FINAL
Site Inspection Report
Kalaeloa Army Aviation Support Facility #1-JRF
O‘ahu, Hawai‘i

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

December 2023

Prepared for:

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

UNCLASSIFIED

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
%	Percent
µg/kg	Microgram(s) per kilogram
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous film-forming foam
amsl	Above mean sea level
AOI	Area of interest
ARFF	Airport Rescue and Fire Fighting
ARNG	Army National Guard
bgs	Below ground surface
btoc	Below top of casing
BRAC	Base Realignment and Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain-of-custody
CSM	Conceptual site model
CWRM	Commission on Water Resource Management
DA	Department of the Army
DoD	Department of Defense
DQO	Data quality objective
DUA	Data Usability Assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
EB	Equipment Blank
FB	Field blank
FedEx	Federal Express
ft	Foot (feet)
HA	Health advisory
HDOH	Hawai‘i State Department of Health
HDOT	Hawai‘i Department of Transportation
HDOT-A	Hawai‘i Department of Transportation, Airports Division
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
HIARNG	Hawai‘i Army National Guard
IDW	Investigation-derived waste

ACRONYMS AND ABBREVIATIONS (*continued*)

In.	Inch(es)
ITRC	Interstate Technology Regulatory Council
JRF	John Rodgers Field
LC/MS/MS	Liquid chromatography tandem mass spectrometry
MIL-SPEC	Military Specification
mg/L	Milligram(s) per liter
MS	Matrix spike
MSD	Matrix spike duplicate
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Systems Command
NELAP	National Environmental Laboratory Accreditation Program
ng/L	Nanogram(s) per liter
No.	Number
OSD	Office of the 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
PQAPP	Programmatic Uniform Federal Policy Quality Assurance Project Plan
PVC	Polyvinyl chloride
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
QSM	Quality Systems Manual
RI	Remedial investigation
SI	Site inspection
SL	Screening level
TOC	Total organic carbon
TPP	Technical Project Planning

ACRONYMS AND ABBREVIATIONS (*continued*)

UCMR3	Unregulated Contaminant Monitoring Rule 3
UFP	Uniform Federal Policy
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

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), 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 two Areas of Interest (AOIs), where PFAS-containing materials may have been stored, disposed, or released historically (see Table ES-2 for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, no further action is required because there is no release that is the responsibility of the ARNG, or based on a comparison of SI results to SLs for the relevant compounds. This SI was completed at the Kalaeloa Army Aviation Support Facility (AASF) #1-John Rodgers Field (JRF) in Kapolei, Hawaiʻi.

In 2001, Hawaiʻi Army National Guard (HIARNG) acquired multiple parcels of land totaling approximately 172.83 acres belonging to the former Naval installation. The area acquired include numerous existing Navy buildings which could be adapted for HIARNG use. In July 2016, HIARNG began leasing two additional parcels of land (totaling approximately 17.09 acres) from the Hawaiʻi Department of Transportation (HDOT) for a term of 30 years. The parcels are located along the north/northeastern boundary of the airport and includes a vacant overgrown area which was formerly part of a Navy Fuel Farm (approximately 7.31 acres) and an open area (approximately 9.78 acres) adjacent to a HDOT runway which is used as an access apron to support AASF operations. In 2017, HIARNG also acquired a 10.94-acre parcel from the Navy which abuts HIARNG lands in the southwest. Currently, the HIARNG operates on approximately 200.86 acres.

The PA identified two AOIs for investigation during the SI phase. SI sampling results from the AOIs were compared to OSD SLs. The Naval Facilities Engineering Systems Command (NAVFAC) Final PA dated June 2022, which was finalized after the ARNG SI fieldwork was completed, mentioned a former Navy plating shop located in the southwestern portion of Building 117 on HIARNG property. Wastewater from Building 117 discharged into an adjacent drywell to the north-northwest. NAVFAC's PA noted a potential for PFAS to be present onsite at

[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.

this location (NAVFAC 2022). No previous PFAS investigations have been completed at Building 117 as the identification of Building 117 did not occur until after the SI fieldwork, it was not investigated as part of the SI. Building 117 is recommended for future investigation. Table ES-2 summarizes the SI results for the AOIs. Based on the results of this SI, and following the CERCLA process, a remedial investigation (RI) is warranted for AOI 2. For AOI 1, at no point during either the PA or the SI was there any evidence that any of the relevant compounds were the result of current or historical ARNG/Department of Defense (DoD) activities.

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

Analyte[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	600
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:

1. Assistant Secretary of Defense. 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.

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

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

AOI	Potential Release Area	Soil Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	Former Fuel Farm Area	●	●	●	No further action under CERCLA
2	Hangar Suppression and Storage	◐	●	●	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 compounds listed in the OSD 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)[3] at ARNG facilities nationwide.
The ARNG performed this SI at the Kalaeloa Army Aviation Support Facility (AASF) #1- John Rodgers Field (JRF) in Kapolei, Hawaiʻi. The Kalaeloa AASF #1-JRF 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 U.S. Department of the Army (DA) requirements and guidance for field investigations.

1.2 SITE INSPECTION PURPOSE

A PA was performed at the Kalaeloa AASF #1-JRF (AECOM Technical Services, Inc. [AECOM] 2020) that identified two Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOIs 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 because there is no release that is the responsibility of the ARNG or based on SLs for the relevant compounds.

[3] 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.

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2. FACILITY BACKGROUND

2.1 FACILITY LOCATION AND DESCRIPTION

Kalaeloa AASF #1-JRF is located on a portion of Former Naval Air Station (NAS) Barbers Point. The Navy commissioned the NAS Barbers Point on April 15, 1942, and the 3,700-acre installation was manned by 12,000 Navy servicemen. NAS Barbers Point primary mission was to support the Naval operations in nearby Pearl Harbor, but its role quickly expanded to include aircraft repair and maintenance for carrier-based aircraft for the duration of the war.

After World War II ended, NAS Barbers Point became the primary Naval Air Station for Naval operations in the Pacific throughout the Cold War era until its close in 1989. NAS Barbers Point closed on 2 July 1999 in accordance with the Base Realignment and Closure Act (BRAC). Since 1999, the former installation has had ongoing redevelopment by Federal, state, and county agencies, as well as military and private organizations.

Much of the former NAS Barbers Point installation currently operates as Kalaeloa Airport (JFR) on 757 acres and is used as an alternate landing site for Honolulu International Airport and for general aviation purposes. The transfer of the airport property from the Department of the Navy to the Hawaiʻi Department of Transportation (HDOT) was finalized on July 1, 1999 (WOC, 2010). However, environmental oversight is maintained by the BRAC Cleanup Team. In addition to the airport, the community of Kalaeloa, which approximates the former NAS Barbers Point installation area, comprises park space, industrial, and low and medium density residential land uses. The BRAC portions of the former installation also support the Hawaiʻi ARNG (HIARNG), U.S. Coast Guard, industrial/commercial land uses, and park space.

In 2001, HIARNG acquired multiple parcels of land totaling approximately 172.83 acres belonging to the former Naval installation. The area acquired include numerous existing Navy buildings which could be adapted for HIARNG use. In July 2016, HIARNG began leasing two additional parcels of land (totaling approximately 17.09 acres) from the Hawaiʻi Department of Transportation (HDOT) for a term of 30 years. The parcels are located along the north/northeastern boundary of the airport and includes a vacant overgrown area which was formerly part of a Navy fuel farm (approximately 7.31 acres) and an open area (approximately 9.78 acres) adjacent to the HDOT runways which is used as an access apron to support AASF operations. In 2017, HIARNG also acquired a 10.94-acre parcel from the Navy which abuts HIARNG lands in the southwest. Currently the HIARNG operates on approximately 200.86 acres.

The Facility is located at Midway Street in Kapolei, Hawaiʻi on the island of Oʻahu (**Figure 2-1**). The property boundary as outlined in the figures includes a readiness center, joint forces headquarters and the AASF. The AASF provides training, maintenance, and flight operations for the various aviation units that support the HIARNG. AASF #1-JRF consists of office areas, hangars, aircraft parking area, maintenance bays, and storages bays. The Kalaeloa AASF #1-JRF formally opened in 2018 (AECOM 2020). The Facility is bordered by Kalaeloa mixed-use lots (commercial/industrial/ residential) to the west, the city of Kapolei to the north, Ewa Beach residential communities to the east, and the Kalaeloa Airport (operated by HDOT, Airports Division [HDOT-A]) to the south (AECOM 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

The Facility is located on the southern shore of Oʻahu, approximately 5 miles west of the entrance to Pearl Harbor. The natural terrain in the area slopes gently southward, ranging from a maximum elevation of 0 to 65 feet (ft) above mean sea level (amsl) over a distance of about 2 miles (**Figure 2-2**) (AECOM 2020).

The following sections include information on geology, hydrogeology, hydrology, climate, and current and future land use. The topography at the Facility is shown on **Figure 2-2**. The regional geology and groundwater features are shown on **Figure 2-3**. The regional surface water features and drainage basins are shown on **Figure 2-4**. Groundwater elevations and contours are presented on **Figure 2-5**.

2.2.1 Geology

The island of Oʻahu is composed of two shield volcanoes, the Waiʻanae volcano and the Koʻolau volcano. The geomorphic sequence of volcanic eruptions, basaltic lava flow deposition, and coastal plain development was created by of the eruption of the Waiʻanae volcano, which formed the Waiʻanae range on the western side of Oʻahu, followed by the eruption and formation of the Koʻolau range to the east. Subsequent lava flows and ash deposits resulting from the eruptions that formed the Koʻolau range formed the Schofield plateau, bridging the Koʻolau range and the Waiʻanae range in the center of the island. Coastal plain environments on the coasts of Oʻahu are comprised of alternating shallow marine coral limestone units and non-marine, volcanically derived, detrital sediments (NEESA 1983).

The Facility is located in the southern coastal plain on the southwestern coast of Oʻahu where the primary lithology is coralline limestone caprock. Caprock at former NAS Barbers Point ranges in thickness from 50 to 400 feet at the northern boundary and 750 to 1,000 feet along the coastline. The near-surface geological units encountered at the Facility are predominantly marine with minor terrestrial and fill sediments. Major units include coralline limestone, carbonate clastics, and construction fill material. The coral limestone is of Pleistocene age and was deposited on a shoreline or in shallow-water, near shore environment. Within the carbonate clastics unit are minor layers of darker carbonate mud and reworked coralline rubble and sand (AECOM 2020). Multiple sinkholes are present within the Facility boundary.

According to the United States Department of Agriculture Natural Resource Conservation Service Web Soil Survey for the Island of Oʻahu, Hawaiʻi, almost three quarters of the of the Facility is comprised of coral outcrops. However, Mamala cobbly silty clay loam with zero to twelve percent slopes and mixed fill comprise the remaining soil at the Facility (USDA 2022).

The subsurface conditions at the site were explored through a total of 11 cores ranging in depth from 33'- 48' below ground surface (bgs), which were collected using hollow-stem, continuous core augers. Subsurface descriptions are a general observation, provided to highlight the major soil strata encountered.

The topsoil fill material was found to be generally dry and loose primarily comprised of medium silty sands, silty gravel, and sandy gravel. The older alluvium depths generally consisted of silty sand, silty gravel, clayey sands, sandy silt gravels, clayey silts, gravelly cobbles, and minor fat clay deposits.

Sample locations AOI01-01 through AOI01-03 were primarily comprised of white coralline silty sand, with 20-30% fines and gravels with increasing size of course sand and gravels indicating fine coralline debris and sands, consistent with alluvial geology of the site. AOI01-04, AOI01-05, AOI02-01, AOI02-02, AOI02-04 had varying degrees of topsoil fill between 0'- 2' bgs mainly comprised of dry organic soils with cobbles, and gravels which may be associated with past grading of the site. Surface soils were generally classified as dark grayish brown to grayish brown, dry, poorly graded gravels, and fines. AOI02-04 had concrete cobbles that was encountered to a depth of approximately 0'- 1' bgs. Highly plastic fat clay was encountered 11'-48' bgs. Soil boring logs are provided in **Appendix E**.

2.2.2 Hydrogeology

The shallow groundwater beneath Kalaeloa AASF #1-JRF is perched and occurs within the caprock. The caprock consists of alternating layers of permeable marine sedimentary rock and alluvial deposits that overlie the basal volcanic aquifer. Caprock pore water is largely separate from the deeper basal groundwater, occurring above and frequently within caprock sediments and extending from the ocean edge to approximately 1 mile inland. This type of groundwater is usually connected with the ocean and therefore has high concentrations of total dissolved solids and is considered non-potable (AECOM 2020).

The Aquifer Identification and Classification for O‘ahu: Groundwater Protection Strategy for Hawai‘i, published by the Water Resources Research Center at the University of Hawai‘i (Mink and Lau 1990) provides information on groundwater conditions below the Facility. According to the report, two aquifer systems, an upper and a lower, underlie the Facility in the Ewa aquifer system. The upper aquifer (Aquifer Code 3-02-04-116, Status Code 13321) is described as a basal, unconfined aquifer in sedimentary or non-volcanic lithology. The groundwater status for the upper aquifer is classified as: neither a drinking water source nor ecologically important; moderate salinity level of 1,000 to 5,000 milligrams per liter (mg/L) chloride; replaceable in uniqueness; and highly vulnerable to contamination. The lower aquifer (Aquifer Code 3-02-04-121, Status Code 13213) is described as a confined basal aquifer of the flank type. The groundwater status is classified as: neither a drinking water source nor ecologically important; low salinity level of 250 to 1,000 mg/L chloride; irreplaceable in uniqueness; and low vulnerability to contamination.

Additionally, the Facility is located below (downgradient) of the Underground Injection Control (UIC) line as shown on the UIC map of O‘ahu published by the Hawai‘i State Department of Health (HDOH). This typically indicates that the underlying aquifer is not considered a drinking water source.

An Environmental Database Report (EDR™) report conducted 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 researched to a 4-mile radius of the Facility (**Figure**

2-3). Several irrigation and industrial wells lie in the inferred upgradient and cross-gradient pathway to the Facility. A 2002 Annual Groundwater monitoring report for Former NAS Barber's Point showed 21 groundwater monitoring wells within a mile radius of the Facility (DON 2002). It is uncertain if these wells are still in place or actively monitored, with the exception of MW-11 which was sampled as part of this investigation.

According to records from the State of Hawai'i Department of Land and Natural Resources, Commission on Water Resource Management (CWRM), groundwater within the former NAS Barbers Point boundary, including Kalaeloa AASF #1-JRF, is currently designated to be allocated for non-drinking uses only (CWRM 2019). Drinking water for the Facility is supplied by a "Maui type" well (mine-like shaft with infiltration tunnels) located approximately 2 miles north and is known as the "Barbers Point Shaft" (AECOM 2020).

2.2.3 Hydrology

No perennial streams or drainage ways exist on Kalaeloa AASF #1-JRF due to relatively low precipitation (20 inches per year) and highly permeable coralline limestone. Storm water runoff follows the topography (**Figure 2-4**), flowing south toward the Pacific Ocean (**Figure 2-5**). Local drainage diversions also convey runoff into a series of dry wells. There are an estimated 77 UIC wells located around the Facility, which are used for stormwater drainage. Details regarding the construction of the UIC wells were not available at the time of the PA (AECOM 2020). The dry wells are currently permitted through the State Department of Health, but as of 2006 they did not conform to city standards (Naval Facilities Engineering Systems Command [NAVFAC] 2022).

2.2.4 Climate

O'ahu is located in the tropics, with a climate characterized by mild temperatures, northeasterly trade winds year-round, and moderate humidity. Hawai'i has two seasons: summer (between May and October) and winter (between October and April). The average coastal temperature is approximately 79 degrees Fahrenheit (°F), with temperatures decreasing at higher elevations. The coldest temperatures are in January (72°F) and the warmest temperatures are in August (89°F). Humidity on O'ahu ranges from approximately 30 to 90 percent (%). Precipitation predominantly occurs when the island's mountain masses capture and cool the rising, warm, moist ocean air, producing higher rainfall in the windward and mountain areas and lower rainfall in the leeward and coastal zones. Annual rainfall ranges from 20 inches in the leeward coastal areas (where Kalaeloa AASF #1-JRF is located) to 250 inches on the Ko'olau mountain peaks. Kalaeloa HIARNG has a mean annual rainfall of approximately 20 inches (AECOM 2020).

2.2.5 Current and Future Land Use

Current Kalaeloa AASF #1-JRF operations include training and maintenance for the various aviation units, which support the HIARNG. In addition to aircraft maintenance and aircraft support for HIARNG, periodic training exercises and course work for the National Guard/Army Reserve units are conducted at the Facility. AASF #1-JRF shares tarmac space with the neighboring Kalaeloa Airport to the south. Portions of the eastern and western borders of

Kalaeloa AASF #1-JRF are abutted primarily by commercial properties. Residential homes border the northeastern border of the Facility (AECOM 2020).

Reasonably anticipated future land use of the Facility includes continued use by HIARNG which is not expected to change from the current land use described above (AECOM 2020). The HIARNG is fenced with a guarded access point to the north, near sample location KAASF-01. Access to and from the airfield (also a fenced, secure Facility) is toward the southeast near AOI 2 and restricts access.

2.2.6 Sensitive Habitat and Threatened/Endangered Species

Historically surveys have been conducted by others on the former NAS Barbers Point. As noted in NAVFAC's Final PA, the vegetation found at the former Barbers Point installation includes kiawe and lowland scrub, coastal strand, coastal salt flat, sinkholes, mangrove swamp, and marine wetland. Federally listed endangered plant species previously observed on former NAS Barbers Point include ‘Ewa Plains ‘akoko and ‘Ewa Hinahina. Conservation and restoration actions and subsequent surveys have been conducted to determine the proliferation of those endangered species. Biological surveys were also performed by Botanical Consultants in 1984 identified 170 plant and 23 bird species at former NAS Barbers Point. Five of these bird species are considered indigenous and the remaining 17 are species that have been introduced to the ecosystem. The Hawaiian black-necked stilt, Hawaiian Coot, and Hawaiian Moorhen are federal- and state-listed endangered species that have been detected during the former NAS Barbers Point surveys, and individuals were historically observed in the coastal salt flats around Ordy Pond (NAVFAC 2022). Specific locations of the species/habitat identified was not listed in the PA.

