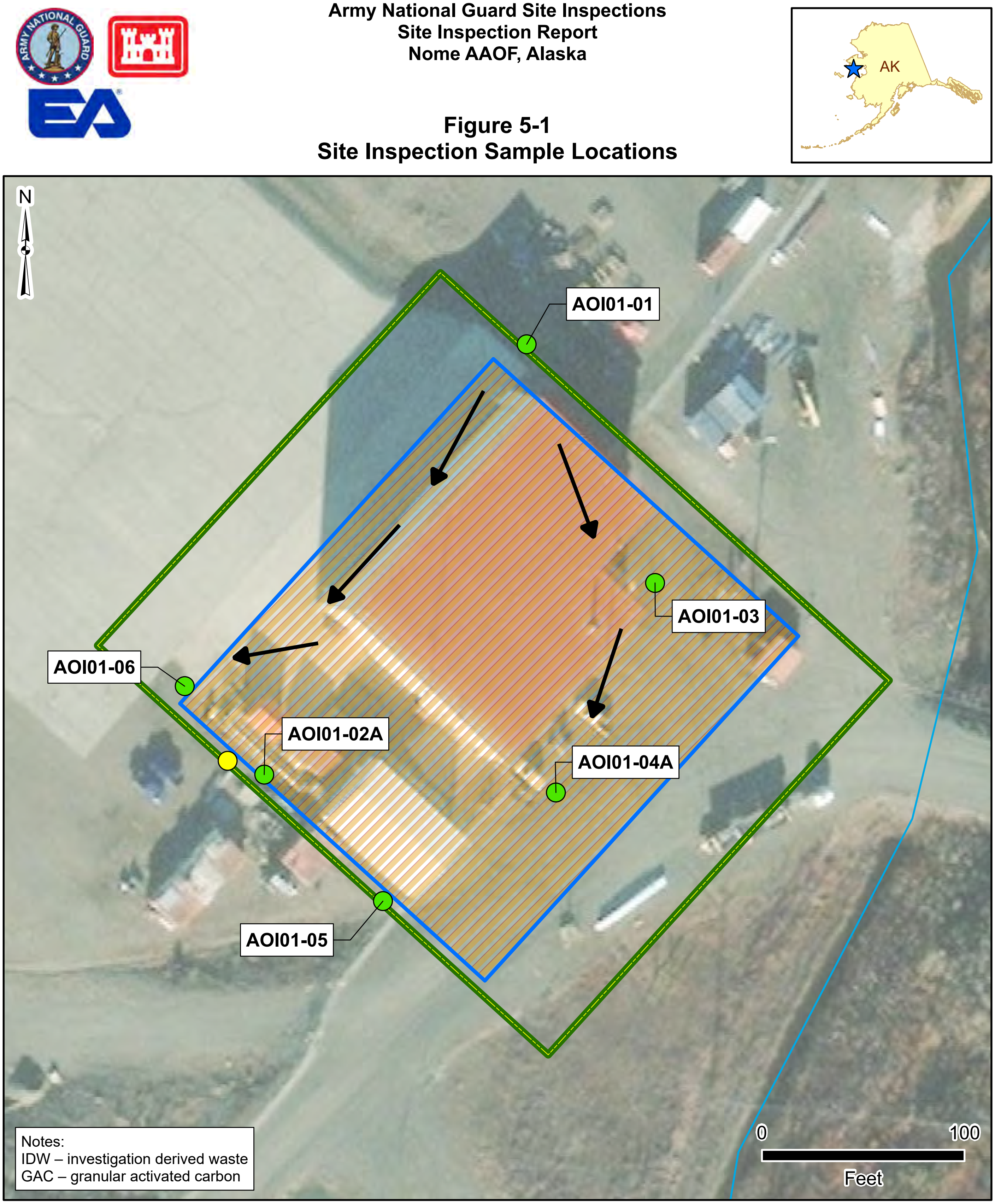
| Monitoring Well ID | Top of Casing Elevation (ft amsl) | Depth to Water (ft btoc) | Groundwater Elevation (ft amsl) |
|---|---|---|---|
| AOI01-01 | 42.43 | 6.72 | 35.71 |
| AOI01-02A | 42.42 | 11.21 | 31.21 |
| AOI01-03 | 47.05 | 14.30 | 32.75 |
| AOI01-04A | 46.64 | 15.30 | 31.34 |
| AOI01-05 | 43.10 | 12.08 | 31.02 |
| AOI01-06 | 42.12 | 11.70 | 30.42 |

Notes:
amsl = above mean sea level
btoc = below top of casing

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

**Figure 5-1**
**Site Inspection Sample Locations**




**Facility Data**

- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Sample Location**

- Soil Boring/Temporary Well Location
- Liquid IDW Application/GAC Filtration to Ground Surface

**Hydrology/Hydrogeology**

- Groundwater Flow Direction
- River/Stream

Data Sources:
ESRI 2020
AECOM 2020
USGS NHD 2021

Date:..........................August 2022
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

# 6. SITE INSPECTION RESULTS

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1** and **Table 6-1**. A discussion of the results for the AOI and boundary areas is provided in **Section 6.3**. **Tables 6-2** through **6-5** present results for soil or groundwater for the relevant compounds. Tables that contain all results are provided in **Appendix G**, and the laboratory reports are provided in **Appendix H**.

## 6.1 SCREENING LEVELS

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 6 July 2022 (Assistant Secretary of Defense 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS. The SLs established in the OSD memorandum apply to the six compounds presented on **Table 6-1**.

**Table 6-1. Screening Levels (Soil and Groundwater)**

| Analyte[1] | Residential (Soil) (µg/kg)[1] | Industrial/Commercial Composite Worker (Soil) (µg/kg)[1] | Tap Water (Groundwater) (ng/L)[1] |
|---|---|---|---|
| PFOA | 19 | 250 | 6 |
| PFOS | 13 | 160 | 4 |
| PFBS | 1,900 | 25,000 | 601 |
| PFHxS | 130 | 1,600 | 39 |
| PFNA | 19 | 250 | 6 |

Notes:
1. Assistant Secretary of Defense. July 2022. Risk Based Screening Levels Calculated for Groundwater and Soil using U.S. Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient=0.1. May 2022.

µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the Facility: the residential scenario is applied to surface soil results (0 to 2 ft bgs) and the industrial/commercial worker scenario is applied to shallow subsurface soil results (2 to 15 ft bgs). The SLs are not applied to deep subsurface soil results (greater than 15 ft bgs) because 15 ft is the anticipated limit of construction activities.

## 6.2 SOIL PHYSICOCHEMICAL ANALYSES

To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which are important for evaluating transport through the soil medium. **Appendix G** contains the results of the TOC and pH sampling.