A wildlife survey at the Kalaeloa AASF #1-JRF was not included as part of this investigation. Therefore, the U.S. Fish and Wildlife Services (USFWS) was consulted to identify species that may be present in the surrounding area and which are listed as federally endangered, threatened, proposed, and/or candidate species in Honolulu County, Hawai‘i (USFWS 2022). The following species were identified (2022):

- Birds:
  - Band-rumped Storm-petrel, *Oceanodroma castro* (Endangered)
  - Hawai‘i ‘Ākepa, *Loxops coccineus* (Endangered)
  - Hawai‘ian Duck, *Anas wyvilliana* (Endangered)
  - Hawai‘ian Common Gallinule, *Gallinula galeata sandvicensis* (Endangered)
  - Hawai‘ian Coot, *Fulica americana alai* (Endangered)
  - Hawai‘ian Petrel, *Pterodroma sandwichensis* (Endangered)
  - Hawai‘ian Stilt, *Himantopus mexicanus knudseni* (Endangered)
  - Newell's Townsend's Shearwater, *Puffinus auricularis newelli* (Endangered)

- Mammals:
  - Hawai‘ian Hoary Bat, *Lasiurus cinereus semotus* (Endangered)

- Ferns and Allies:
  - ‘Ihi‘ihi, Marsilea villosa (Endangered)

- Flowering Plants:
  - ʻakoko, *Euphorbia spp.* (Endangered)
  - ʻ enaʻena, *Pseudognaphalium sandwicensium var.molokaiense* (Endangered)
  - ʻoheʻohe, *Polyscias gymnocarpa* (Endangered)
  - Ewa Plains ʻakoko, *Euphorbia skottsbergii var. skottsbergii* (Endangered)
  - ʻIhi, *Portulaca villosa* (Endangered)
  - Puʻukaʻa, *Cyperus trachysanthos* (Endangered)
  - Round-leaved Chaff-flower, *Achyranthes splendens* (Endangered)
  - *Vigna o-wahuensis* (Endangered).

2.3 HISTORY OF PFAS USE

Two AOIs were identified in the PA where aqueous film-forming foam (AFFF) may have been used, stored, disposed, or released historically at the Kalaeloa AASF #1-JRF (AECOM 2020). The potential PFAS release areas were grouped into two AOIs based on preliminary data and presumed groundwater flow directions.

Chemguard C301MS AFFF was released by the HDOT-A Kalaeloa Airport Rescue and Fire Fighting (ARFF) Unit (hereafter referred to as HDOT-A Kalaeloa ARFF Unit) into AOI 1 in 2017 during pump testing and repair activities which occurred at the adjacent Kalaeloa Airport. The area where the release occurred was part of the Former Fuel Farm area and it is located on land currently owned by HDOT-A and leased by ARNG.

AOI 2 is the location of the hangar and the adjacent surrounding area at Kalaeloa AASF #1-JRF. Although there have been no known incidence of AFFF release at AOI 2, the hangar and the surrounding area are conservatively considered a potential PFAS release area based on the presence of the AFFF charged fire suppression system and the storage of eight 55-gallon drums of 3% AFFF concentrate (identified as Ansulite AFC-3MS) (AECOM 2020).

A description of each AOI is presented in **Section 3**.

Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

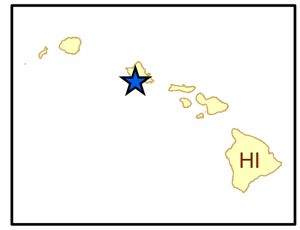
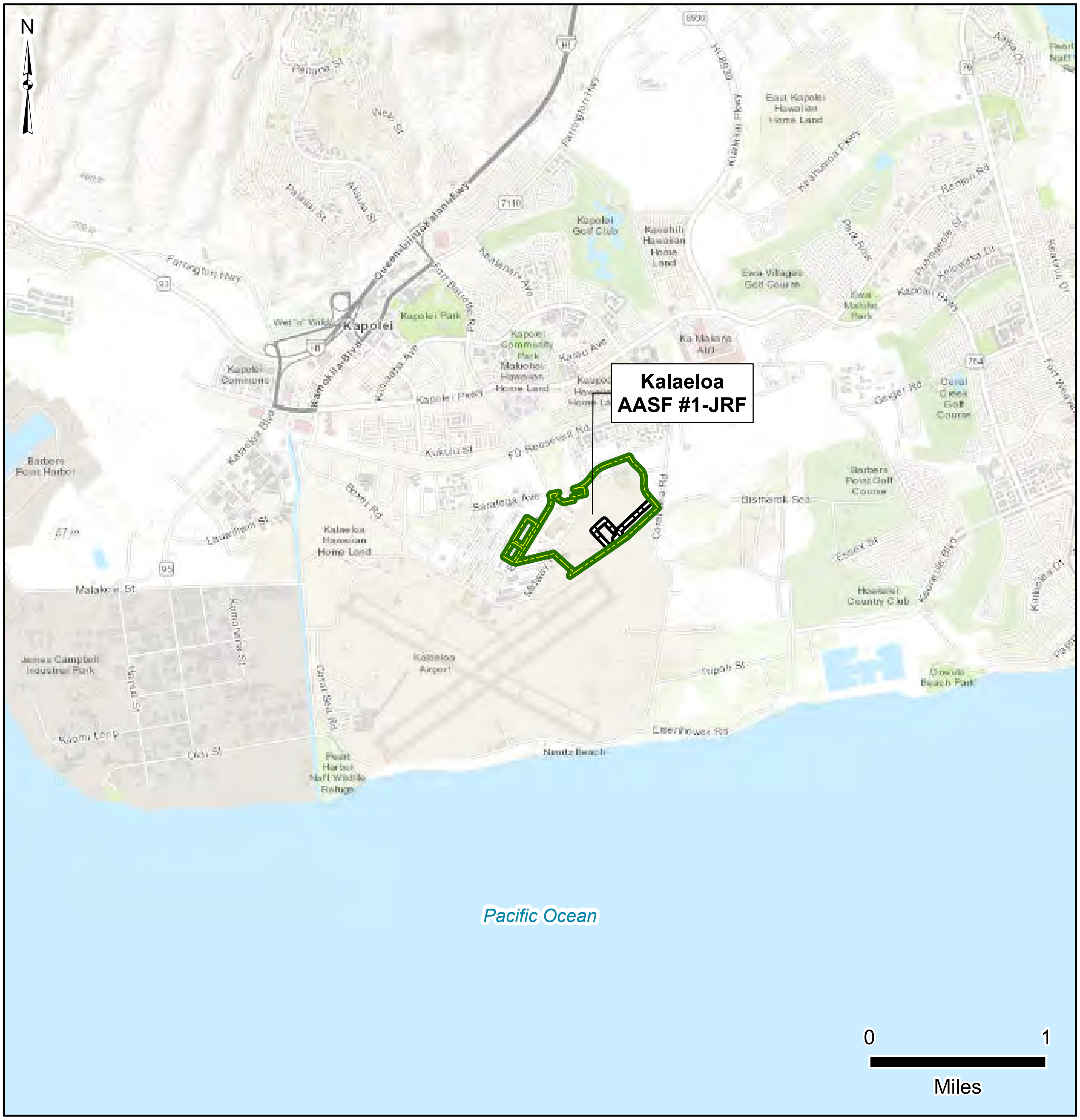


Figure 2-1
Facility Location



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Facility Data

Facility Boundary

Leased Parcels

Data Sources:
ESRI 2020
AECOM 2020

Date:....................November 2023
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

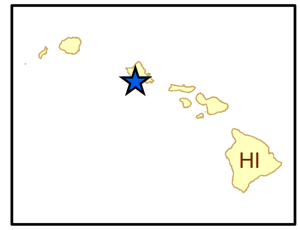
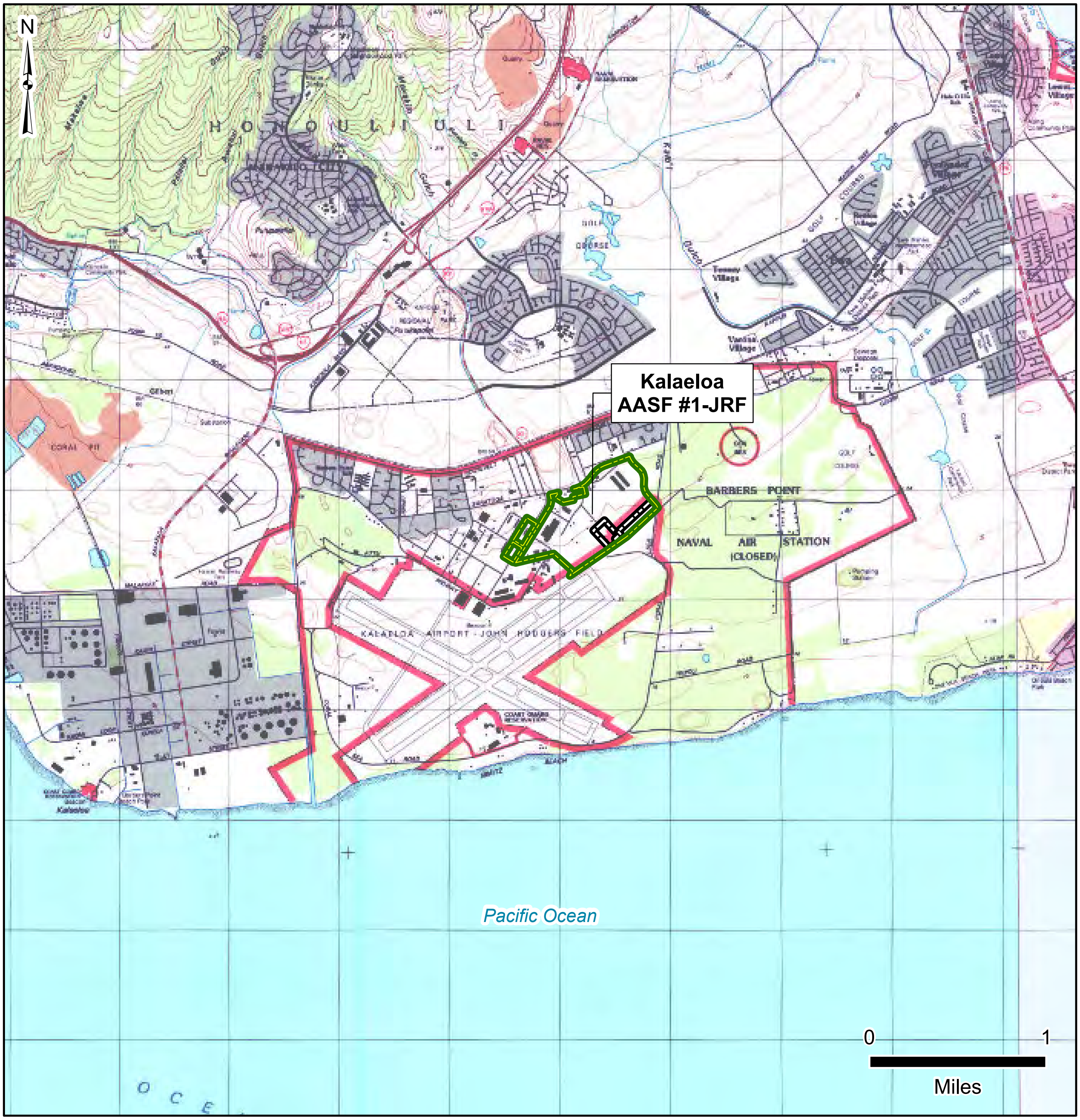


Figure 2-2
Topography



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Facility Data

Facility Boundary

Leased Parcels

Data Sources:
ESRI 2020
AECOM 2020

Date:....................November 2023
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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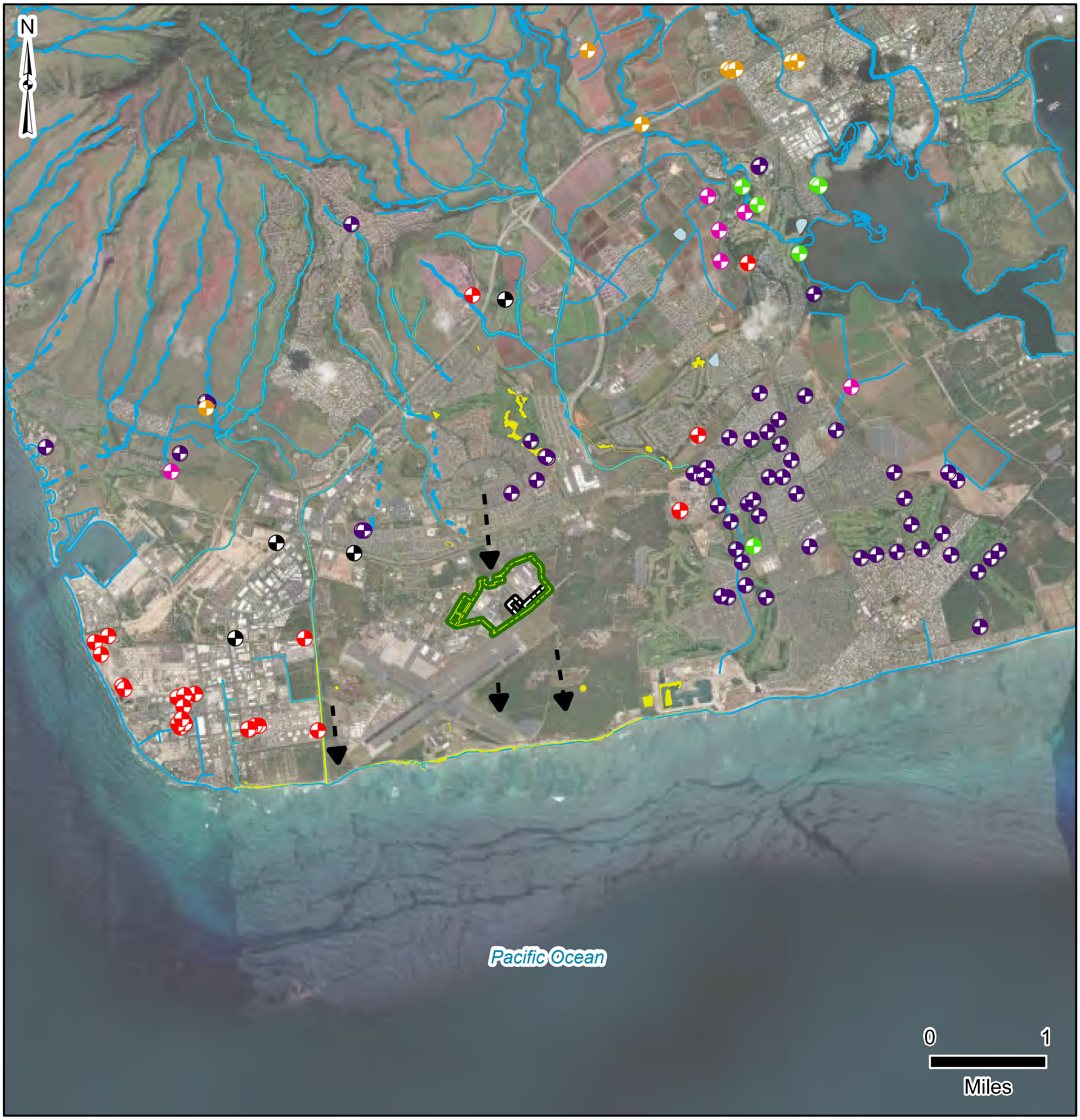
Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 2-3
Groundwater Features



Facility Data
Facility Boundary
Leased Parcels

Well Type
Agricultural Well
Domestic Well
Industrial Well
Irrigation Well
Municipal Water Supply Well
Other Well

Hydrology/Hydrogeology
Inferred Groundwater Flow Direction
Perennial Stream/Creek
Intermittent Stream/Creek
Water Body
Wetlands

Data Sources:
ESRI 2020
AECOM 2020

Date:....................November 2023
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

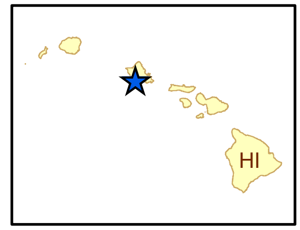

Figure 2-4
Surface Water Features

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Kalaeloa\KalaeloaSI.aprx

Facility Data
- Facility Boundary
- Leased Parcels

Hydrology
- Surface Water Flow Direction
- Intermittent Stream/Creek
- Water Body
- Wetlands

Watershed Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:....................November 2023
Prepared By:..............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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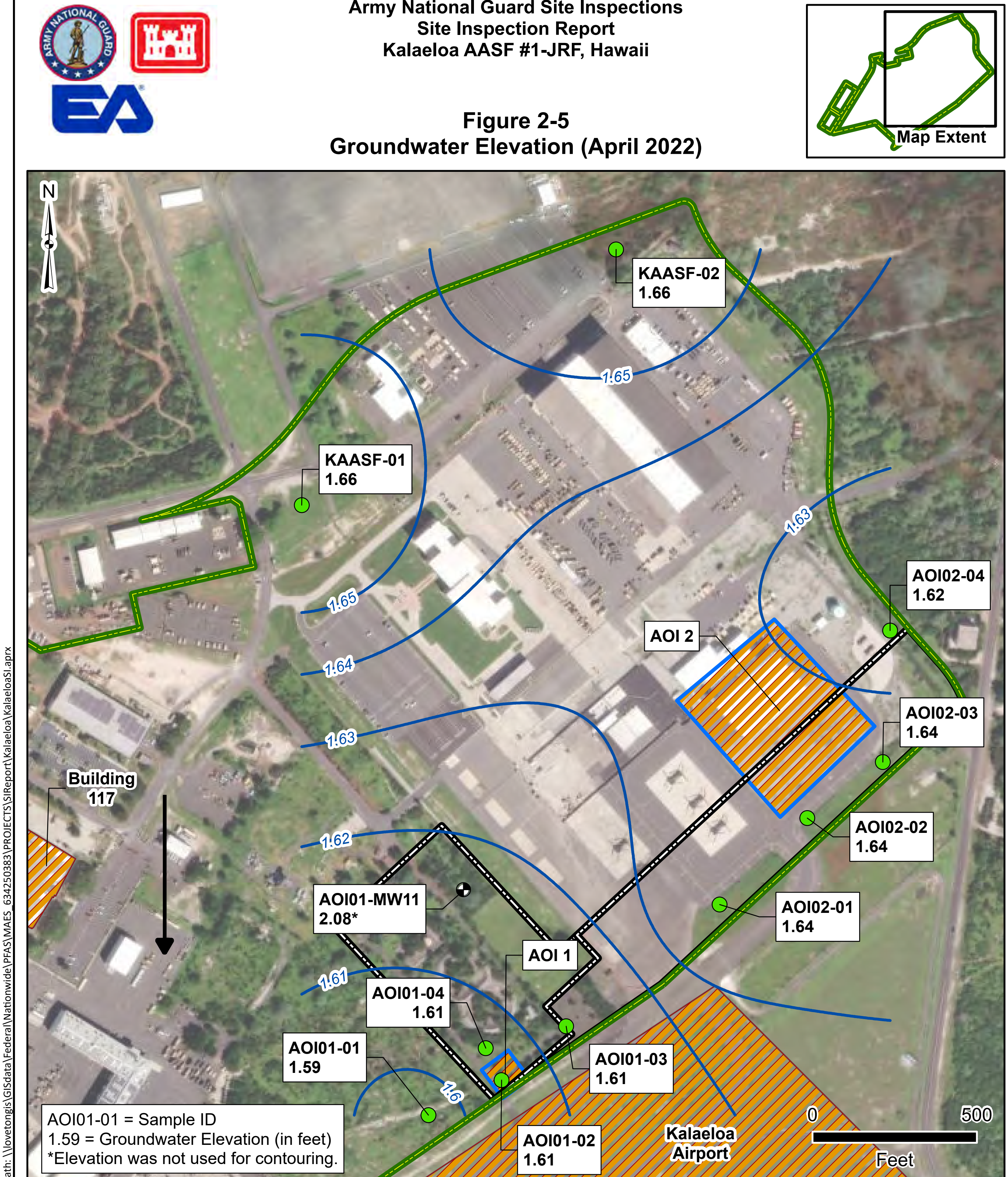
Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 2-5
Groundwater Elevation (April 2022)



Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Sample Locations
- Sample Location
- Monitoring Well

Hydrogeology
- Groundwater Flow Direction

Data Sources:
ESRI 2020
AECOM 2020

Date:....................November 2023
Prepared By:.............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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3. SUMMARY OF AREAS OF INTEREST

The ARNG Final PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, two potential release areas were identified at Kalaeloa AASF #1-JRF and grouped into two AOIs identified as: AOI 1 Former Fuel Farm Area and AOI 2 Hangar Suppression System and Storage. Additionally, there is an off-Facility potential source area as detailed in **Section 3.3**. The potential AOIs are shown on **Figure 3-1**.

3.1 AOI 1 – FORMER FUEL FARM AREA

AOI 1 consists of a portion of HDOT-A property, leased by HIARNG since July 2016, that contains a former fuel farm area. The former fuel farm is located adjacent to the northern side of the airfield and was approximately 7 acres in size. The site previously contained 26 large fuel USTs which were removed. NAVFAC prepared a PA for the Former NAS Barber Point site which encompasses the approximately 7-acre former fuel farm area. The Final PA identified the former fuel farm as AOI 23. The PA noted that based on a review of historical information, operations at the site did not involve materials known to contain PFAS. The PA also concluded that no known DoD releases of products containing PFAS are suspected at the former tank farm. The PA determined no further DoD action was required for the area, based on the lack of AFFF storage and use by the DoD (NAVFAC 2022). The site is covered with low grass and shrubs and there have been no documented releases in this area by the HIARNG.

HDOT-A operates the adjacent Kalaeloa Airport and maintains an ARFF unit. On 12 October 2017, HIARNG personnel observed an unknown foam-like substance present on a walkway located within the former fuel farm area near UIC well #73. As documented in the subsequent spill report and confirmed by an interview with the unit fire chief, it was determined that the HDOT Kalaeloa ARFF Unit discharged the contents of a firetruck's water tank during pump testing/repair. The water tank reportedly contained 25-gallons of 1.6% Chemguard C301MS AFFF mixed with water. Tank contents flowed onto the former fuel farm area leased by HIARNG from the point of release along the fence line that separates HDOT-A controlled property from the former fuel farm which is controlled by HIARNG. HDOT-A Kalaeloa ARFF Unit personnel were unaware that the former fuel farm area was no longer under HDOT-A use. Unit personnel were reportedly following the historical practice of performing pump testing over the fence line that separates the former fuel farm from the active runway. HIARNG personnel did not participate in pump testing activities (AECOM 2020).

In addition to the foam observed on the walkway, HIARNG personnel observed flattened vegetation among the surrounding areas, indicating that the foam mixture likely affected a larger area. The spill report notes that based on the direction of flattened vegetation adjacent to UIC Well #73, it is suspected some of the AFFF mixture may have also entered the UIC well (AECOM 2020).

3.2 AOI 2 – HANGAR SUPPRESSION SYSTEM AND STORAGE

AOI 2 consists of the hangar at Kalaeloa AASF #1-JRF, which was constructed in 2017 and is equipped with an AFFF fire suppression system. The system consists of an 800-gallon tank that contains approximately 440-gallons of Ansulite AFC-3MS 3% AFFF (NSN 4210-01-144-0291) concentrate. The AFFF tank is located within the mechanical room of the hangar. Prior to 2022, an additional eight 55-gallon drums of the same Ansulite 3% AFFF were stored on secondary containment pallets within the Facility's hangar. The drums of AFFF were reportedly moved within the hangar as needed and had temporarily been stored outside the hangar on at least one occasion (AECOM 2020). In January 2022, the 800-gallon bladder tank was replaced. The foam in the tank was disposed of at PVT Landfill, consistent with current laws and regulations. The tank was refilled to full capacity (800 gallons) and the facility now stores twenty 55-gal drums of the Ansulite 3% AFFF at its vehicle wash rack equipment room, constructed in September 2022. During the bladder tank replacement, the fire suppression system was not tested and there was no release of AFFF.

The hangar suppression system is supplied with water by an external aboveground storage tank and associated Fire Pump Building located northeast of the hangar. The Fire Pump Building contains the diesel-powered water pump system that services the hangar building. AFFF is not currently or historically stored within the Fire Pump Building (AECOM 2020).

The hangar was not inspected during the PA's visual site inspection. Information provided by HIARNG indicates that the system has never been tested, and there have been no known instances of leaks or spills from either the system or the drums of AFFF. However, because AFFF was stored at the Facility, there is potential for it to have been incidentally released to the environment during handling or via leaks. If a spill or system release occurred within the hangar or mechanical room, it would likely flow into floor drains that connect to an oil/water separator and subsequently discharge to the sanitary sewer. Incidental spills that may have occurred or been tracked outside the hangar would travel via stormwater as sheet flow across impervious pavement to areas of crushed concrete that surround the hangar and subsequently to stormwater infiltration pits and/or UIC wells (AECOM 2020).

3.3 ADJACENT SOURCES

Following the investigation, one potential source on the HIARNG Facility and one potential off-Facility source of PFAS adjacent to the Facility and that is not under the control of the HIARNG was identified. The adjacent potential sources are shown on **Figure 3-1** and described in the following sections for informational purposes only and they were not investigated as part of this SI.

3.3.1 Building 117

A Final PA report prepared by NAVFAC in 2022 as part of the Base-wide Investigation for PFAS at the Former NAS Barbers Point noted that a former Plating Facility was located in the southwestern portion of Building 117 (See Figure 3-1). Wastewater from the Facility discharged into an adjacent drywell to the north-northwest. Specifics were not available as to the type of plating operation or the types and quantities of the wastes; however, NAVFAC's PA identified Building 117 as an AOI (AOI 1) and noted a potential for PFAS to be present onsite at this location (NAVFAC 2022). The property where the Plating Facility was located was transferred to the HIARNG on September 14, 2001, and is part of Kalaeloa AASF #1-JRF. No previous PFAS investigations have been completed at Building 117. Due to the release date of

NAVFAC's Final PA, this area was not included in ARNG's SI. Building 117 is recommend for further evaluation during future CERCLA phases.

3.3.2 Kalaeloa Airport

No visual site inspection was performed at the adjacent Kalaeloa Airport during the ARNG PA in 2020. However, the Kalaeloa Airport is considered an adjacent PFAS source, as runways are typically the location of crash sites requiring the usage of AFFF in emergency response, and aviation hangars may have fire suppression systems charged with AFFF. The Kalaeloa Airport was originally part of the NAS Barbers Point facility operated by the Navy. According to NAVFAC's 2022 PA, the general configuration of the runways are consistent with the runways originally constructed for former NAS Barbers Point. According to the Base Supervisory Engineer at the former NAS Barbers Point (leaving in 1993 because of the BRAC Act), the Federal Aviation Agency (FAA) had recommended foaming runways for emergency landings in 1966 before withdrawing the recommendation in 1987 and banning it 2002. At that time, the base engineer spoke with Airfield Operations personnel who described the practice of foaming runways. The base engineer also recalled that there was a time constraint on how fast the foaming needed to be done, however, he never witnessed the foaming. The runway property was transferred to HDOT on June 30, 1999. Based on the potential for foaming to have occurred from 1966 to 1987 (due to FAA Recommendations), the runways were identified as an AOI (AOI 5) in NAVFAC's PA. Additional fire training areas and a fire station which are also located on the Kalaeloa Airport were noted as potential AOIs where PFAS may have been released (NAVFAC 2022). No previous PFAS investigations have been completed for these areas, although it is noted that the areas identified in the PA are not immediately adjacent to the ARNG Facility and they are considered downgradient of the Facility.

An interview obtained during the 2020 ARNG PA indicated that the HDOT-A Kalaeloa Airport ARFF Unit conducts pump tests of their firetrucks on the vacant areas controlled by HDOT-A around the airstrip. According to the ARFF fire chief, at the time ARFF was performing monthly maintenance tests of the firetruck pumps. The fire chief noted this is typically just water; however, sometimes a little AFFF is in the tank. He noted that the discharges occur in open areas around the airstrip/DOT Property (AECOM 2020). One such pump testing location was a former fuel farm that was previously controlled by HDOT-A until July 2016 when HIARNG began leasing the property (identified as ARNG AOI-1). Previous pump testing may have also occurred at the former fuel farm area while it was under HDOT-A use. The exact locations of all pump testing areas at Kalaeloa Airport are unknown. As documented, although the pump testing was typically conducted with water, AFFF was sometimes mixed in the water tank; thus, residual PFAS may have been released from the previous testing of equipment with AFFF. Pump testing began at an unknown time and is conducted once a month. Review of the EDR™ reports did not reveal other likely PFAS sources near the Facility (AECOM 2020).

The Kalaeloa Airport is located downgradient of the AASF; however, as noted in previous discussions, HDOT-A Kalaeloa ARFF Unit conducts pump tests of their firetrucks at random locations surrounding the adjacent airport runway which could have included other fenceline or over the fenceline releases (similar to the tank farm area release identified as ARNG AOI 1). The potential exists that releases from HDOT-A ARFF pump tests along the boundary of the airport may enter the HIARNG Facility via runoff if the release was close enough to the boundary.

Army National Guard Site Inspections
Site-Specific Quality Assurance Project Plan
Kalaeloa AASF #1-JRF, Hawaii

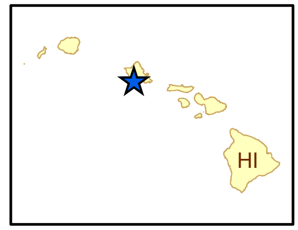
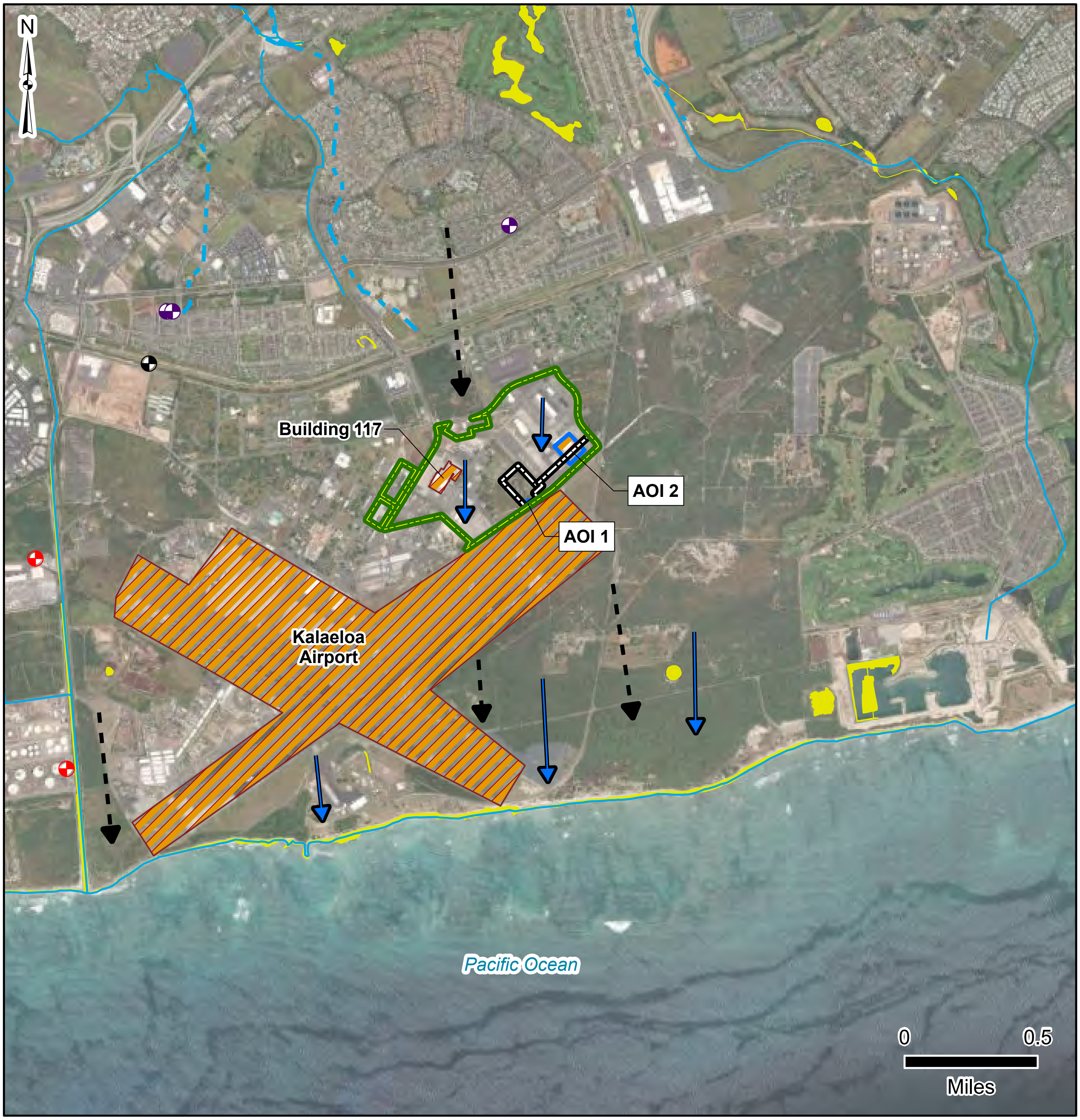


Figure 3-1
Area of Interest



Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Kalaeloa\KalaeloaSI.aprx

Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential PFAS Release

Well Type
- Industrial Well
- Irrigation Well
- Other Well

Hydrology/Hydrogeology
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Perennial Stream/Creek
- Intermittent Stream/Creek
- Water Body
- Wetlands

Data Sources:
ESRI 2020
AECOM 2020

Date:.....................November 2023
Prepared By:..............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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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 2022), the objective of the SI is to identify whether there has been a release to the environment at the AOIs identified in the PA. For each 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 each of the sampled AOIs.

4.1 PROBLEM STATEMENT

ARNG will recommend AOIs for remedial investigation (RI) if related soil and groundwater samples have concentrations of the relevant compounds above the OSD risk-based screening levels (SLs) that were the result of ARNG/Dod activities. 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 Kalaeloa Army Aviation Support Facility #1-JRF (AECOM 2020)
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific UFP-QAPP Addendum (EA 2022)
- Field data collected during the SI, 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 2-2**). 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 Sacramento and Eurofins Lancaster Laboratories Environment Testing, LLC, accredited under the DoD Environmental Laboratory Accreditation Program (ELAP); Accreditation Numbers (Nos.) L2468 and 0001.01, and the National Environmental Laboratory Accreditation Program (NELAP); Certificate Nos. 4040 and 022-001, respectively. PFAS data underwent 100 percent (%) Stage 2B validation in accordance with the DoD General Data Validation Guidelines (2019b) 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 2022).

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; USEPA 2017b).

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 Addendum (EA 2022).

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, Kalaeloa Army Aviation Support Facility #1-JRF, dated October 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, Kalaeloa Army Aviation Support Facility #1-JRF, Hawai‘i, dated March 2022 (EA 2022)
- Final Programmatic Accident Prevention Plan, Revision 1, dated November 2020 (EA 2020b)
- Final Site Safety and Health Plan, Kalaeloa AASF #1-JRF, dated November 2021 (EA 2021)
- Final Preliminary Assessment Report, Basewide Investigation of Per- and Polyfluoroalkyl Substances (PFAS), Former Naval Air Station Barbers Point, O‘ahu, Hawai‘i. (NAVFAC 2022).

The SI field activities were conducted from 24 March to 5 May 2022 and consisted of geophysical surveys, land surveys, hollow stem auger (HSA) borings and discrete soil sample collection, monitoring well installation, and grab groundwater sample collection. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2022a) and EPA Guidance (USEPA 2006), except as noted in **Section 5.8**.

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

- Thirty-one (31) discrete soil samples from 11 locations (10 soil borings locations, 1 in the vicinity of an existing monitoring well location)
- Eleven (11) grab groundwater samples from well locations
- Twenty-six (26) quality assurance (QA)/quality control (QC) 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**. 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, Engineers Manual (EM) 200-1-2 (Department of the 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 14 December 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, HIARNG, USACE, and the Hawaiʻi Department of Health 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 29 September 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 contacted Hawaiʻi One Call to notify them of intrusive work at the Facility. EA contracted GeoTek Hawaiʻi, Inc., a private company, to perform utility clearance and drilling services at the Facility. Utility clearance was performed at each of the proposed boring locations on 11 and 14 April 2021 with input from the EA field team. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, a hand auger was used in locations until shallow bedrock/coral was encountered to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 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 Kalaeloa AASF #1-JRF (behind Building 29), was collected on 18 November 2021, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15.

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 (PQAPP) (EA 2020a).

5.2 HAND AUGER SOIL BORINGS AND SOIL SAMPLING

A hand auger was used to collect soil from up to the top 5 ft of each soil boring in compliance with utility clearance procedures. Soil samples were collected from the 11 monitoring well locations for chemical analysis from 0 to 2 ft below ground surface (bgs) using a hand auger or HSA rig (Geoprobe® 7822DT/6620DT dual-tube sampling system) depending on the presence of shallow bedrock/coral. All soil sample locations are shown on **Figure 5-1**. The 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 2022). Non-dedicated sampling equipment (i.e., hand auger or drilling equipment) was decontaminated between sampling locations. A modified incremental sampling procedure was identified in the UFP QAPP which required a larger volume of material to be collected. In order to provide adequate sample volume, additional soil was collected from drilling spoils if needed at certain locations (as noted in the field change request -**Appendix B4**).

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 ice and transported via Federal Express (FedEx) under standard chain-of-custody (COC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15) in accordance with the UFP-QAPP Addendum. QC samples and analysis were performed as described in the UFP-QAPP Addendum (EA 2022).

Subsurface soil samples were collected via HSA drilling methods. A Geoprobe® 7822DT/6620DT dual-tube sampling system was used to collect continuous soil cores to the target depth. If necessary to provide adequate sample volume, additional soil was collected from drilling spoils (as noted in the field change request -**Appendix B4**).