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions, and are therefore relatively mobile in groundwater (Xiao et al. 2015) but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo and Higgins 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients ($K_{oc}$ values) can help in evaluating transport potential, though other geochemical factors (for example, pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC 2018).

Soil pH was measured as 8 in a sample collected from AOI 1. TOC was 21 milligrams per kilogram in a sample collected from AOI 1.

## 6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, the Nome AAOF Hangar. The detected compounds are summarized in **Tables 6-2** through **6-5**. Soil and groundwater results are presented on **Figures 6-1** through **6-7.**

### 6.3.1 AOI 1 – Soil Analytical Results

**Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figures 6-1** through **6-5** present the ranges of detections in soil.

Soil was sampled in six boring locations in AOI 1. Soil was sampled from three intervals at each location.

PFOS was detected in surface soil in four of the six borings at concentrations ranging from 0.28 J μg/kg (AOI01-05) to 0.61 J μg/kg (AOI01-03), which are below the SL of 13 μg/kg. The highest detections of PFOS occurred in boring AOI01-03 at concentrations of 0.55 J and 0.61 J μg/kg in the primary and FD samples, between 0 and 2 ft bgs. PFOA was not detected in any surface soil samples, except for AOI01-06 at a concentration of 0.3 J μg/kg, which is below the SL of 19 μg/kg. PFBS, PFHxS, and PFNA were not detected in any surface soil samples.

PFOS, PFOA, and PFBS were detected in subsurface soil in two of the six borings. PFOS was detected in subsurface soil intervals 7–10 ft bgs and 14–15 ft bgs (in boring AOI01-01, at concentrations of 7.1 μg/kg and 0.48 J μg/kg, respectively) and 6–8 ft bgs and 9–11 ft bgs (in boring AOI01-03, at concentrations of 0.6 J μg/kg and 0.7 μg/kg, respectively). PFOS detections are below the SL of 160 μg/kg. PFOA was detected in subsurface soil intervals at 7–10 ft bgs (at location AOI01-01, at a concentration of 0.38 J µg/kg) and 9–11 ft bgs (in boring AOI01-03, at a concentration 0.7 J µg/kg). PFOA detections are below the SL of 250 µg/kg. PFBS was detected in one subsurface soil sample in boring AOI01-03 at the 9–11 ft bgs interval. PFBS was detected at a concentration of 0.7 J µg/kg, which is below the SL of 25,000 µg/kg. PFHxS was detected in one subsurface soil interval in boring AOI01-01 at the 7–10 ft bgs interval. PFHxS was detected at a concentration of 0.21 J µg/kg, which is below the SL of 1,600 µg/kg. PFNA was not detected in any subsurface soil samples.

### 6.3.2 AOI 1 – Groundwater Analytical Results

**Figures 6-6** and **6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

Groundwater samples were collected from the six temporary wells at AOI 1 during the SI. PFOS, PFOA, and PFBS were detected in all six of the temporary groundwater monitoring wells. PFOS was detected above the SL of 4 ng/L in all six temporary wells at concentrations ranging from 28 J ng/L (AOI01-02A) to 89 J ng/L (AOI01-01). PFOA was detected above the SL of 6 ng/L in all six of the temporary wells, ranging from 6.7 J ng/L (AOI01-05) to 23 J ng/L (AOI01-01 and AOI01-04A). PFBS was detected below the SL of 601 ng/L in all six of the temporary wells, ranging from 2.8 J ng/L (AOI01-03) to 14 J ng/L (AOI01-04A). PFHxS was detected in all six temporary wells. PFHxS was detected above the SL of 39 ng/L in AOI01-01, AOI01-03, and AOI01-04A at concentrations of 130 J ng/L, 180 J ng/L, and 120 J ng/L, respectively. PFHxS was detected below the SL in AOI01-02A, AOI01-05, and AOI01-06 at concentrations of 19 J ng/L, 32 J ng/L, and 31 J ng/L, respectively. PFNA was detected below the SL of 6 ng/L in five of six temporary wells at concentrations ranging from 0.45 J ng/L (AOI01-04A) to 0.92 J ng/L (AOI01-02A). PFNA was not detected in AOI01-06.

### 6.3.3 AOI 1 – Conclusions

Based on the results of the SI, PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil below their respective SLs. PFOS, PFOA, and PFHxS were detected in groundwater at concentrations above their respective SLs. Based on the exceedances of the SLs in groundwater further evaluation at AOI 1 is warranted.

*This page intentionally left blank*

**Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil**
**Site Inspection Report, NAAOF**

| | | **Location ID** | AOI01-01 | | AOI01-02 | | AOI01-03 | | AOI01-03 | | AOI01-04A | | AOI01-05 | | AOI01-06 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Sample Name** | AOI01-01-SB-00-02 | | AOI01-02-SB-00-02 | | AOI01-03-SB-00-02 | | NAAOF-SB99-0920 | | AOI01-04A-SB-00-02 | | AOI01-05-SB-00-02 | | AOI01-06-SB-00-02 | |
| | | **Parent Sample ID** | | | | | | | AOI01-03-SB-00-02 | | | | | | | |
| | | **Sample Date** | 9/19/2021 | | 9/18/2021 | | 9/20/2021 | | 9/20/2021 | | 9/20/2021 | | 9/18/2021 | | 9/19/2021 | |
| | | **Depth(ft bgs)** | 0-2 | | 0-2 | | 0-2 | | 0-2 | | 0-2 | | 0-2 | | 0-2 | |
| **Analyte** | **Screening Level[1,2]** | **Unit** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** |
| **PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | 1900 | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorononanoic acid (PFNA) | 19 | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorooctanesulfonic acid (PFOS) | 13 | µg/kg | ND | U | ND | U | 0.55 | J | 0.61 | J | 0.32 | J | 0.28 | J | 0.38 | J |
| Perfluorooctanoic acid (PFOA) | 19 | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | 0.3 | J |

Notes:
J = Estimated concentration.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
µg/kg = Microgram(s) per kilogram.
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil.
Values exceeding the Screening Level are shaded gray.
ft bgs = Feet below ground surface.
Qual = Qualifier.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).