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 collected at the mid-point between the surface and the groundwater table (not to exceed 15 ft bgs). Approximately 2 kilograms of soil were collected per sample in order for the laboratory to perform a multi-increment subsampling procedure. Groundwater was encountered at depths ranging from 34 to 48 ft bgs during drilling. Total boring completion depths, to accommodate well installation, ranged from 41 to 57 ft bgs.

Soil borings completed during the SI found silty sand and well graded gravel as the dominant lithology types of the unconsolidated sediments below Kalaeloa AASF. Varying levels of sand occurred throughout the Facility, with some isolated layers of clay observed at AOI 2. Gravel layers typically began at 12-15ft bgs and ranged from 20-25ft in thickness. These observations are consistent with the understood depositional environment of the region.

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 2022). One boring location was adjusted within a 50-ft offset to bring the location inside the Facility fence line. Only one soil sample (0-2 ft bgs) was collected at location AOI01-05 as noted in the approved field change request included in **Appendix B4**. Additionally, a modified incremental sampling procedure was identified in the UFP-QAPP which required a larger volume of material to be collected. In order to provide adequate sample volume, additional soil was collected from drilling spoils if needed at certain locations (as noted in the field change request -**Appendix B4**).

During the mobilization, 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 field logbook. Depth interval, recovery thickness, PID concentrations, moisture, relative density, Munsell color, and Unified Soil Classification System texture were recorded. The boring logs are provided in **Appendix E**.

Each sample was collected into a laboratory-supplied PFAS-free HDPE bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard COC 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 2022).

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, one equipment blank (EB) was collected per day and analyzed for the same parameters as the soil samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6 degrees Celsius (°C) during shipment.

HSA borings were converted to permanent wells in accordance with the UFP-QAPP Addendum (EA 2022). Whenever possible, borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces. Two boring locations at AOI 1 were installed through asphalt to maintain proximity to the historic release location.

5.3 WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

Wells were installed using a GeoProbe® 7822DT/6620DT dual-tube sampling system. Once the borehole was advanced to the desired depth, a permanent well was constructed of a 10-ft section of 1-inch Schedule 40 polyvinyl chloride (PVC) screen with sufficient casing to reach the ground surface. New PVC pipe and screen were used at each location to avoid cross contamination between locations. The screen intervals for the wells are provided in **Table 5-2**.

Wells were not developed until a minimum of 24-hours after installation, in accordance with the UFP-QAPP Addendum. Additionally, wells were not sampled prior to 24-hours after development. Groundwater samples were collected using a bladder pump with PFAS-free HDPE tubing. Each sample was collected in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The 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 accordance with the UFP-QAPP Addendum, a subsample of each groundwater sample was collected in a separate container and a shaker test was performed to identify if there was any foaming which would result in notification to the laboratory (foaming is potentially indicative of high PFAS concentrations). No foaming was noted. The containers were also provided to the lab for their use. Samples were packaged on ice and transported via FedEx under standard COC 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 2022).

Field duplicate 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. Five field blanks (FB) were collected in accordance with the UFP-QAPP Addendum (EA 2022). In instances when non-dedicated sampling equipment was used, such as a bladder pump, one EB was collected a day and analyzed for the same parameters as the groundwater samples A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment. One groundwater sample proposed for location AOI01-05 was collected from an existing monitoring well (MW-11) located approximately 30 ft from AOI01-05 (**Figure 2-5**) as noted in the approved field change request (**Appendix B4**).

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 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

The northern side of each new well casing was surveyed by a Hawaiʻi-Licensed surveyor, Park Engineering. Positions were collected in the applicable Universal Transverse Mercator zone projection with World Geodetic System 1984 datum (horizontal) and North American Vertical Datum 1988 (vertical). Surveying data were collected on 25 April 2022 and are provided in **Appendix B3**.

5.6 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not regulated federally. IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the SI QAPP Addendum (EA 2022) and with the DA Guidance for Addressing Releases of PFAS (DA, 2018).

All solid (i.e., soil cuttings) and liquid (i.e., purge water, development water, and decontamination fluids) IDW were contained in labeled, 55-gallon steel drums, removed from the site, and disposed of in a Resource Conservation and Recovery Act Subtitle C landfill. Specifics on the disposal of solid and liquid IDW will be summarized in a separate IDW disposal report.

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 as non-hazardous solid waste to be transported to 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 Eurofins Lancaster Laboratories Environmental, LLC, 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 SITE INVESTIGATION UFP-QAPP ADDENDUM

Deviations from the UFP-QAPP Addendum occurred based on field conditions. These deviations were discussed between EA, ARNG G-9, HIARNG, HDOH, and USACE. One deviation from the UFP-QAPP Addendum is noted below:

- AOI01-05: An existing groundwater monitoring well was discovered in the vicinity of the planned location for permanent well AOI01-05. Instead of three soil boring samples, a single surface soil sample was collected in the vicinity of the permanent well. The groundwater sample for this location was collected from the existing monitoring well. This change is noted in the Field Change Request Form provided in **Appendix B4** which includes a figure to show the well and soil sampling location.

Table 5-1. Site Inspection Samples by Medium
Kalaeloa AASF #1-JRF, Hawai‘i
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15 (ISM Preparation for soils)	TOC (USEPA Method	pH (USEPA Method 9045D)	Grain Size	Comments
Soil Samples							
KAASF-01-SB-01-02	11 Apr 2022	0-2	X				
KAASF-01-SB-01-02 (Dup)	11 Apr 2022	0-2	X				Field duplicate of KAASF-01-SB-01-02
KAASF-01-SB-13-15	11 Apr 2022	13-15	X				
KAASF-01-SB-40-42	11 Apr 2022	40-42	X				
KAASF-02-SB-01-02	12 Apr 2022	1-2	X				
KAASF-02-SB-13-15	12 Apr 2022	13-15	X				
KAASF-02-SB-46-48	12 Apr 2022	46-48	X				
AOI2-03-0-2	15 Apr 2022	0-2	X				
AOI2-03-13-15	15 Apr 2022	13-15	X				
AOI2-03-36-38	15 Apr 2022	36-38	X				
AOI02-01-SB-0-2	18 Apr 2022	0-2	X				
AOI02-01-SB-13-15	18 Apr 2022	13-15	X				
AOI02-02-SB-0-2	18 Apr 2022	0-2	X				
AOI02-02-SB-13-15	18 Apr 2022	13-15	X				
AOI02-02-SB-36-38	18 Apr 2022	36-38	X				
AOI02-01-SB-34-36	19 Apr 2022	34-36	X				
AOI02-04-SB-0-2	19 Apr 2022	0-2	X				
AOI02-04-SB-13-15	19 Apr 2022	13-15	X				
AOI02-04-SB-36-38	19 Apr 2022	36-38	X				
KAASF-DUP-SB-01	19 Apr 2022	0-2	X				Field duplicate of AOI02-04-SB-0-2
AOI01-03-SB-13-15	20 Apr 2022	13-15	X	X	X	X	
AOI01-03-SB-0-2	20 Apr 2022	0-2	X				
AOI01-03-SB-34-36	20 Apr 2022	34-36	X				
KAASF-DUP-SB-01	20 Apr 2022	13-15	X				Field duplicate of AOI01-03-SB-13-15
AOI01-02-SB-0-2	20 Apr 2022	0-2	X				
AOI01-02-SB-13-15	20 Apr 2022	13-15	X				
AOI01-02-SB-32-34	20 Apr 2022	32-34	X				
KAASF-DUP-SB-03	20 Apr 2022	0-2	X				Field duplicate of AOI01-02-SB-0-2
AOI01-01-SB-32-34	21 Apr 2022	32-34	X				
AOI01-01-SB-0-2	21 Apr 2022	0-2	X				
AOI01-01-SB-13-15	21 Apr 2022	13-15	X				
KAASF-DUP-SB-04	21 Apr 2022	0-2	X				Field duplicate of AOI01-05-SB-0-2
AOI01-04-SB-0-2	21 Apr 2022	0-2	X				
AOI01-04-SB-31-33	21 Apr 2022	31-33	X				

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15 (ISM Preparation for soils)	TOC (USEPA Method	pH (USEPA Method 9045D)	Grain Size	Comments
AOI01-04-SB-13-15	21 Apr 2022	13-15	X				
AOI01-05-SB-0-2	21 Apr 2022	0-2	X				
Groundwater Samples							
KAASF-01-GW	29 Apr 2022	-	X				
AOI02-02-GW	2 May 2022	-	X				
AOI02-01-GW	2 May 2022	-	X				
AOI02-03-GW	3 May 2022	-	X				
AOI01-03-GW	4 May 2022	-	X				
AOI01-MW11-GW	5 May 2022	-	X				
AOI01-04-GW	5 May 2022	-	X				
AOI02-04-GW	5 May 2022	-	X				
AOI01-02-GW	4 May 2022	-	X				
AOI01-01-GW	5 May 2022	-	X				
KAASF-02-GW	4 May 2022	-	X				
KAASF-DUP-GW-01	4 May 2022	-	X				Field duplicate of AOI01-02-GW
KAASF-DUP-GW-02	5 May 2022	-	X				Field duplicate of AOI02-04-GW
KAASF-MSD-GW	5 May 2022	-	X				MS/MSD
Blank Samples							
KAASF-EB-01	11 Apr 2022	-	X				Equipment Blank
KAASF-EB-02	12 Apr 2022	-	X				Equipment Blank
KAASF-EB-03	15 Apr 2022	-	X				Equipment Blank
KAASF-EB-04	18 Apr 2022	-	X				Equipment Blank
KAASF-EB-05	19 Apr 2022	-	X				Equipment Blank
KAASF-EB-06	20Apr 2022	-	X				Equipment Blank
KAASF-EB-07	21 Apr 2022	-	X				Equipment Blank
KAASF-EB-09	29 Apr 2022	-	X				Equipment Blank
KAASF-FB-01	29 Apr 2022	-	X				Field Blank
KAASF-EB-10	2 May 2022	-	X				Equipment Blank
KAASF-FB-02	2 May 2022	-	X				Field Blank
KAASF-FB-03	3 May 2022	-	X				Field Blank
KAASF-EB-11	3 May 2022	-	X				Equipment Blank
KAASF-FB-04	4 May 2022	-	X				Field Blank
KAASF-FB-05	5 May 2022	-	X				Field Blank
KAASF-EB-12	4 May 2022	-	X				Equipment Blank
KAASF-EB-13	5 May 2022	-	X				Equipment Blank

Table 5-2. Soil Boring Depths and Well Screen Intervals
Kalaeloa AASF #1-JRF, Hawai‘i
Site Inspection Report

Area of Interest	Boring ID	Soil Boring Depth (ft bgs)	Well Screen Interval (ft bgs)[1]	Ground Surface Elevation ft amsl
1	AOI01-01	42	32-42	36.28
	AOI01-02	42	32-42	35.92
	AOI01-03	44	34-44	36.53
	AOI01-04	41	31-41	36.65
	AOI01-MW11[2]	N/A	Unknown	37.99
2	AOI02-01	43	33-43	36.76
	AOI02-02	45	35-45	39.12
	AOI02-03	45	35-45	39.99
	AOI02-04	46	36-46	40.78
	KAASF-01	47	37-47	46.45
	KAASF-02	57	47-57	50.11

Notes:
[1] Well screen set above total depth to capture groundwater interface.
[2] Groundwater sample collected from existing monitoring well (MW-11) found in planned vicinity of Location AOI01-05.
AASF = Army Aviation Support Facility
bgs = below ground surface
ft = feet
JRF = John Rodgers Field

Table 5-3. Groundwater Elevation
Kalaeloa AASF #1-JRF, Hawai‘i
Site Inspection Report

Monitoring Well ID	Top of Casing Elevation (ft amsl)	Depth to Water (ft btoc) [1]	Groundwater Elevation (ft amsl)	Depth to Water (ft bgs)
KAASF-01	46.17	44.51	1.66	45.00
KAASF-02	49.62	47.96	1.66	48.24
AOI01-01	35.97	34.38	1.59	34.69
AOI01-02	35.62	34.01	1.61	34.31
AOI01-03	36.23	34.62	1.61	34.92
AOI01-04	36.46	34.85	1.61	35.04
AOI01-MW11[2]	37.18	35.10	2.08	35.91
AOI02-01	36.50	34.86	1.64	35.12
AOI02-02	38.76	37.12	1.64	37.48
AOI02-03	39.55	37.91	1.64	38.35
AOI02-04	40.46	38.84	1.62	39.16

Notes:
[1] Well screen set above total depth to capture groundwater interface.
[2] Groundwater sample collected from existing monitoring well (MW-11) found in planned vicinity of Location AOI01-05.
btoc = below top of casing
AASF = Army Aviation Support Facility
amsl = Above mean sea level
bgs = below ground surface
btoc = below top of casing
ft = feet
JRF = John Rodgers Field

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Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

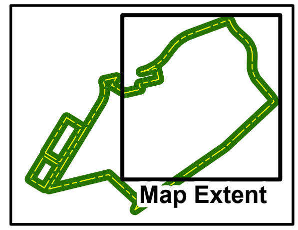
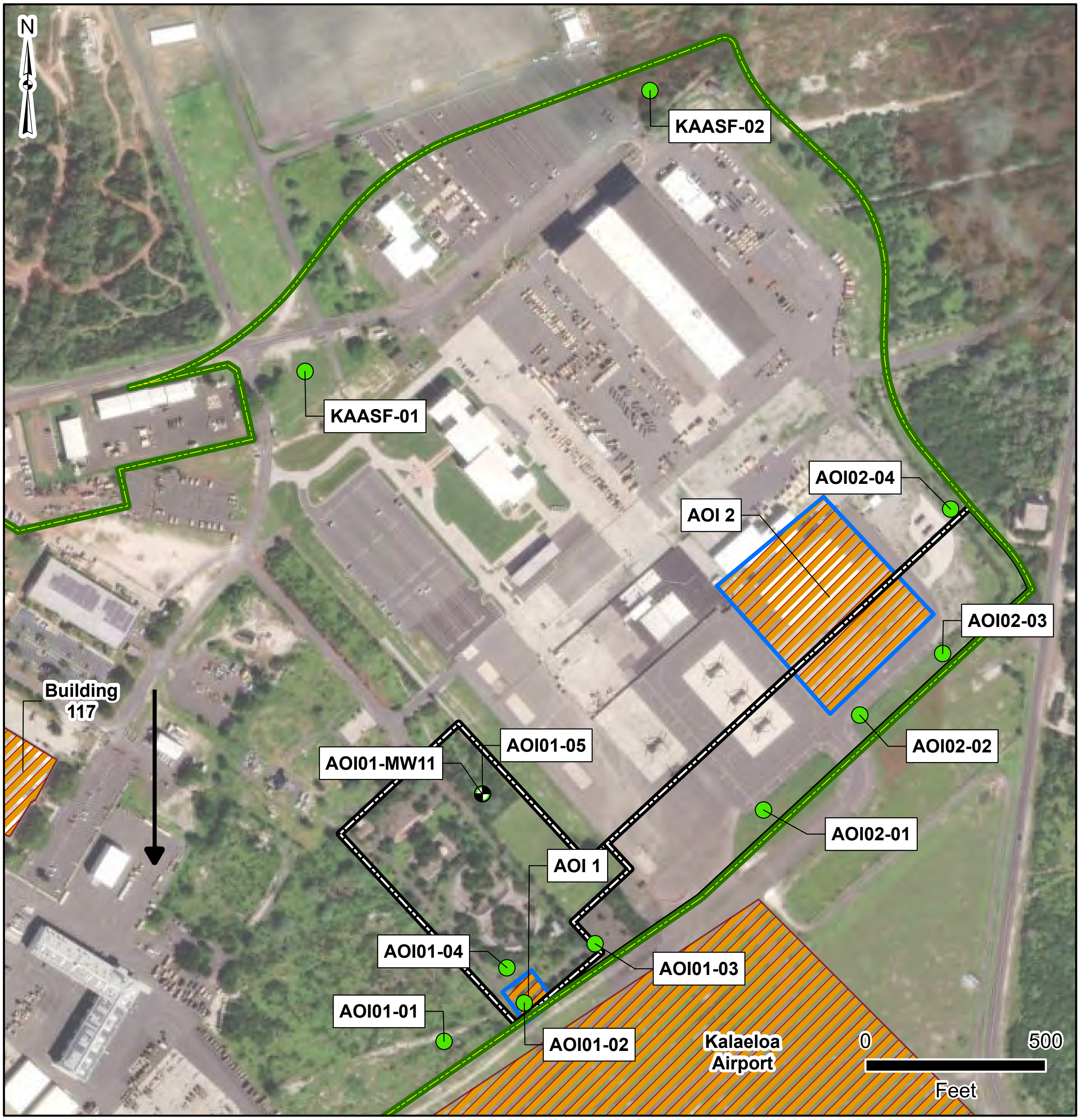


Figure 5-1
Site Inspection Sample Locations



Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Sample Locations
- Monitoring Well Location
- Sample Location

Hydrogeology
- Groundwater Flow Direction

Data Sources:
ESRI 2020
AECOM 2020

Date:....................November 2023
Prepared By:............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Kalaeloa\KalaeloaSI.aprx

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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**. A discussion of the results for the AOIs and boundary areas is provided in **Sections 6.3 through 6.5**. **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 F**, and the laboratory reports are provided in **Appendix G**.

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. The SLs established in the OSD memorandum apply to the five compounds presented on **Table 6-1**.

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

Analyte[2]	**Residential 0 to 2 ft bgs (Soil) (µg/kg)[1]**	**Industrial/Commercial Composite Worker 2 to 15 ft bgs (Soil) (µg/kg)[1]**	**Tap Water (Groundwater) (ng/L)[1]**
PFOA	19	250	6
PFOS	13	1,600	4
PFBS	1,900	25,000	600
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
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. 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.

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

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 industrial/commercial worker scenario was applied to shallow subsurface soil samples collected from mid-point at the soil borings (13 to 15 ft bgs) in each AOI, providing a conservative assessment of that potential exposure route for the industrial/commercial workers. 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 F** 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. 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 and TOC was analyzed in soil sample AOI01-03-SB-13-15. Results showed pH values of 7.2 and a TOC result of 8,200 mg/kg. The grain size analysis conducted on sample AOI01-03-SB-13-15 showed a composition of 42.9% sand, 11.7% gravel, 9.2% clay, and 36.2% silt. This result corresponds to a soil texture of sandy loam.

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes the former fuel farm area, including the site of a 2017 reported release of AFFF. The detected compounds are summarized in **Tables 6-2 through 6-5**. **Figures 6-1 through 6-7** present detections for relevant compounds in soil and groundwater.

6.3.1 AOI 1 Soil Analytical Results

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

Soil was sampled in five locations associated with one potential release area at AOI 1. Soil was sampled from three intervals at four locations (AOI01-01, AOI01-02, AOI01-03, and AOI01-04); surface (0-2 ft bgs), shallow subsurface (13-15 bgs), and deep subsurface soil intervals (32-36 ft bgs). A single surface soil sample (0-2 ft bgs) was collected from one location (AOI01-05).

All five compounds in Table 6-1 were detected in surface soil samples (0-2 ft bgs) at three locations (AOI01-01, AOI01-02, and AOI01-05). PFOA, PFOS, and PFHxS were detected in surface samples from the remaining two locations (AOI01-03 and AOI01-04). PFOA was detected above the SL of 19 µg/kg at AOI01-02 (concentration of 100 µg/kg) and its duplicate sample (110 µg/kg). Remaining detections ranged from 0.26 µg/kg to 2.1 µg/kg at AOI01-04 and AOI01-05, respectively (2.5 µg/kg in the AOI01-05 duplicate sample). PFOS was detected above the SL of 13 µg/kg with concentrations of 45 µg/kg at AOI01-05 (39 µg/kg in the duplicate sample) and 1,500 J+ µg/kg at AOI01-02 (1,500 J- µg/kg in the duplicate sample). Remaining detections ranged from 0.5 J+ µg/kg to 4.7 J+ µg/kg at AOI01-04 and AOI01-01, respectively. PFHxS was detected above the SL of 130 µg/kg at AOI01-02 with a concentration of 340 µg/kg (360 µg/kg in the duplicate sample). Remaining detections ranged from 0.54 µg/kg to 2.6 µg/kg at AOI01-03 and the AOI01-05 (duplicate sample), respectively. PFBS concentrations ranged from 0.084 J µg/kg to 19 µg/kg (25 µg/kg in duplicate sample) at AOI01-01 and AOI01-02, respectively, below the SL of 1,900 µg/kg. PFNA concentrations ranged from 0.042 J µg/kg to 12 µg/kg in AOI01-01 and AOI01-02 (and 12 µg/kg in the AOI01-02 duplicate sample), respectively, below the SL of 19 µg/kg.

No relevant compounds were detected above SLs in the shallow subsurface soil samples (13-15 ft bgs). PFOA was detected in three shallow subsurface soil samples at concentrations ranging from 0.054 J+ µg/kg to 0.2 J+ µg/kg in AOI01-03 and AOI01-02, respectively, below the SL of 250 µg/kg. PFOS was detected in three shallow subsurface soil samples at concentrations ranging from 0.059 µg/kg to 0.54 µg/kg in AOI01-03 (duplicate sample) and AOI01-02, respectively, below the SL of 160 µg/kg. PFHxS was detected in four shallow subsurface soil samples at concentrations ranging from 0.022 J µg/kg to 3.4 µg/kg in AOI01-04 and AOI01-02, respectively, below the SL of 1,600 µg/kg. PFBS was detected in two shallow subsurface soil samples at concentrations of 0.047 J µg/kg, (0.049 µg/kg in the duplicate result), and 6.5 µg/kg in AOI01-03 and AOI01-02, respectively, below the SL of 25,000 µg/kg. PFNA was not detected in any shallow subsurface soil samples.

PFOA was detected in all four deep subsurface soil samples (32-36 ft bgs) at concentrations ranging from 0.024 J µg/kg to 0.1 µg/kg in AOI01-04 and AOI01-02, respectively. PFOS was detected in three deep subsurface soil samples at concentrations ranging from 0.11 µg/kg to 0.33 µg/kg in AOI01-03 and AOI01-02, respectively. PFHxS was detected in three deep subsurface soil samples and a duplicate sample at concentrations ranging from 0.029 J µg/kg to 0.12 µg/kg in AOI01-01 duplicate and AOI01-03, respectively. PFBS was detected in one deep subsurface soil sample (AOI01-02) at a concentration of 0.075 J µg/kg. PFNA was not detected in any deep subsurface soil samples.

6.3.2 AOI 1 Groundwater Analytical Results

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

Groundwater samples were collected from five permanent wells at AOI 1 during the SI. The following exceedances of the SLs were measured:

- PFOA and PFOS were detected above the SL of 6 ng/L and 4 ng/L, respectively, in all five samples. PFOA concentrations ranged from 18 J ng/L to 740 J ng/L in AOI01-04 and

AOI01-02, respectively, and PFOS concentrations ranged from 16 J ng/L to 6,900 J ng/L in AOI01-04 and AOI01-02 duplicate, respectively.

- PFNA was detected above the SL of 6 ng/L in one well (AOI01-02) at a concentration of 35 J ng/L (34 ng/L in the duplicate sample).

- PFHxS was detected above the SL of 39 ng/L in three wells (AOI01-01, AOI01-02 [and the duplicate sample], and AOI01-03) at concentrations ranging from 50 J ng/L to 7,100 J ng/L in AOI01-01 and AOI01-02, respectively.

PFNA was detected below the SL in three wells with concentrations ranging from 0.9 J ng/L to 2.3 J ng/L in AOI01-04 and AOI01-03, respectively. PFHxS was detected below the SL in two wells with concentrations of 14 J ng/L and 36 J ng/L in AOI01-04 and AOI01-MW11, respectively. PFBS was detected below the SL of 601 ng/L in four wells with concentrations ranging from 4.8 J ng/L to 480 J ng/L (530 ng/L in the duplicate sample) in AOI01-04 and AOI01-02, respectively.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, three relevant compounds (PFOA, PFOS, and PFHxS) were detected in soil above their respective SLs; and PFNA, and PFBS were detected below their respective SLs. Four relevant compounds (PFOA, PFOS, PFHxS, and PFNA) were detected in groundwater at concentrations above their respective SLs and PFBS was detected below the SL. However, at no point during the PA or the SI was there any evidence that any of the relevant compounds were the result of current or historical ARNG/DoD activities.

6.4 AOI 2

6.4.1 AOI 2 Soil Analytical Results

Figures 6-1 through 6-7 present the ranges of detections in soil. **Tables 6-2 through 6-4** summarize the soil results.

Soil was sampled in four boring locations associated with a former AFFF storage area at AOI 2. Soil was sampled from three intervals at four locations (AOI02-01, AOI02-02, AOI02-03, and AOI02-04); surface (0-2 ft bgs), shallow subsurface soil (13-15 bgs), and deep subsurface soil (34-38 ft bgs). Additionally, soil was sampled from three intervals at two boring locations along the Facility boundary (KAASF-01 and KAASF-02 termed boundary locations); surface soil samples (0-2 ft bgs), shallow subsurface soil samples (13-15 bgs), and deep subsurface soil samples (40-48 ft bgs). No relevant compounds were detected above SLs in soil samples collected from AOI 2 or the Facility boundary.

PFOA was detected in six surface soil samples (0-2 ft bgs) (four source sample locations and two boundary sample locations, including duplicate samples) at concentrations ranging from 0.21 J+ μg/kg to 2.4 μg/kg in AOI02-02 and AOI02-03, respectively, below the SL of 19 μg/kg. PFOS was detected in six surface samples (four source sample locations and two boundary sample locations including duplicate samples) at concentrations ranging from 1 J+ µg/kg to 3.5 µg/kg in AOI02-02 and AOI02-03, below the SL of 13 µg/kg. PFNA was detected in five surface samples (four source sample locations and one boundary sample location, including duplicate samples) at concentrations ranging from 0.043 J+ µg/kg (0.041 J µg/kg in the duplicate sample) to 0.31 µg/kg in AOI02-04 and AOI02-03, respectively, below the SL of 19 µg/kg. PFHxS was detected in six surface samples (four source sample locations and two boundary sample locations, including duplicate samples) at concentrations ranging from 0.045 J µg/kg to 0.66 µg/kg in AOI02-02 and AOI02-03, respectively, below the SL of 130 µg/kg. PFBS was detected in two surface samples (two source sample locations) at the same concentration of 0.043 µg/kg in AOI02-01 and AOI02-02, below the SL of 1,900 µg/kg.

PFOA was detected in four shallow subsurface soil samples (13-15 ft bgs) (two source sample locations and two boundary sample locations) at concentrations ranging from 0.024 J µg/kg and 0.16 J+ µg/kg in boundary sample KAASF-01 and source sample AOI02-04, respectively, below the SL of 250 µg/kg. PFOS was detected in four shallow subsurface soil samples (two source sample locations and two boundary sample locations) at concentrations ranging from 0.068 J µg/kg and 0.39 J+ µg/kg in boundary sample KAASF-02 and location AOI02-04, respectively, below the SL of 160 µg/kg. PFHxS was detected in three shallow subsurface soil samples (three source sample locations) at concentrations ranging from 0.025 J µg/kg to 0.32 µg/kg in AOI02-02 and AOI02-04, respectively, below the SL of 1,600 µg/kg. PFBS was detected in two shallow subsurface soil samples (two source sample locations) at concentrations of 0.056 J µg/kg and 0.18 J µg/kg in AOI02-04 and AOI02-03, respectively, below the SL of 25,000 µg/kg. PFNA was not detected in any shallow subsurface soil samples.

PFOA was detected in two deep subsurface soil samples (two source sample locations) at concentrations of 0.12 J+ µg/kg and 0.64 J+ µg/kg in AOI02-01 and AOI02-04, respectively. PFOS was detected in four deep subsurface soil samples (three source sample locations and one boundary sample location) at concentrations ranging from 0.38 J µg/kg to 0.89 J+ µg/kg in boundary sample KAASF-02 and location AOI02-04, respectively. PFNA was detected in one deep subsurface soil sample in the source location (AOI02-02) at a concentration of 0.047 J µg/kg. PFHxS was detected in three deep subsurface soil samples (three source sample locations) at concentrations ranging from 0.029 µg/kg to 0.55 µg/kg in AOI02-02 and AOI02-04, respectively. PFBS was detected in two deep subsurface soil samples (two source sample locations) at concentrations of 0.078 J µg/kg and 0.37 µg/kg in AOI02-04 and AOI02-02, respectively.

6.4.2 AOI 2 Groundwater Analytical Results

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

Groundwater samples were collected from four permanent wells at AOI 2 and two permanent wells at the Facility boundary (boundary wells) during the SI. The following exceedances of the SLs were measured:

- PFOA was detected above the SL of 6 ng/L in five locations (all four source area wells and one boundary well location KAASF-01). PFOA concentrations ranged from 7 ng/L to 140 J ng/L in KAASF-01 and AOI02-04 (150 J ng/L for the AOI02-04 duplicate sample), respectively.

- PFOS was detected above the SL of 4 ng/L in all six wells (four source area wells and the two boundary well locations). PFOS concentrations ranged from 4.6 J ng/L to 120 ng/L in KAASF-02 and AOI02-02, respectively.

- PFNA was detected above the SL of 6 ng/L in one source area well, AOI02-03, at a concentration of 19 ng/L.

- PFHxS was detected above the SL of 39 ng/L in two source area wells AOI02-02 and AOI02-04 at concentrations of 65 ng/L and 140 J ng/L (130 ng/L for the AOI02-04 duplicate sample), respectively.

PFOA was detected below the SL of 6 ng /L in one boundary well location, KAASF-02, with a concentration of 1.8 ng/L. PFNA was detected below the SL in two wells (one source area well and one boundary well location) with concentrations of 0.75 J ng/L and 1.5 J ng/L in KAASF-01 and AOI02-04, respectively (1.6 ng/L in the duplicate sample for AOI02-04). PFBS was detected below the SL of 601 ng/L in six wells (four source area wells and the two boundary well locations) with concentrations ranging from 0.38 J ng/L to 200 ng/L in KAASF-02 and AOI02-03, respectively. PFHxS was detected below the SL of 39 ng/L in four wells (two source area wells and two boundary well locations) at concentrations of 0.61 ng/L and 32 J ng/L in KAASF-02 and AOI02-01, respectively.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, all five relevant compounds were detected in soil samples below their respective SLs. Four relevant compounds (PFOA, PFOS, PFHxS, and PFNA) were detected in groundwater at concentrations above their respective SLs. PFBS was detected below the SL. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 2 is warranted.

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI01-01		AOI01-02		AOI01-02		AOI01-03		AOI01-04		AOI01-05		AOI01-05		AOI02-01	
		Sample Name	AOI01-01-SB-0-2		AOI01-02-SB-0-2		KAASF-DUP-SB-03		AOI01-03-SB-0-2		AOI01-04-SB-0-2		AOI01-05-SB-0-2		KAASF-DUP-SB-04		AOI02-01-SB-0-2	
		Parent Sample ID					AOI01-02-SB-0-2								AOI01-05-SB-0-2			
		Sample Date	4/21/2022		4/20/2022		4/20/2022		4/20/2022		4/21/2022		4/21/2022		4/21/2022		4/18/2022	
		Depth (ft bgs)	0-2		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**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																		
Perfluorobutanesulfonic acid (PFBS)	1900	µg/kg	0.084	J	19		25		ND	U	ND	U	0.11	J	0.15	J	0.043	J
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	2.1		340		360		0.54		0.65		2.2		2.6		0.13	
Perfluorononanoic acid (PFNA)	19	µg/kg	0.042	J	12		12		ND	UJ	ND	U	3		2.7		0.1	J+
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	4.7	J+	1500		1500	J-	0.72		0.5	J+	45		39		2.3	J+
Perfluorooctanoic acid (PFOA)	19	µg/kg	1.9		100		110		0.33	J+	0.26		2.1		2.5		0.26	J+

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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).

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

Location ID			AOI02-02		AOI02-03		AOI02-04		AOI02-04		KAASF-01		KAASF-01		KAASF-01		KAASF-02	
Sample Name			AOI02-02-SB-0-2		AOI02-03-SB-0-2		AOI02-04-SB-0-2		KAASF-DUP-SB-01		KAASF-01-SB-0TO2		KAASF-01-SB-0TO2 Duplicate		KAASF-01-SB-0TO2 Triplicate		KAASF-02-SB-01-02	
Parent Sample ID									AOI02-04-SB-0-2				KAASF-01-SB-0TO2		KAASF-01-SB-0TO2			
Sample Date			4/18/2022		4/15/2022		4/19/2022		4/19/2022		4/11/2022		4/11/2022		4/11/2022		4/12/2022	
Depth (ft bgs)			0-2		0-2		0-2		0-2		0-2		0-2		0-2		1-2	
Analyte	**Screening Level[1,2]**	**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 (µg/kg)																		
Perfluorobutanesulfonic acid (PFBS)	1900	µg/kg	0.043	J	ND	U	ND	U	ND	U	ND	UJ	ND	U	ND	U	ND	UJ
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	0.045	J	0.66		0.35		0.35		0.09	J	0.087		0.081		0.2	J
Perfluorononanoic acid (PFNA)	19	µg/kg	0.067	J+	0.31		0.043	J	0.041	J	0.092	J	0.094		0.092		ND	UJ
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	1	J+	3.5		2.7	J+	2.8	J+	1.1	J	1.1		1		2.2	J
Perfluorooctanoic acid (PFOA)	19	µg/kg	0.21	J+	2.4		0.87	J+	0.88	J+	0.28	J	0.26		0.28		1.2	J

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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).

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI01-01		AOI01-02		AOI01-03		AOI01-03		AOI01-04		AOI02-01		AOI02-02		AOI02-03		AOI02-04		KAASF-01		KAASF-02	
		Sample Name	AOI01-01-SB-13-15		AOI01-02-SB-13-15		AOI01-03-SB-13-15		KAASF-DUP-SB-02		AOI01-04-SB-13-15		AOI02-01-SB-13-15		AOI02-02-SB-13-15		AOI02-03-SB-13-15		AOI02-04-SB-13-15		KAASF-01-SB-13-15		KAASF-02-SB-13-15	
		Parent Sample ID							AOI01-03-SB-13-15															
		Sample Date	4/21/2022		4/20/2022		4/20/2022		4/20/2022		4/21/2022		4/18/2022		4/18/2022		4/15/2022		4/19/2022		4/11/2022		4/12/2022	
		Depth (ft bgs)	13-15		13-15		13-15		13-15		13-15		13-15		13-15		13-15		13-15		13-15		13-15	
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**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 (µg/kg)																								
Perfluorobutanesulfonic acid (PFBS)	25000	µg/kg	ND	U	6.5		0.047	J	0.049	J	ND	U	ND	U	ND	U	0.18	J	0.056	J	ND	UJ	ND	UJ
Perfluorohexanesulfonic acid (PFHxS)	1600	µg/kg	0.045	J	3.4		0.13		0.13		0.022	J	0.039	J	0.025	J	ND	U	0.32		ND	UJ	ND	UJ
Perfluorononanoic acid (PFNA)	250	µg/kg	ND	UJ	ND	UJ	ND	UJ	ND	UJ	ND	U	ND	UJ	ND	UJ	ND	U	ND	U	ND	UJ	ND	UJ
Perfluorooctanesulfonic acid (PFOS)	160	µg/kg	0.15	J+	0.54		0.07		0.059	J	ND	U	ND	U	0.13	J+	ND	U	0.39	J+	0.071	J	0.068	J
Perfluorooctanoic acid (PFOA)	250	µg/kg	0.071	J+	0.2	J+	0.054	J+	0.061	J+	ND	U	ND	UJ	0.11	J+	ND	U	0.16	J+	0.037	J	0.024	J

Notes:
J = Estimated concentration.
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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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.
ft bgs = Feet below ground surface.
Qual = Qualifier.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).

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Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Kalaeloa AASF #1-JRF

	Location ID	AOI01-01		AOI01-01		AOI01-01		AOI01-02		AOI01-03		AOI01-04	
	Sample Name	AOI01-01-SB-32-34		AOI01-01-SB-32-34 Duplicate		AOI01-01-SB-32-34 Triplicate		AOI01-02-SB-32-34		AOI01-03-SB-34-36		AOI01-04-SB-31-33	
	Parent Sample ID			AOI01-01-SB-32-34		AOI01-01-SB-32-34							
	Sample Date	4/21/2022		4/21/2022		4/21/2022		4/20/2022		4/20/2022		4/21/2022	
	Depth (ft bgs)	32-34		32-34		32-34		32-34		34-36		31-33	
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	ND	U	0.075	J	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	ND	U	0.029	J	0.039	J	0.11		0.12		0.041	J
Perfluorononanoic acid (PFNA)	µg/kg	ND	UJ	ND	U	ND	U	ND	U	ND	UJ	ND	U
Perfluorooctanesulfonic acid (PFOS)	µg/kg	0.16	J+	0.21		0.28		0.33		0.11		ND	U
Perfluorooctanoic acid (PFOA)	µg/kg	0.032	J+	0.049	J	0.037	J	0.1		0.055	J+	0.024	J

Notes:
J = Estimated concentration.
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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.

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).