*This page intentionally left blank*

## Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
## Site Inspection Report, NAAOF

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Location ID** | | | AOI01-01 | | AOI01-02 | | AOI01-03 | | AOI01-04A | | AOI01-05 | | AOI01-05 | | AOI01-06 | |
| **Sample Name** | | | AOI01-01-SB-07-10 | | AOI01-02-SB-05-10 | | AOI01-03-SB-06-08 | | AOI01-04A-SB-05-08 | | AOI01-05-SB-05-10 | | NAAOF-SB99-0918 | | AOI01-06-SB-05-07 | |
| **Parent Sample ID** | | | | | | | | | | | | | AOI01-05-SB-05-10 | | | |
| **Sample Date** | | | 9/19/2021 | | 9/18/2021 | | 9/20/2021 | | 9/20/2021 | | 9/18/2021 | | 9/18/2021 | | 9/19/2021 | |
| **Depth (ft bgs)** | | | 7-10 | | 5-10 | | 6-8 | | 5-8 | | 5-10 | | 5-10 | | 5-7 | |
| **Analyte** | **Screening Level[1,2]** | **Unit** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** |
| **PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | 25000 | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorohexanesulfonic acid (PFHxS) | 1600 | µg/kg | 0.21 | J | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorononanoic acid (PFNA) | 250 | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorooctanesulfonic acid (PFOS) | 160 | µg/kg | 7.1 | | ND | U | 0.6 | J | ND | U | ND | U | ND | U | ND | U |
| Perfluorooctanoic acid (PFOA) | 250 | µg/kg | 0.38 | J | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |

Notes:
J = Estimated concentration.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of
µg/kg = Microgram(s) per kilogram.
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.
Values exceeding the Screening Level are shaded gray.
ft bgs = Feet below ground surface.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.

*This page intentionally left blank*

**Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil**
**Site Inspection Report, NAAOF**

| | **Location ID** | AOI01-01 | | AOI01-02 | | AOI01-03 | | AOI01-04A | | AOI01-05 | | AOI01-06 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Sample Name** | AOI01-01-SB-14-15 | | AOI01-02-SB-10-13 | | AOI01-03-SB-09-11 | | AOI01-04A-SB-10-12 | | AOI01-05-SB-11-12 | | AOI01-06-SB-14-15 | |
| | **Parent Sample ID** | | | | | | | | | | | | |
| | **Sample Date** | 9/19/2021 | | 9/18/2021 | | 9/20/2021 | | 9/20/2021 | | 9/18/2021 | | 9/19/2021 | |
| | **Depth (ft bgs)** | 14-15 | | 10-13 | | 9-11 | | 10-12 | | 11-12 | | 14-15 | |
| **Analyte** | **Unit** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** |
| **PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | µg/kg | ND | U | ND | U | 0.7 | J | ND | U | ND | U | ND | U |
| Perfluorohexanesulfonic acid (PFHxS) | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorononanoic acid (PFNA) | µg/kg | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| Perfluorooctanesulfonic acid (PFOS) | µg/kg | 0.48 | J | ND | U | 0.7 | | ND | U | ND | U | ND | U |
| Perfluorooctanoic acid (PFOA) | µg/kg | ND | U | ND | U | 0.7 | J | ND | U | ND | U | ND | U |

Notes:
J = Estimated concentration.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
Qual = Qualifier.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).

*This page intentionally left blank*

**Table 6-5. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater**
**Site Inspection Report, NAAOF**

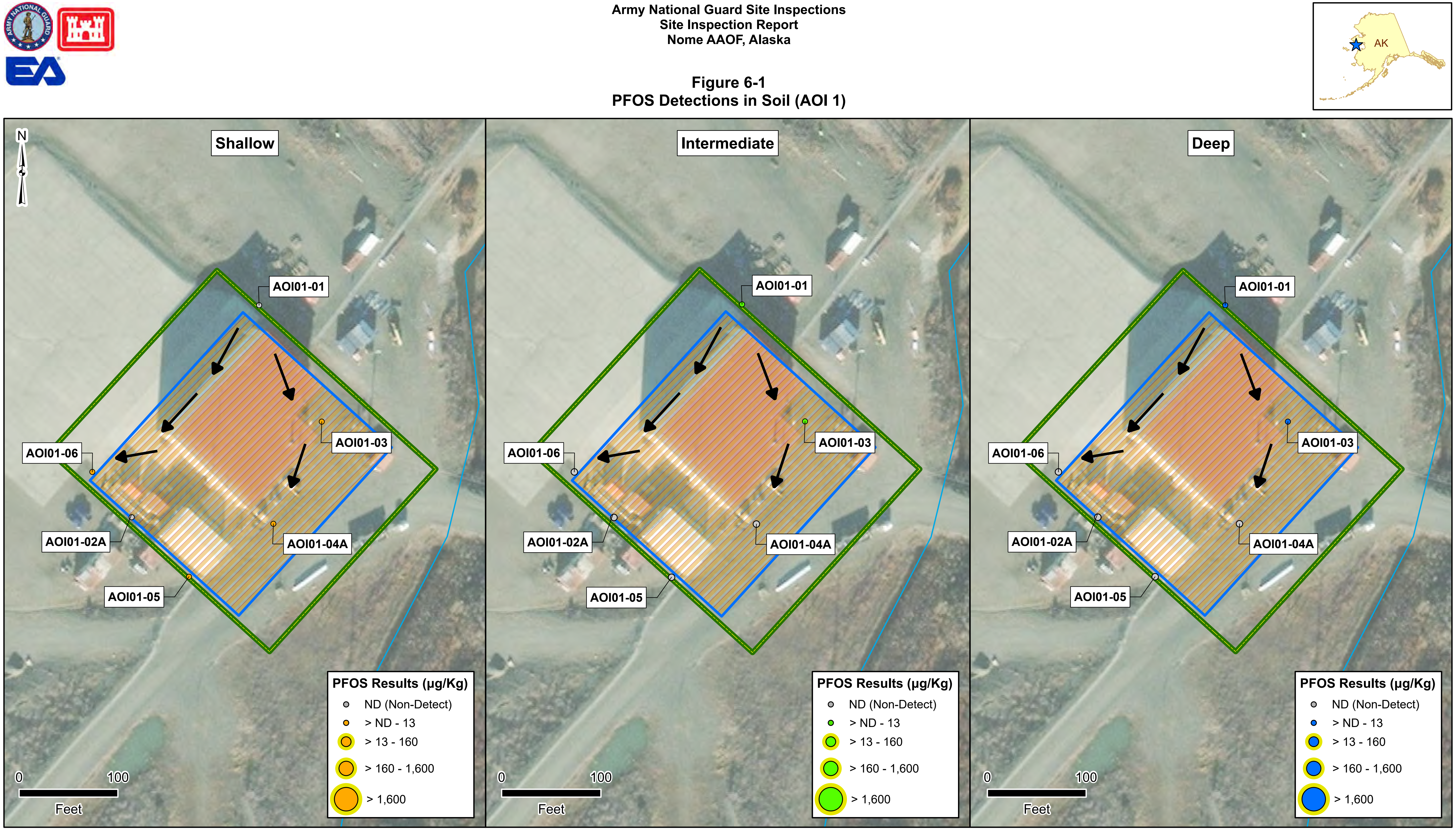
| | | Location ID | AOI01-01 | | AOI01-02A | | AOI01-02A | | AOI01-03 | | AOI01-04A | | AOI01-05 | | AOI01-05 | | AOI01-06 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | AOI01-01-GW | | AOI01-02A-GW | | NAAOF-GW99-0920 | | AOI01-03-GW | | AOI01-04A-GW | | AOI01-05-GW | | NAAOF-GW99-0918 | | AOI01-06-GW | |
| | | Parent Sample ID | | | | | AOI01-02A-GW | | | | | | | | AOI01-05-GW | | | |
| | | Sample Date | 9/20/2021 | | 9/20/2021 | | 9/20/2021 | | 9/20/2021 | | 9/20/2021 | | 9/18/2021 | | 9/18/2021 | | 9/19/2021 | |
| **Analyte** | **Screening Level [1]** | **Unit** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** |
| **PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)** | | | | | | | | | | | | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | 601 | ng/L | 8.2 | J | 2.8 | J | 2.9 | J | 2.8 | J | 14 | J | 9.7 | J | 9.9 | J | 4.5 | J |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | ng/L | 130 | J | 18 | J | 19 | J | 180 | J | 120 | J | 30 | J | 32 | J | 31 | J |
| Perfluorononanoic acid (PFNA) | 6 | ng/L | 0.8 | J | 0.92 | J | 0.65 | J | 0.66 | J | 0.45 | J | 0.47 | J | 0.55 | J | ND | UJ |
| Perfluorooctanesulfonic acid (PFOS) | 4 | ng/L | 89 | J | 28 | J | 29 | J | 81 | J | 36 | J | 25 | J | 32 | J | 42 | J |
| Perfluorooctanoic acid (PFOA) | 6 | ng/L | 23 | J | 7.1 | J+ | 8.7 | J+ | 21 | J | 23 | J | 6.1 | J | 6.7 | J | 8.8 | J |