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

	Location ID	AOI02-01		AOI02-02		AOI02-03		AOI02-04		KAASF-01		KAASF-02	
	Sample Name	AOI02-01-SB-34-36		AOI02-02-SB-36-38		AOI02-03-SB-36-38		AOI02-04-SB-36-38		KAASF-01-SB-40-42		KAASF-02-SB-46-48	
	Parent Sample ID												
	Sample Date	4/19/2022		4/18/2022		4/15/2022		4/19/2022		4/11/2022		4/12/2022	
	Depth (ft bgs)	34-36		36-38		36-38		36-38		40-42		46-48	
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	0.37		0.078	J	ND	UJ	ND	UJ
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	0.092		0.029	J	ND	U	0.55		ND	UJ	ND	UJ
Perfluorononanoic acid (PFNA)	µg/kg	ND	UJ	0.047	J	ND	U	ND	U	ND	UJ	ND	UJ
Perfluorooctanesulfonic acid (PFOS)	µg/kg	0.5	J+	0.74	J+	ND	U	0.89	J+	ND	UJ	0.38	J
Perfluorooctanoic acid (PFOA)	µg/kg	0.12	J+	ND	U	ND	U	0.64	J+	ND	UJ	ND	UJ

Notes:
J = Estimated concentration.
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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.

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).

Table 6-5. PFOA, PFOS, PFNA, and PFHxS Results in Groundwater, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI01-01		AOI01-02		AOI01-02		AOI01-03		AOI01-04		AOI01-MW11		AOI02-01		AOI02-02	
		Sample Name	AOI01-01-GW		AOI01-02-GW		KAASF-DUP-GW-01		AOI01-03-GW		AOI01-04-GW		AOI01-MW11-GW		AOI02-01-GW		AOI02-02-GW	
		Parent Sample ID					AOI01-02-GW											
		Sample Date	5/5/2022		5/4/2022		5/4/2022		5/4/2022		5/5/2022		5/5/2022		5/2/2022		5/2/2022	
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	6.6	J	480	J	530	J	8	J	4.8	J	ND	UJ	3.4		11	
Perfluorohexanesulfonic acid (PFHxS)	39	ng/L	50	J	7100	J	6700	J	64	J	14	J	36	J	32		65	
Perfluorononanoic acid (PFNA)	6	ng/L	0.99	J	35	J	34	J	2.3	J	0.9	J	ND	UJ	1.2	J	19	
Perfluorooctanesulfonic acid (PFOS)	4	ng/L	25	J	5700	J	6900	J	50	J	16	J	200	J	22		120	
Perfluorooctanoic acid (PFOA)	6	ng/L	52	J	740	J	710	J	55	J	18	J	36	J	17		48	

Notes:
J = Estimated concentration.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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.
Qual = Qualifier.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).

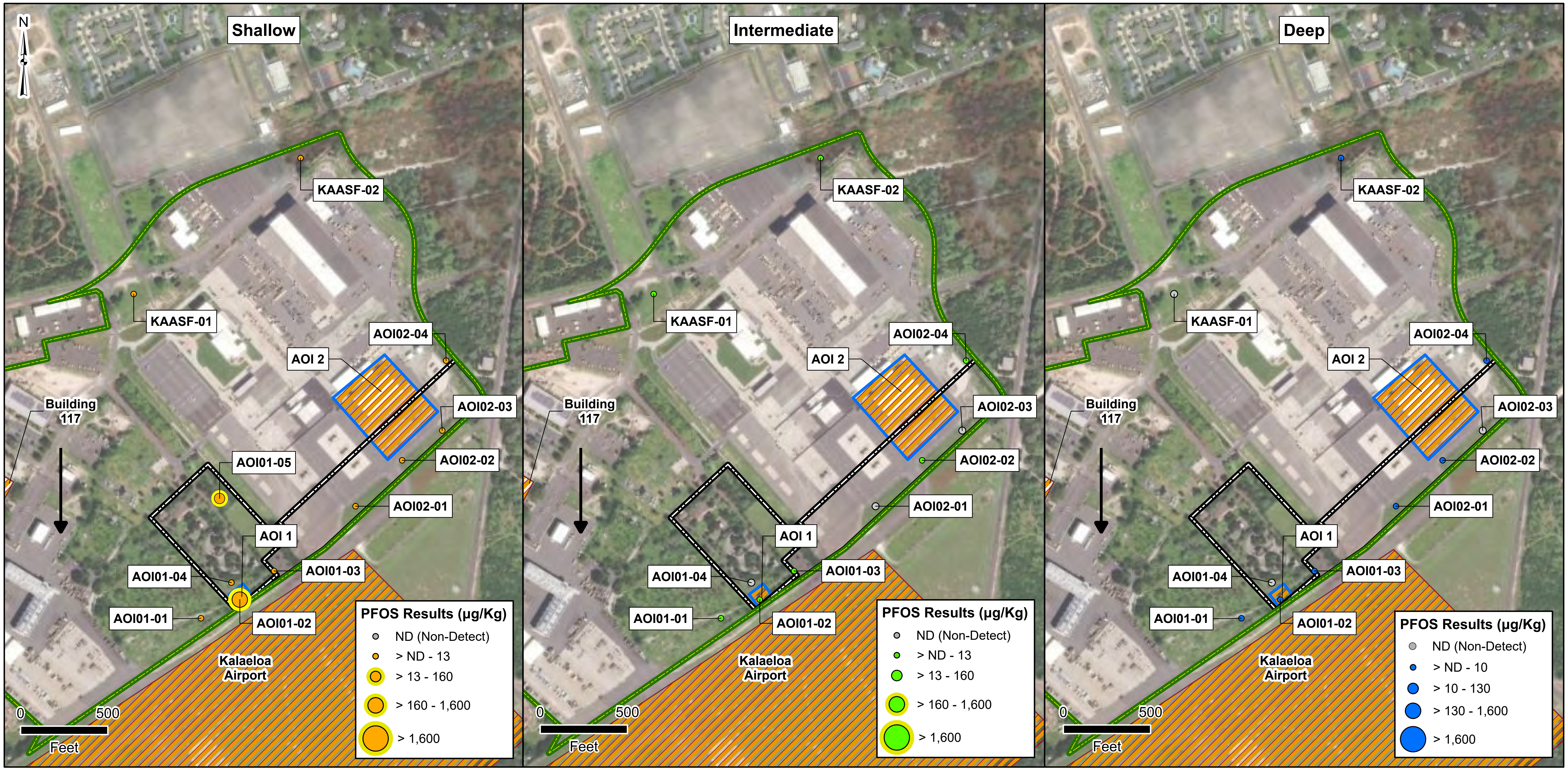
Table 6-5. PFOA, PFOS, PFNA, and PFHxS Results in Groundwater, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI02-03		AOI02-04		AOI02-04		KAASF-01		KAASF-02		Source-1		Source-2	
		Sample Name	AOI02-03-GW		AOI02-04-GW		KAASF-DUP-GW-02		KAASF-01-GW		KAASF-02-GW		Source 1-18		Source 2-18	
		Parent Sample ID					AOI02-04-GW									
		Sample Date	5/3/2022		5/5/2022		5/5/2022		4/29/2022		5/4/2022		11/18/2021		11/18/2021	
Analyte	**Screening Level[1]**	**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 (ng/L)																
Perfluorobutanesulfonic acid (PFBS)	601	ng/L	200		13	J	12	J	6.4		0.38	J	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	39	ng/L	29		140	J	130	J	8.8		0.61	J	ND	U	ND	U
Perfluorononanoic acid (PFNA)	6	ng/L	ND	U	1.5	J	1.6	J	0.75	J	ND	UJ	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	4	ng/L	13	J	51	J	51	J	8.1		4.6	J	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	6	ng/L	22		140	J	150	J	7		1.8	J	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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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.
Qual = Qualifier.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).

Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 6-1
AOI 1 and AOI 2
PFOS Detections in Soil



Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOS = Perfluorooctanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....................November 2023
Prepared By:..............................EA
Prepared For:...................USACE
Projection:.......WGS 84 UTM 4N

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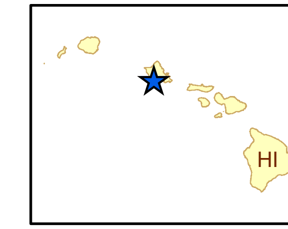
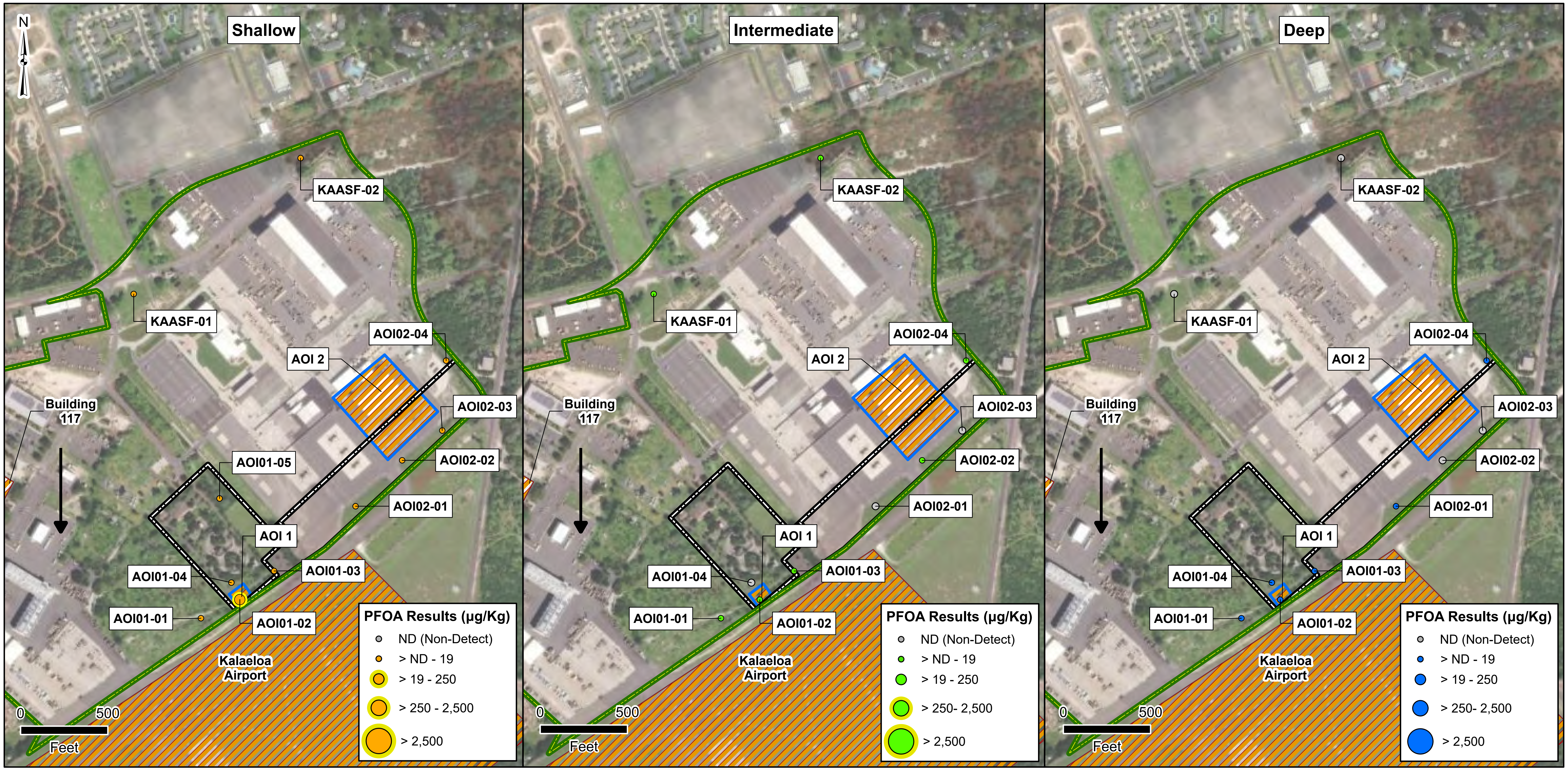
Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 6-2
AOI 1 and AOI 2
PFOA Detections in Soil





Facility Data

- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology

- Groundwater Flow Direction

Notes:
PFOA = Perfluorooctanoic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....................November 2023
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 4N

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Army National Guard Site Inspections
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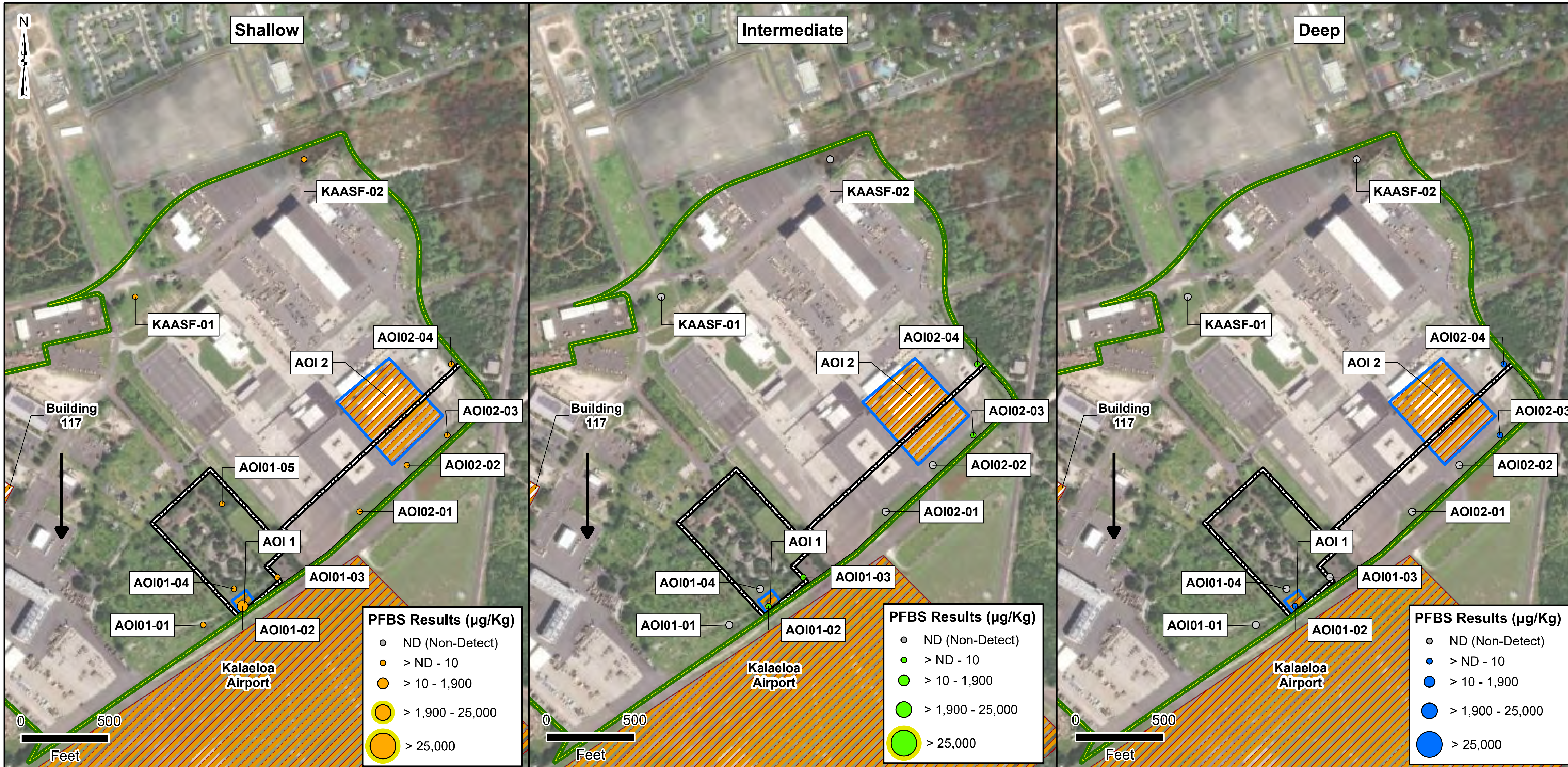
Kalaeloa AASF #1-JRF, Hawaii

Figure 6-3
AOI 1 and AOI 2
PFBS Detections in Soil



Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology
- Groundwater Flow Direction

Notes:
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:....................November 2023
Prepared By:..........................EA
Prepared For:..................USACE
Projection:........WGS 84 UTM 4N

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Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

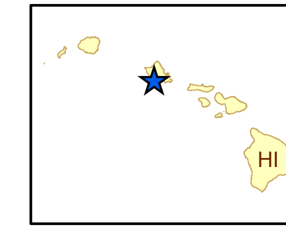
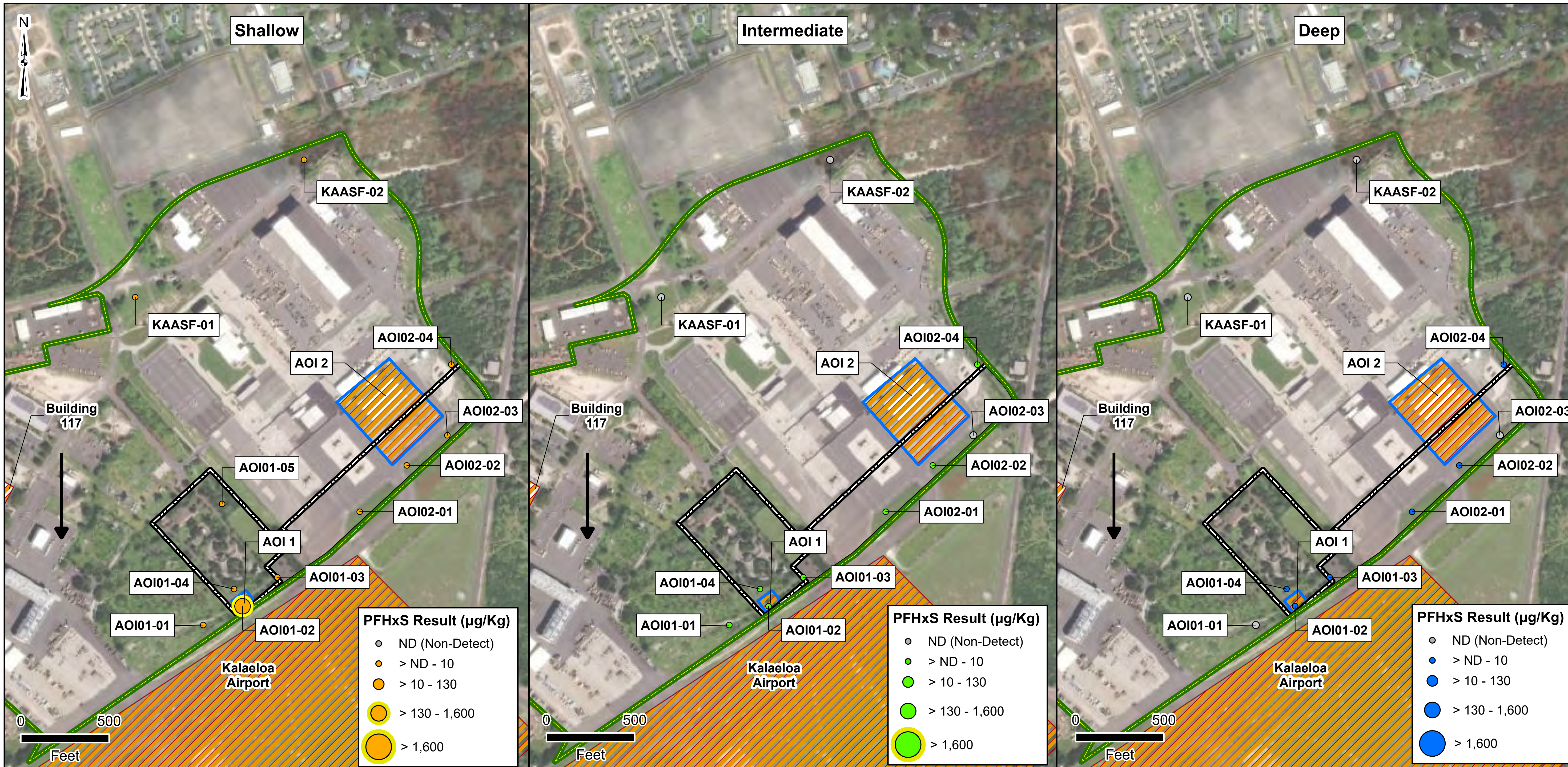


Figure 6-4
AOI 1 and AOI 2
PFHxS Detections in Soil



Facility Data

- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology

- Groundwater Flow Direction

Notes:
PFHxS = Perfluorohexanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:....................November 2023
Prepared By:............................EA
Prepared For:...................USACE
Projection:........WGS 84 UTM 4N

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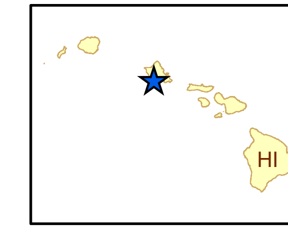
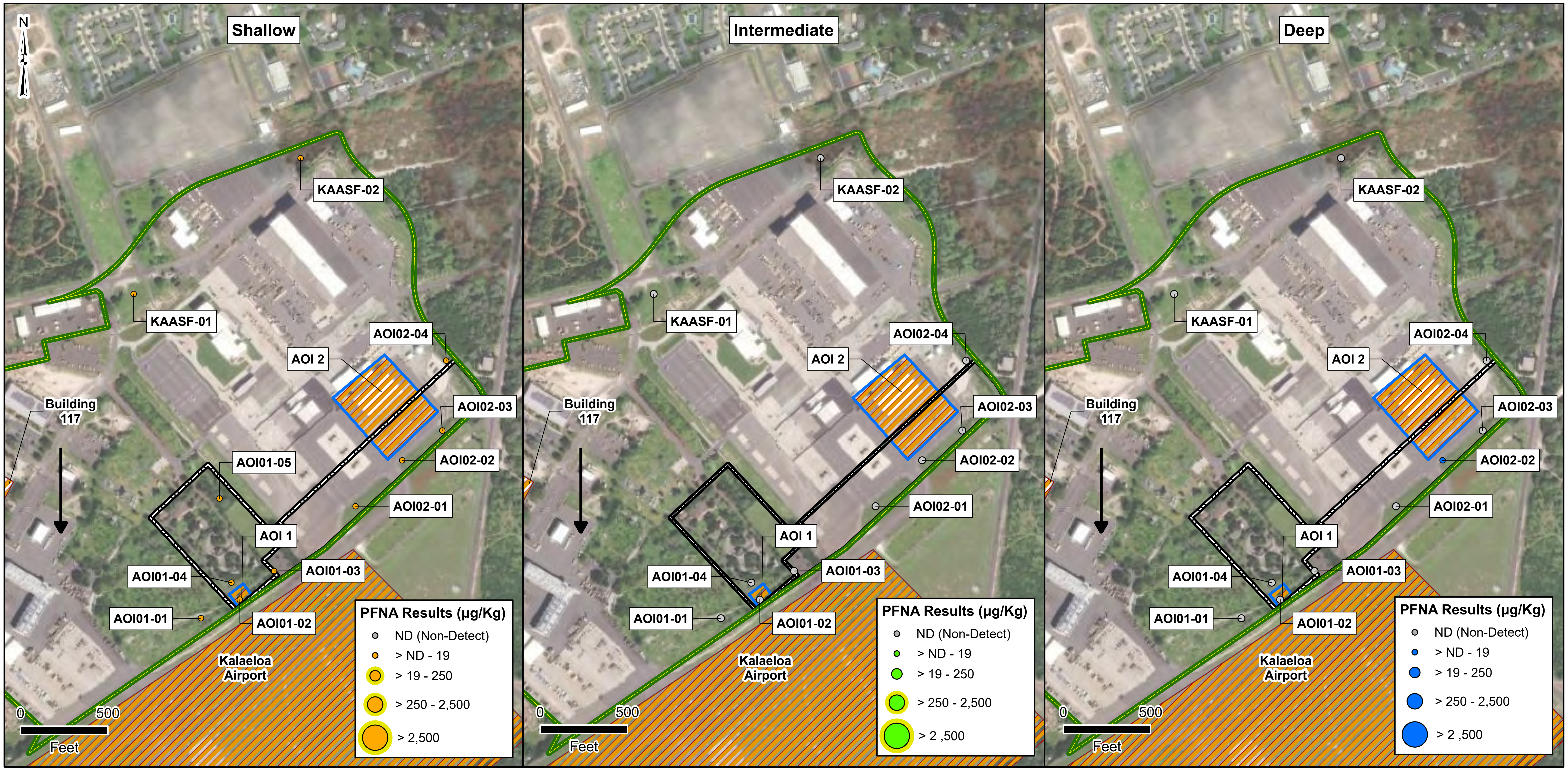
Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 6-5
AOI 1 and AOI 2
PFNA Detections in Soil





Facility Data

- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology

- Groundwater Flow Direction

Notes:
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:......................November 2023
Prepared By:..............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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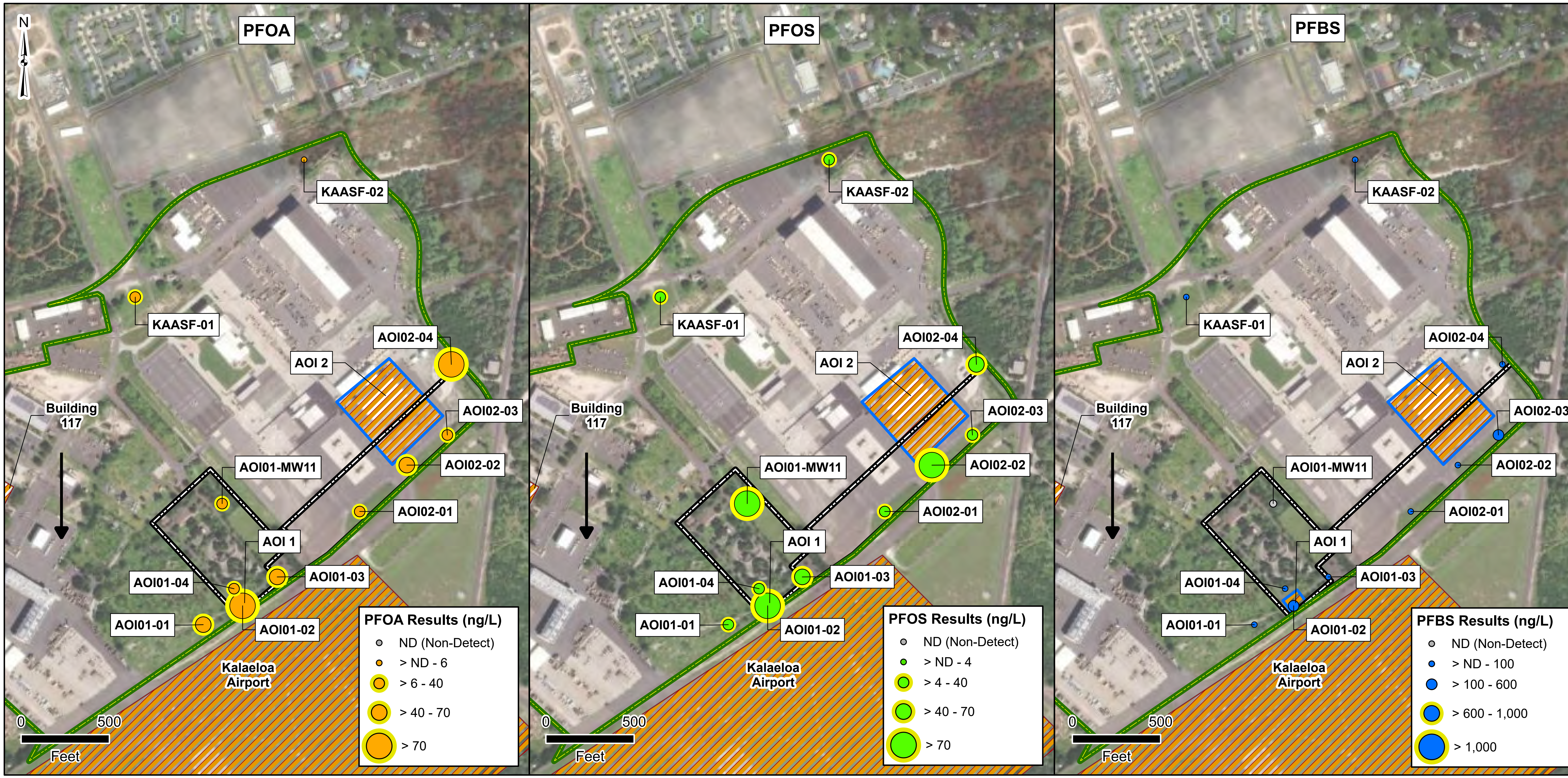
Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 6-6
AOI 1 and AOI 2
PFOA, PFOS and PFBS Detections in Groundwater



Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology
- Groundwater Flow Direction

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

Data Sources:
ESRI 2022
AECOM 2019

Date:....................November 2023
Prepared By:..............................EA
Prepared For:....................USACE
Projection:........WGS 84 UTM 4N

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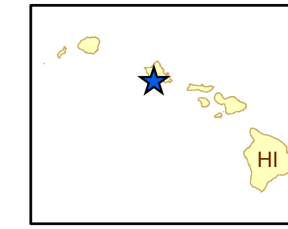
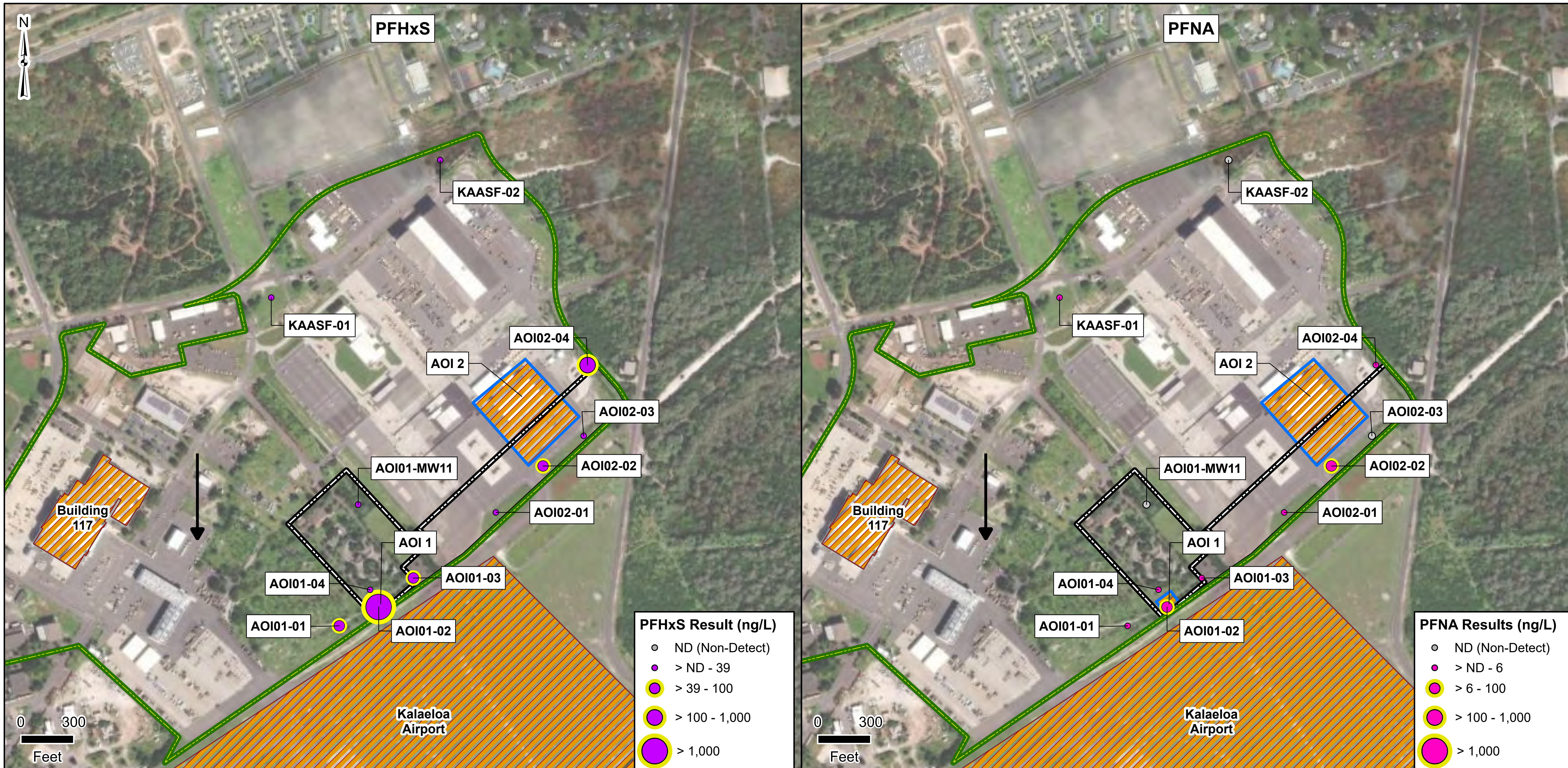
Army National Guard Site Inspections
Site Inspection Report
Kalaeloa AASF #1-JRF, Hawaii

Figure 6-7
AOI 1 and AOI 2
PFHxS and PFNA Detections in Groundwater





Facility Data
- Facility Boundary
- Leased Parcels
- Area of Interest
- Potential Release Area

Hydrogeology
- Groundwater Flow Direction

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:.....................November 2023
Prepared By:............................EA
Prepared For:...................USACE
Projection:.......WGS 84 UTM 4N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Kalaeloa\KalaeloaSI.aprx

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7. EXPOSURE PATHWAYS

The conceptual site model (CSM) for the AOIs, revised based on the SI findings, are 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 and whether the release is more than likely attributable to the DoD. 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. SLs are presented in Section 6.1 of this report.

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 CSMs indicate whether potentially complete exposure pathways may exist, the recommendation for future study in a remedial investigation (RI) or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs and whether the release came from DoD activities.

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 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 each AOI based on the aforementioned criteria.

7.1.1 AOI 1

On 12 October 2017, an HDOT-A Kalaeloa ARFF Unit discharged the contents of a firetruck's water tank, containing 25 gallons of 1.6% Chemguard C301MS AFFF mixed with water, during pump testing/repair along the fence line at AOI 1. The site is covered with low grass and shrubs and there have been no documented releases in this area by the HIARNG.

All five relevant compounds were detected in surface soil at AOI 1. PFOS, PFOA, and PFHxS were detected above SLs in surface soil at two locations, AOI01-01 and AOI01-02. Site workers, construction workers, and trespassers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for site workers, future construction workers, and trespassers is considered potentially complete. PFOA, PFOS, PFHxS, and PFBS were detected below their respective SLs in subsurface soil between 13-15ft bgs. Ground disturbing activities could result in future construction worker exposure. Therefore, the soil exposure pathway for future construction workers is considered potentially complete. The CSM is presented in **Figure 7-1**.

7.1.2 AOI 2

AOI 2 encompasses the hangar at Kalaeloa AASF #1-JRF, which includes an AFFF suppression system and storage as well as the northern Facility boundary. There have been no documented releases of AFFF at AOI 2, however the potential exists for the incidental release of stored material.

All five relevant compounds were detected in soil at AOI 2. None were detected above SLs. Site workers, construction workers, and trespassers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for site workers, future construction workers, and trespassers is potentially complete. PFOA, PFOS, PFHxS, and PFBS were detected in subsurface soil at AOI 2 and the boundary sample locations below their respective SLs. Ground disturbing activities to this area could result in future construction worker exposure via incidental ingestion. Therefore, the soil exposure pathway for future construction workers is considered potentially complete. The CSM is presented in **Figure 7-2**.

7.2 GROUNDWATER EXPOSURE PATHWAY

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

7.2.1 AOI 1

Drinking water at Kalaeloa AASF #1-JRF is resourced from public drinking water wells. No drinking water wells exist at the Facility, and no private supply wells exist downgradient. Groundwater in the upper, unconfined aquifer is not used for drinking water purposes due to the salinity levels and high vulnerability to contamination (AECOM 2020).

Groundwater was encountered at depths between approximately 34 to 36 ft bgs in the area of AOI 1. As such, groundwater is not considered a complete pathway via drinking water ingestion for any receptor nor via incidental ingestion during excavation activities by construction workers. The CSM is presented in **Figure 7-1**.

7.2.2 AOI 2

As noted above, no drinking water wells exist at the Facility, and no private supply wells exist downgradient. Groundwater was encountered at depths between approximately 36 to 38 ft bgs in the area of AOI 2. As such, groundwater is not considered a complete pathway via drinking water ingestion for any receptor nor via incidental ingestion during excavation activities by construction workers. The CSM is presented in **Figure 7-2**.