Notes:
J = Estimated concentration.
J- = Estimated concentration, biased low.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
ng/L = Nanogram(s) per liter.
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
Values exceeding the Screening Level are shaded gray.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
- = No screening level available.

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

## Figure 6-1
## PFOS Detections in Soil (AOI 1)




**Facility Data**

- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrology/Hydrogeology**

- Groundwater Flow Direction
- River/Stream

Notes:
PFOS = Perfluorooctanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo.

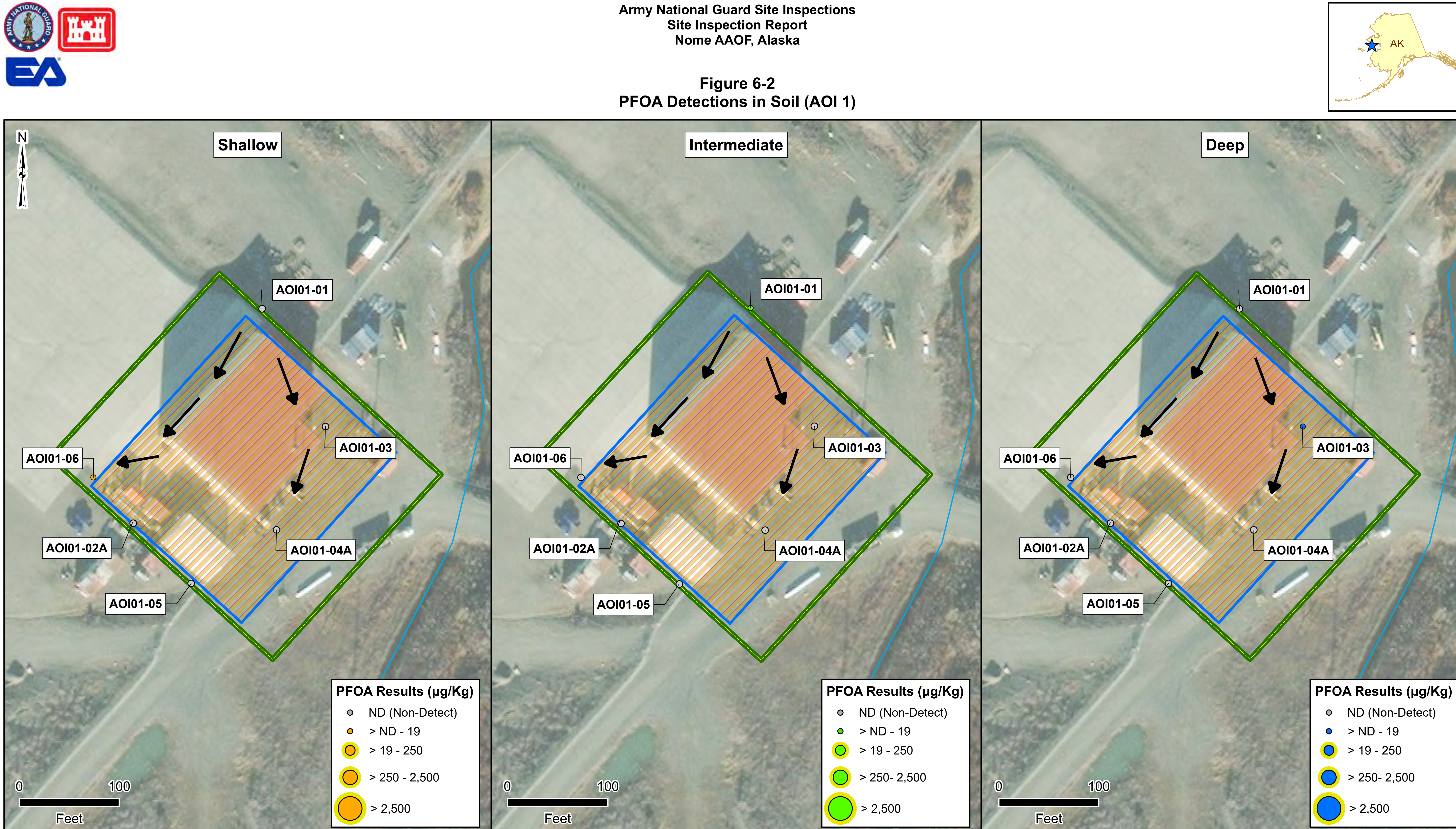
Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:.............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

# Figure 6-2
# PFOA Detections in Soil (AOI 1)




**Facility Data**
- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrology/Hydrogeology**
- Groundwater Flow Direction
- River/Stream

Notes:
PFOA = Perfluorooctanoic acid
Exceedances of the OSD SL are depicted with a yellow halo.

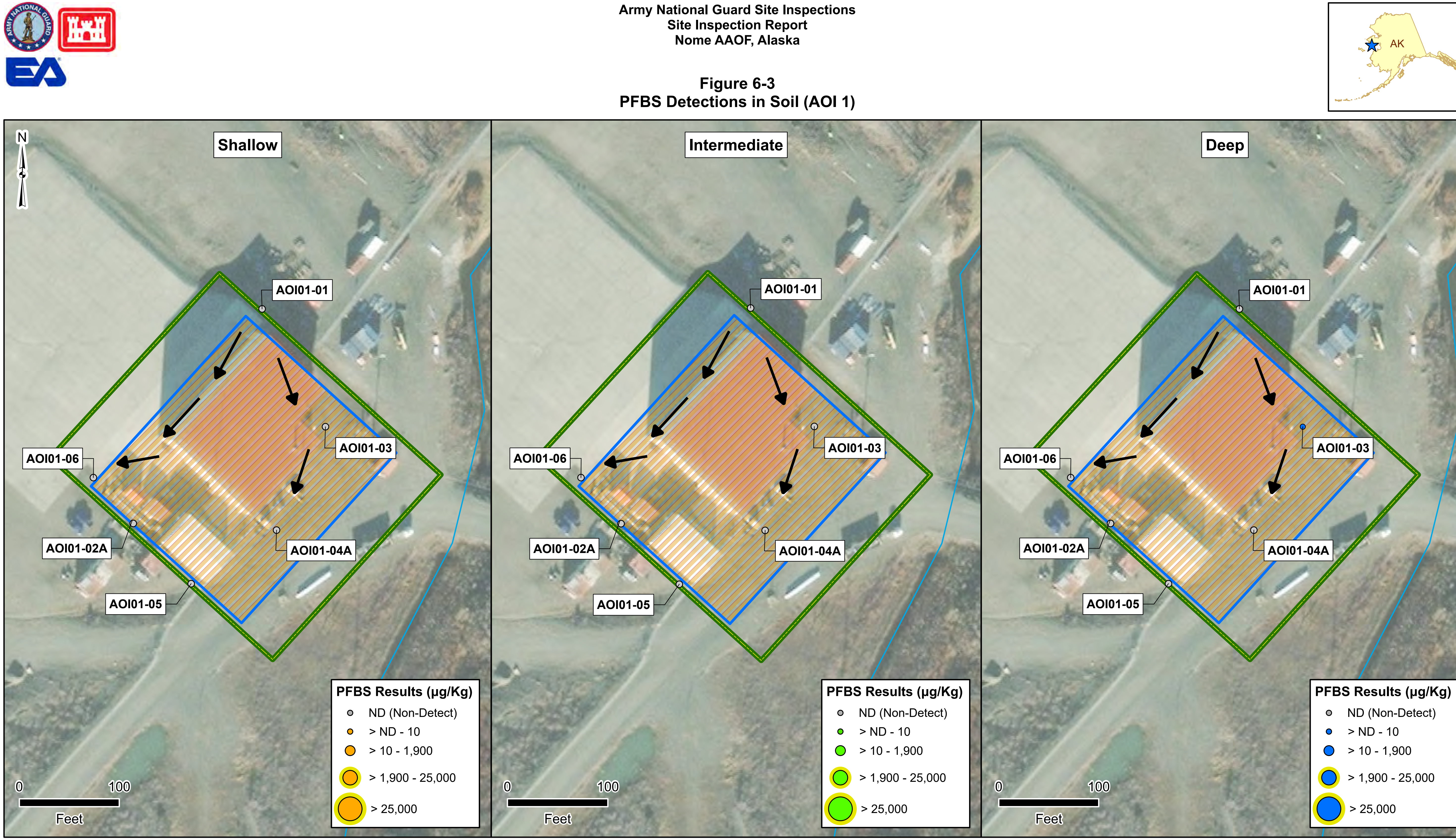
Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

# Figure 6-3
# PFBS Detections in Soil (AOI 1)




**Facility Data**
- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrology/Hydrogeology**
- Groundwater Flow Direction
- River/Stream

Notes:
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:.............................EA
Prepared For:..................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

**Figure 6-4**
**PFHxS Detections in Soil (AOI 1)**


**Facility Data**
Facility Boundary
Area of Interest
Potential PFAS Release

**Hydrology/Hydrogeology**
Groundwater Flow Direction
River/Stream

Notes:
PFHxS = Perfluorohexanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo.

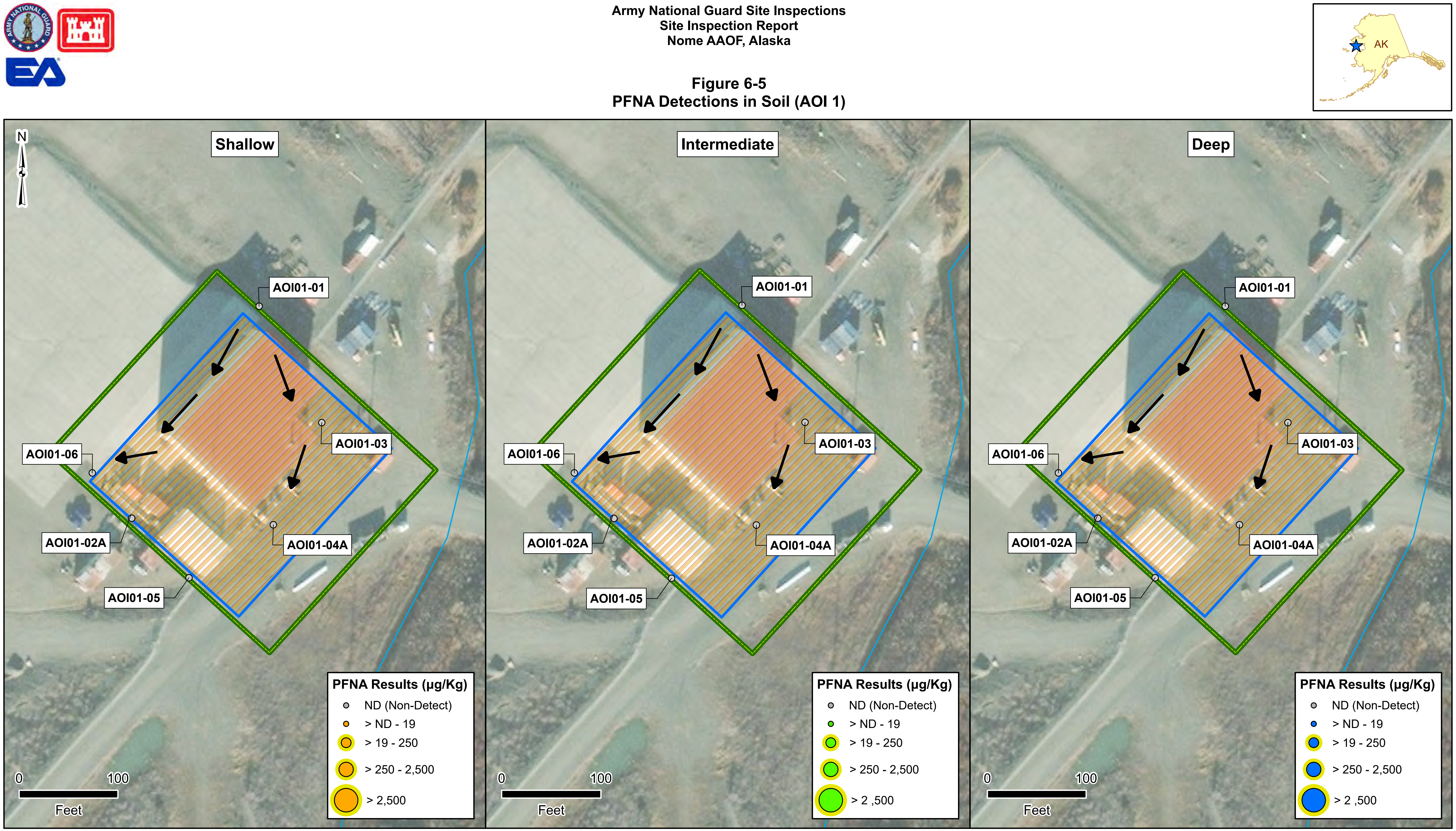
Data Sources:
ESRI 2020
AECOM 2020

Date:........................August 2022
Prepared By:..............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

**Figure 6-5**
**PFNA Detections in Soil (AOI 1)**




**Facility Data**
Facility Boundary
Area of Interest
Potential PFAS Release

**Hydrology/Hydrogeology**
Groundwater Flow Direction
River/Stream

Notes:
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:.............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska


## Figure 6-6
## PFOA, PFOS and PFBS Detections in Groundwater (AOI 1)


**Facility Data**

- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrology/Hydrogeology**

- Groundwater Flow Direction
- River/Stream

Notes:
PFOA = Perfluorooctanesulfonic acid
PFOS = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo.

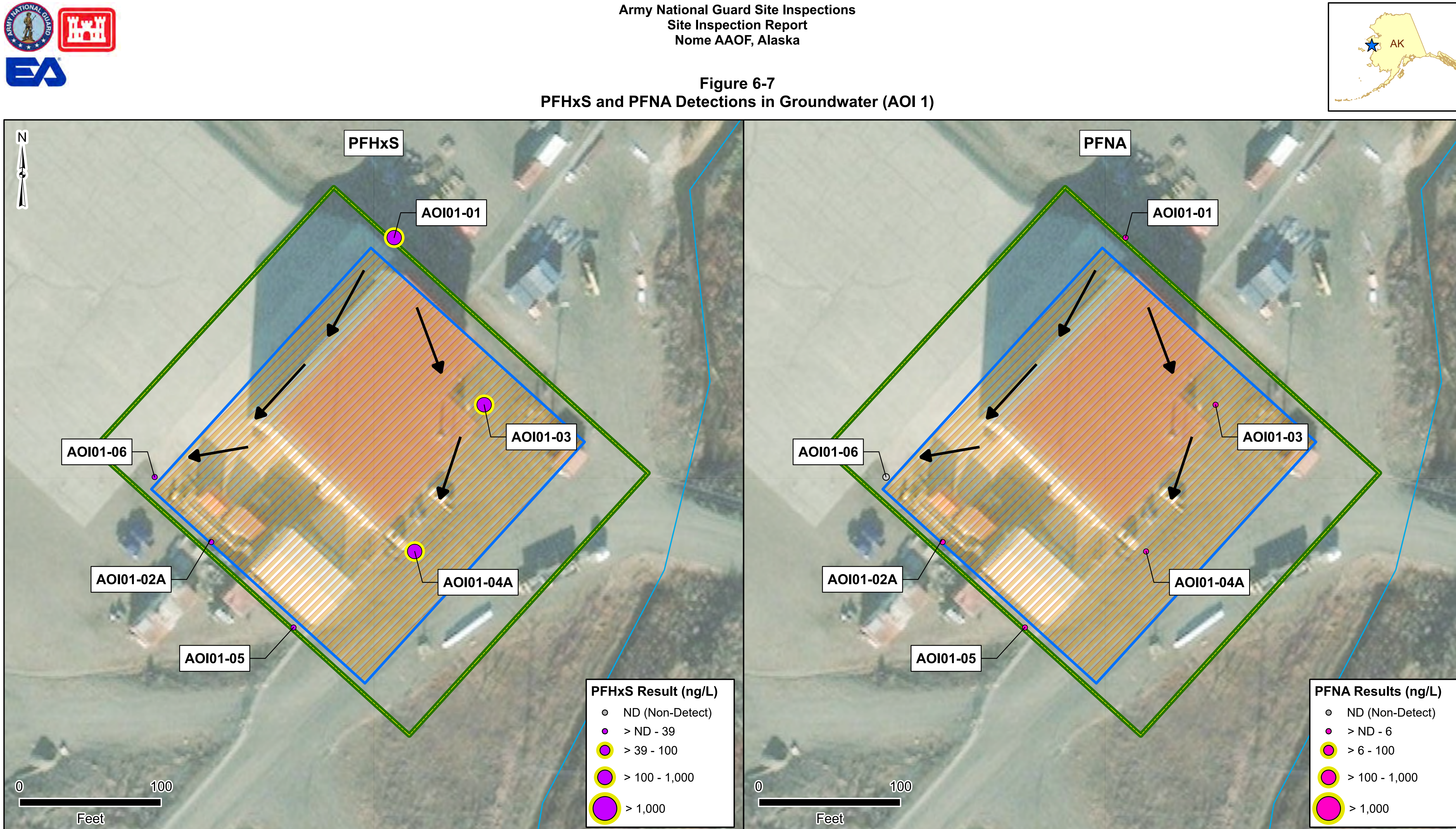
Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:.............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

Army National Guard Site Inspections
Site Inspection Report
Nome AAOF, Alaska

**Figure 6-7**
**PFHxS and PFNA Detections in Groundwater (AOI 1)**




**Facility Data**
- Facility Boundary
- Area of Interest
- Potential PFAS Release

**Hydrology/Hydrogeology**
- Groundwater Flow Direction
- River/Stream

Notes:
PFHxS = Perfluorohexanesulfonic acid
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:..........................August 2022
Prepared By:............................EA
Prepared For:..................USACE
Projection:........WGS 84 UTM 3N

*This page intentionally left blank*

# 7. EXPOSURE PATHWAYS

The CSM for the AOI, revised based on the SI findings, is presented on **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined solely based upon exceedances of the SLs for the relevant compounds. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

1. Contaminant source
2. Environmental fate and transport
3. Exposure point
4. Exposure route
5. Potentially exposed populations.

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if the relevant compounds are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of relevant compounds above the SLs. Areas with an identified potentially complete pathway that have detections of the relevant compounds above the SLs may warrant further investigation. Although the CSM indicates whether potentially complete exposure pathways may exist, the recommendation for future study in a RI or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs.

In general, the potential routes of exposure to the relevant compounds are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA 2001). Receptors at the Facility include Facility workers (e.g., facility staff and visiting soldiers), construction workers, trespassers, residents outside the facility boundary, and recreational users who may fish or swim in Snake River outside of the facility boundary.

## 7.1 SOIL EXPOSURE PATHWAY

The SI results for soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOI based on the aforementioned criteria.

### 7.1.1 AOI 1

The Nome AAOF Hangar stores five 5-gal buckets of Chemguard 3% AFFF concentrate and a single Tri-Max™ 30 emergency response cart. Although AFFF solution is not mixed or sprayed within the hangar, it is possible that leakages may have occurred from the storage of AFFF.

Currently, these containers of AFFF are full, closed, and in good condition with no evidence of leakage in the storage area.

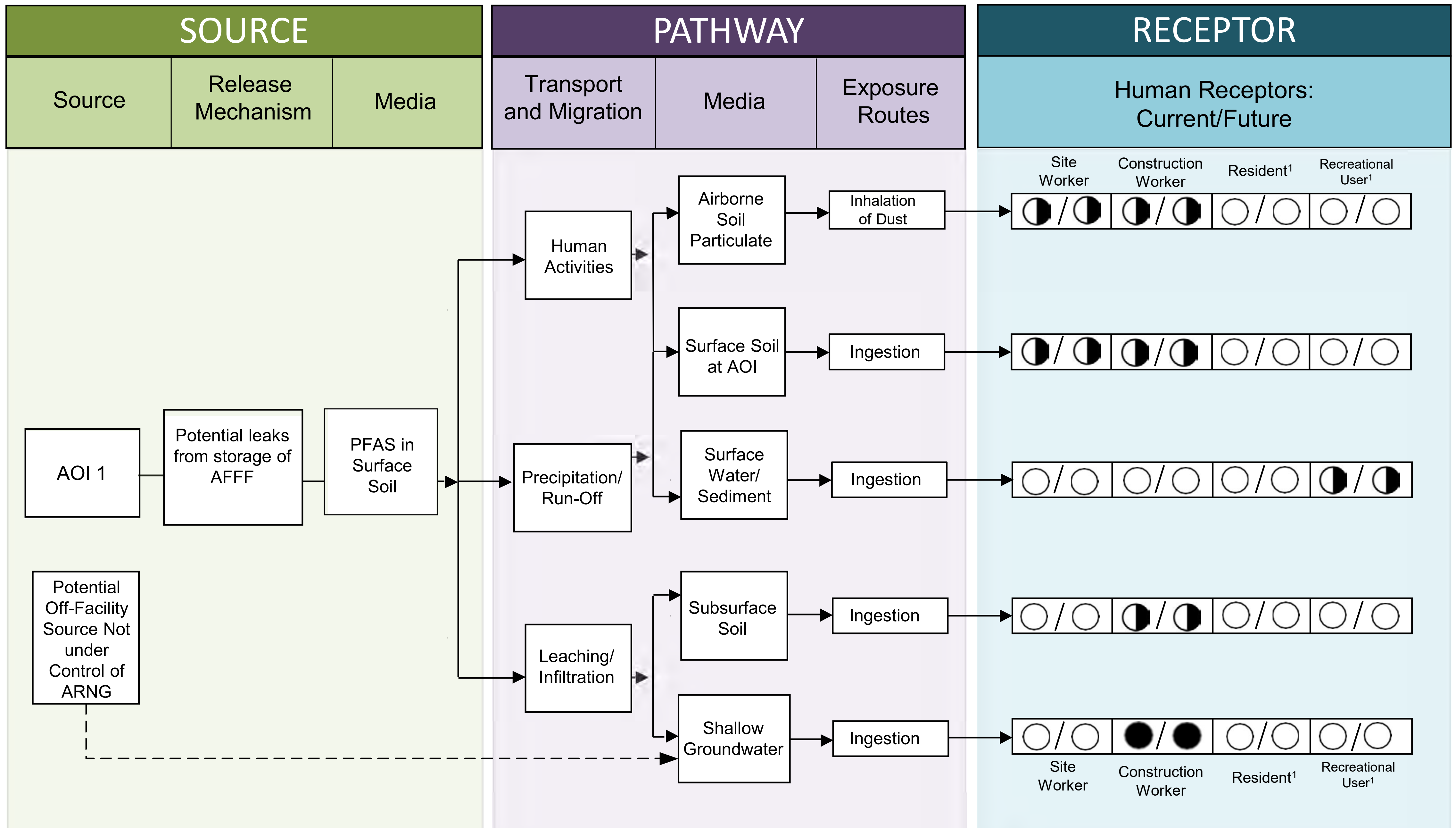
PFOA, PFOS, PFBS, and/or PFHxS were detected in soil at five of six boring locations completed at AOI 1, confirming a potential release of PFAS to soil at AOI 1. Based on the results of the SI in AOI 1, ground-disturbing activities to surface soil could result in Facility worker and construction worker exposure to PFOA, PFOS, PFBS, and/or PFHxS via inhalation of dust and ingestion of surface soil. Ground-disturbing and/or trenching activities to subsurface soil could result in construction worker exposure to PFOA, PFOS, PFBS, and/or PFHxS via ingestion. Therefore, the exposure pathways for inhalation and ingestion are potentially complete for these receptors. The CSM is presented in **Figure 7-1**.

## 7.2 GROUNDWATER EXPOSURE PATHWAY

The SI results in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors based on the aforementioned criteria.

### 7.2.1 AOI 1

PFOS and PFOA concentrations in all six temporary monitoring wells exceeded the SLs. PFHxS concentrations in three of six temporary monitoring wells exceeded the SL. PFBS was detected below the SL in all six temporary wells. PFNA was detected below the SL in five of six temporary wells. The drinking water source for Nome city water is located upgradient of the Nome AAOF Hangar. However, the hydraulic connection between groundwater and marine water supports a potential recreational user pathway. Based on this information, the ingestion exposure pathway is potentially complete for off-Facility residents/recreational users. Ground-disturbing and/or trenching activities to shallow groundwater could also result in construction worker exposure to PFOA, PFOS, PFBS, PFHxS, and/or PFNA via ingestion. Based on this information, the ingestion exposure pathway is complete for construction workers. The CSM is presented in **Figure 7-1**.




**LEGEND**

- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of Screening Level

**Notes:**

1. The resident and recreational users refer to off-site receptors.

**Figure 7-1**
Conceptual Site Model
Nome AAOF, AK

*This page intentionally left blank*

# 8. SUMMARY AND OUTCOME

This section summarizes SI activities and findings. The most significant findings are summarized in this section and are reproduced directly or abstracted from information contained in this report. The outcome provides general and comparative interpretations of the findings relative to the SLs.

## 8.1 SITE INSPECTION ACTIVITIES

The SI field activities at the Facility were conducted from 17 to 21 September 2021. The SI field activities included soil and groundwater sampling. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA 2021a), samples were collected and analyzed for a subset of 24 compounds by LC/MS/MS compliant with QSM Version 5.3 Table B-15 as follows:

- Eighteen (18) primary soil grab samples from six boring locations
- Six (6) primary grab groundwater samples from six temporary well locations
- Twelve (12) quality assurance/quality control samples.

An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at the AOI to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or that no further action is required. Additionally, the CSM was refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOI, which is described in **Section 7**.

## 8.2 OUTCOME

Based on the results of this SI, further evaluation in the form of a RI is warranted for AOI 1. Based on the CSM developed and revised based on the SI findings, there is potential for exposure to receptors via inhalation and incidental ingestion of soil or groundwater on-site at the Facility. Additionally, there is a potentially complete exposure pathway via groundwater (hyporheic exchange with surface water features) and surface water (if stormwater from the facility enters a surface water feature) to recreational users off-Facility. Sample chemical analytical concentrations collected during this SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to SLs is as follows:

- AOI 1:
  - — PFOS, PFOA, and PFBS were detected in six of six temporary groundwater monitoring wells at AOI-1. PFOS was detected above the SL of 4 ng/L in all six temporary wells at concentrations ranging from 28 J ng/L (AOI01-02A) to 89 J ng/L (AOI01-01). PFOA was detected above the SL of 6 ng/L in all six temporary wells,

ranging from 6.7 J ng/L (AOI01-05) to 23 J ng/L (AOI01-01 and AOI01-04A). PFBS was detected below the SL of 601 ng/L in all six temporary wells, ranging from 2.8 J ng/L (AOI01-03) to 14 J ng/L (AOI01-04A). PFHxS was detected in all six temporary wells. PFHxS was detected above the SL of 39 ng/L in AOI01-01, AOI01-03, and AOI01-04A. PFHxS was detected below the SL in AOI01-02A, AOI01-05, and AOI01-06. PFNA was detected below the SL of 6 ng/L in five of six temporary wells. Based on the results of the SI, further evaluation of AOI-1 is warranted in the RI.

— PFOS, PFOA, PFBS, and PFHxS were detected in soil at AOI 1 below the SLs. PFNA was not detected in soil at AOI-1. PFAS concentrations detected in soil did not exceed SLs.

- The boundary:

— PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater in AOI-01, near the upgradient facility boundary. PFOS, PFOA, and PFHxS, exceeded the SL in groundwater in the upgradient well, which could suggest potential contributions from off-facility sources, although no off-facility sources were identified during the PA completed in 2020. PFOS and PFOA exceeded the SL in all six temporary monitoring wells.

Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

**Table 8-1** summarizes the SI results for soil and groundwater used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI.

**Table 8-1. Summary of Site Inspection Findings and Recommendations**

| AOI | Potential Release Area | Soil Potential Source Area | Groundwater Potential Source Area | Groundwater Facility Boundary | Future Action |
|---|---|---|---|---|---|
| 1 | Nome AAOF Hangar | ◐ | ● | ● | Proceed to RI |

Legend:
● = Detected; exceedance of screening levels
◐ = Detected; no exceedance of screening levels
○ = Not detected

# 9. REFERENCES

AECOM Technical Services (AECOM). 2020. *Final Preliminary Assessment Report, Nome Army Air Operating Facility, Nome, Alaska*. August.

Department of the Army (DA). 2016. *Environmental Quality, Technical Project Planning Process*. EM-200-1-2. 29 February.

DoD. 2019a. *Department of Defense (DoD), Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3*. May.

———. 2019b. General Data Validation Guidelines. November.

———. 2020. *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15*. May.

EA, Engineering, Science, and Technology, PBC (EA). 2020a. *Final Programmatic Uniform Federal Policy Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide*. December.

———. 2020b. *Final Programmatic Accident Prevention Plan*. November.

———. 2021a. *Final Site Inspection Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) Addendum, Nome, Alaska, Per- and Polyfluoroalkyl Substances Impacted Sites ARNG Installations,* Nationwide. September.

______. 2021b. *Accident Prevention Plan / Site Safety and Health Plan Addendum, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites ARNG Installations, Nationwide, Nome Army Aviation Operating Facility, Nome, Alaska Revision 2*. September.

Guelfo, J.L. and C.P. Higgins. 2013. Subsurface transport potential of perfluoroalkyl acids and aqueous film-forming foam (AFFF)-impacted sites. *Environ. Sci. Technol.* 47(9):4164–71.

Higgins, C.P. and R.G. Luthy. 2006. Sorption of perfluorinated surfactants on sediments. *Environ. Sci. Technol.* 40 (23):7251–7256.

Interstate Technology Regulatory Council (ITRC). 2018. *Environmental Fate and Transport for Per- and Polyfluoroalkyl Substances*. March.

NORTECH, Inc. 2020. *Spill Prevention, Control, and Countermeasure Plan, Nome Army Aviation Operations Facility.* Alaska Army National Guard. January.

Office of the Assistant Secretary of Defense (OSD). 2022. *Investigating Per- and Polyfluoroalkyl Substances within The Department of Defense Cleanup Program*. United States Department of Defense. 06 July.

U.S. Environmental Protection Agency (USEPA). 1980. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*. 11 December.

———. 1994. *National Oil and Hazardous Substances Pollution Contingency Plan (Final Rule)*. 40 Code of Federal Regulations Part 300; 59 Federal Register 47384. September.

———. 2001. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation* Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments). December.

U.S. Fish and Wildlife Service (USFWS). 2021. *Endangered Species*. http://ecos.fws.gov/ipac/. Accessed on 21 December 2021.

Xiao, F., M. F. Simcik, T.R. Halbach, and J.S Gulliver. 2015, Perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in soils and groundwater of a U.S. metropolitan area: Migration and implications for human exposure. *Water Research* 72:64–74.