7.3 SURFACE WATER AND SEDIMENT EXPOSURE PATHWAY

PFAS are water soluble and can migrate readily from soil to surface water or groundwater. There are no natural surface water features within the Facility, and surface water and potentially sediment drain into shallow injection wells located around the Facility. These wells are below the UIC line and are not considered a drinking water source. Therefore, the surface water/sediment pathway is considered incomplete. Refer to **Figures 7-1 and 7-2.**

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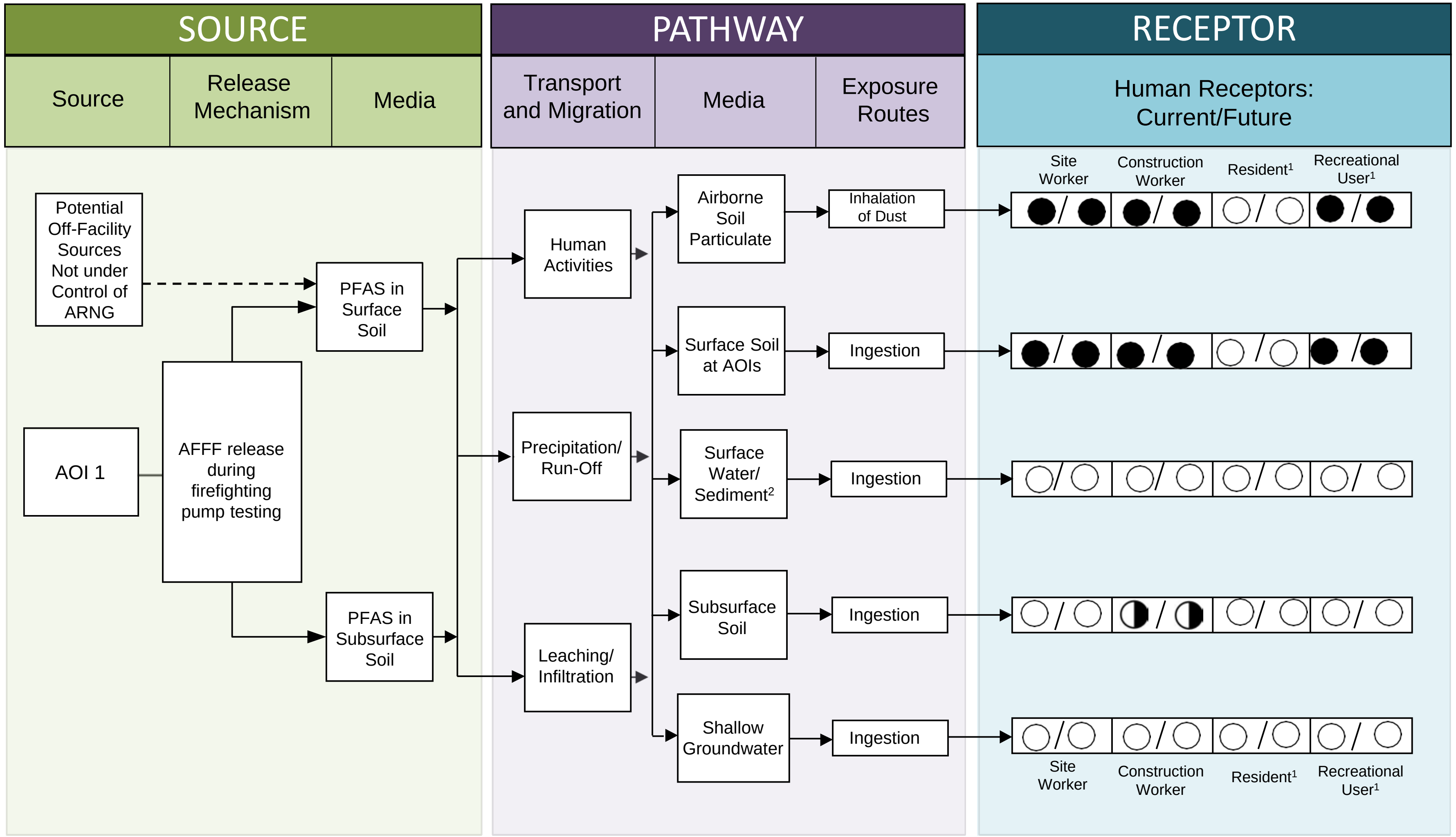

LEGEND

Flow Chart Stops
Flow Chart Continues
Partial/ Possible Flow
Incomplete Pathway
Partially 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
AOI 1 Kalaeloa AASF #1-JRF

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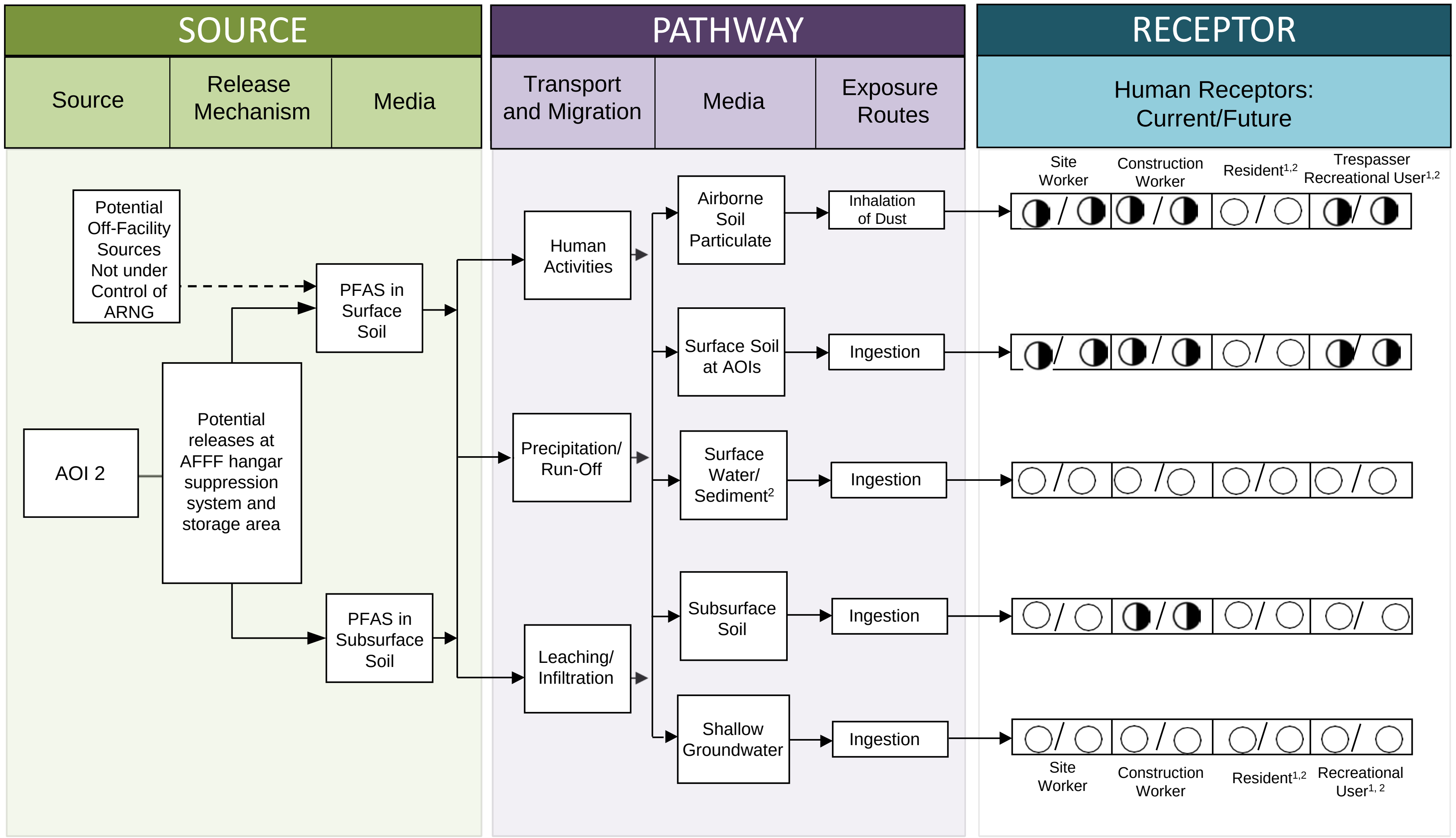

LEGEND

- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Complete Pathway

Notes:

1. The resident and recreational users refer to off-site receptors.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 7-2
Conceptual Site Model
AOI 2 Kalaeloa AASF #1-JRF, HI

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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 on 25 March through 5 May 2022. The SI field activities included geophysical surveys, soil sample collection, permanent monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2022), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA 2022), 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:

- Thirty-one (31) soil sample from 11 locations (10 soil borings locations, one in the vicinity of an existing monitoring well location)

- Eleven (11) grab groundwater samples from well locations

- Twenty-six (26) QA/QC 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 AOIs 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 no further action is required. Additionally, the CSMs were refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOIs, which are described in **Section 7**.

8.2 OUTCOME

Based on the results of this SI, further evaluation under CERCLA is warranted in an RI for AOI 2 (see **Table 8-1**). Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to site workers, construction workers, and trespassers at AOI 2 from sources on the Facility resulting from historical DOD activities.

There is also a potential for exposure to site workers, construction workers, and trespassers at AOI 1 from AFFF releases during HDOT firefighting training activities. However, at no point during either the PA or the SI was there any evidence that the relevant compounds at AOI 1 were the result of current or historical ARNG/DoD activities.

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, PFBS, PFNA, and PFHxS were detected in the five soil boring/hand auger locations at AOI 1. PFOA and PFHxS exceeded the SLs at one location with maximum concentrations of 100 µg/kg (110 µg/kg in duplicate sample) and 340 µg/kg (360 µg/kg in duplicate sample), respectively. PFOS exceeded the SL at two locations with a maximum concentration of 1,500 µg/kg. PFBS and PFNA did not exceed the SL in any sample.
  - PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in groundwater from the five monitoring wells at AOI 1. PFOS and PFOA exceeded the SL in groundwater in all five wells with maximum concentrations of 5,700 ng/L (6,900 ng/L in duplicate sample) and 740 ng/L, respectively. PFNA exceeded the SL in groundwater in one of five wells with a maximum concentration of 35 ng/L. PFHxS exceeded the SL in groundwater in three of five wells with a maximum concentration of 7,100 ng/L. PFBS did not exceed the SL in any sample. There is no evidence that any of the relevant compounds at AOI 1 were the result of current or historical ARNG/DoD activities; therefore, no Further Action under CERCLA is warranted.
- AOI 2:
  - PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in soil at AOI 2 at source locations at concentrations below the SLs. PFOA and PFOS were detected below their respective SLs in the two boundary sample locations, KAASF-01 and KAASF-02, as well.
  - PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in groundwater from the four monitoring wells associated with the source area at AOI 2 as well as the two boundary locations, KAASF-01 and KAASF-02. PFOS and PFOA exceeded the SLs in groundwater in all four source area wells with maximum concentrations of 140 ng/L and 120 ng/L, respectively. PFOA exceeded the SL in boundary well KAASF-01 with a concentration of 7 ng/L. PFOS exceeded the SL in both boundary well locations with concentrations of 8.1 and 4.6 ng/L in KAASF-01 and KAASF-02, respectively. PFNA exceeded the SL in groundwater in one of four wells with a maximum concentration of 19 ng/L. PFHxS exceeded the SL in groundwater in two of four wells with a maximum concentration of 140 ng/L. PFBS did not exceed the SL in any sample. Based on the results of the SI, further evaluation of AOI 2 is warranted in the RI.

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 Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	**Former Fuel Farm Area**	●	●	●	**No further action under CERCLA**
2	**Hangar Suppression and Storage**	◐	●	●	**Proceed to RI**

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

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Appendix A

Data Usability Assessment and Data Validation Reports

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DATA USABILITY ASSESSMENT

The Data Usability Assessment 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 data quality objectives (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.

Data quality indicators (DQIs) (precision, accuracy, representativeness, comparability, completeness, and sensitivity) are important components in assessing data usability. These DQIs are evaluated in the subsequent sections. The results of the evaluation demonstrate that the data presented in this site inspection (SI) report are of high quality overall. Although most of the SI data are considered reliable, some degree of uncertainty can be associated with the data collected. Specific factors that may contribute to the uncertainty of the data evaluation are described below. The Data Validation Report (**Appendix A**) presents explanations for all qualified data in greater detail.

PRECISION

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision is measured with the field duplicate relative percent differences (RPD). Laboratory precision is measured with RPDs for laboratory duplicates, such as laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs and matrix spike (MS) and matrix spike duplicate (MSD) pairs, and with RPDs or relative standard deviations (RSDs) for laboratory replicate samples.

LCS/LCSD pairs were prepared by addition of known concentrations of each analyte to a matrix-free media known to be free of target analytes. Results for LCS/LCSD pairs met the criterion of RPD≤30%, as specified in the UFP-QAPP Addendum (EA 2022), demonstrating that the analytical system was in control during sample preparation and analysis.

Matrix spike/matrix spike duplicate (MS/MSD) pairs were prepared, analyzed, and reported for each preparation batch for per- and polyfluoroalkyl substances (PFAS) analysis at a rate of 5%. MS/MSD results met the criterion of RPD≤30%, as specified in the QAPP Addendum (EA 2022), demonstrating good analytical precision for the matrix being tested, with the following exception. The RPD for 8:2 fluorotelomer sulfonate (FTS) in the MSD performed on sample KAASF-DUP-SB-02 was 48%. The non-detect 8:2 FTS results from this field duplicate and its associated primary sample were UJ qualified and are usable as qualified.

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were within the project established precision limits presented in the UFP-QAPP Addendum (50% for solid samples, 30% for water samples) (EA 2022) or differences were less than the average limit of quantitation (LOQ), indicating acceptable sampling and analytical precision, with the following exceptions. The RPD for perfluorohexanoic acid (PFHxA) in parent sample AOI01-02-GW and its duplicate KAASF-DUP-GW-01 was 35%. The PFHxA results for the parent and duplicate were J qualified and are usable as qualified.

Laboratory triplicates for two samples were analyzed. The RSDs were within the precision limit of 20% presented in the UFP-QAPP Addendum, with the following exceptions. The RSDs for perfluorooctanesulfonic acid (PFOS) and 6:2 FTS in the triplicate laboratory analysis of sample AOI01-01-SB-32-34 were 28% and 27% respectively. The detected results for PFOS and 6:2 FTS in this sample were J qualified.

ACCURACY

Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Accuracy is measured through percent recoveries in calibration verification samples, LCS/LCSD, and MS/MSD, and through extraction internal standards (EIS).

LCS/LCSD samples were prepared by addition of known concentrations of each analyte to a matrix-free media known to be free of target analytes. LCS/LCSD samples were analyzed for each analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis, with the following exceptions. 4:2 FTS recoveries were high in one LCS and one LCSD. Because the LCS and LCSD indicated positive bias and 6:2 FTS was not detected in the 10 associated samples, no data qualifying action was required.

MS/MSDs were performed on soil samples AOI02-03-SB-36-38 and KAASF-DUP-SB-02 and groundwater sample AOI02-04-GW. Analyte recoveries in MS/MSD samples demonstrated that the analytical system was in control for both soil and water, with the following exceptions. Perfluoropentanoic acid (PFPeA) had a recovery below acceptance limits in the MS performed on sample AOI02-03-SB-36-38, and 8:2 FTS had a recovery below acceptance limits in the MSD performed on sample KAASF-DUP-SB-02. Results for these analytes in the parent samples were UJ or J- qualified and are usable as qualified.

EIS were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Several field samples displayed EIS area counts less than the lower quality control (QC) limit of 50%. Sixty-seven positive field sample results were associated with EIS recoveries less than the QC limit, but greater than 20%, and were qualified "J" or "J+"; these qualified results are considered usable as estimated values with a positive bias. Fourteen positive field sample results were associated with EIS recoveries greater than the QC limit and were qualified "J-;" these qualified results are considered usable as estimated values with a negative bias. One hundred and fourteen (114) non-detect field sample results associated with EIS recoveries less than the QC limit, but greater than 20%, were qualified UJ; these qualified results are also considered usable. One hundred and twenty-six

(126) results were associated with EIS recoveries less than 20%, and were qualified "X" by the validator, indicating that these results needed further evaluation during the data usability assessment. No results for perfluorooctanoic acid (PFOA), PFOS, perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), or perfluorohexanesulfonic acid (PFHxS) were X qualified. The project team has determined that results qualified "X" due to very low EIS recoveries are usable for project purposes and these results were UJ qualified.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. All calibration verifications were within the project established precision limits presented in the UFP-QAPP Addendum (EA 2022).

Transition ion ratios were outside the QSM-specified limits for one soil result, which was qualified J+ due to a low EIS recovery. This result is usable as qualified.

REPRESENTATIVENESS

Representativeness qualitatively expresses the degree to which data accurately reflect site conditions. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences. Three sample delivery groups (SDGs) had temperatures exceeding the upper limit of 6 degrees Celsius (°C) when they were received at the laboratory. Results for 15 samples that were received at elevated temperature were J or UJ qualified; however, the reported temperatures of 9.6 to 12.2°C during shipping do not impact the usability of the data.

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with QSM Version 5.3 Table B-15, including the specific preparation requirements (i.e. ENVI-Carb or equivalent used), mass calibration, spectra, all the ion transitions identified in Table B-15 were monitored, standards that contained both branch and linear isomers when available were used, and isotopically labeled standards were used for quantitation. The laboratory used approved standard methods in accordance with the UFP-QAPP Addendum (EA 2022) for all analyses.

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% and MS/MSD samples were collected at a rate of 5%. Appropriate preservation techniques were followed by the field staff, and maximum holding times for extraction and analysis were met by the laboratory.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Instrument blanks and method blanks were non-detect for all target analytes, with the following exception. Total organic carbon (TOC) was detected in one method blank; the TOC result in the associated sample was more than ten times the blank detection, and the usability of the data is not impacted.

Equipment blanks (EBs) and field blanks (FBs) were also collected for groundwater and soil samples. PFOA was detected in 2 EBs and PFOS was detected in 3 EBs. Perfluorooctanesulfonamide (PFOSA) was detected in multiple EBs and FBs. PFBA was detected in 2 EBs and 3 FBs. PFHxA was detected in 4 EBs. PFPeA was detected in 1 EB and 1 FB. One detection of PFBA, one detection of PFOSA, four detections of PFPeA, eight detections of PFOA, 13 detections of PFOS, and 19 detections of PFHxA in associated field samples were less than five times the concentration detected in the blank, but greater than the LOQ, and were qualified J+. These qualified results are considered usable as estimated values with a positive bias. Eight detections of PFOSA, one detection of PFPeA, two detections of PFOA, three detections of PFOS, and two detections of PFHxA in associated field samples that were less than the limit of detection were qualified as U; for three of these results, the final qualifier is UJ, due to low EIS recovery. These results are usable as qualified and treated as non-detects. Non-detects and detections that were greater than five times the concentration detected in the blank were not qualified.

COMPARABILITY

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows and reflects the exclusion of "R" flagged data:

- PFAS in groundwater by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at 100%
- PFAS in soil by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at 100%
- pH in soil by EPA Method 9045D at 100%
- TOC by EPA Method 9060 at 100%.

SENSITIVITY

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a detection limit study, and calibration standards at the LOQ. In order to meet the needs of the data users, project data must meet the measurement performance criteria for sensitivity and project LOQs specified in the UFP-QAPP Addendum (EA 2022). The laboratory provided applicable calibration standards at the LOQ and reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the detection limit were reported and qualified "J" as estimated values by the laboratory.

DATA USABILITY SUMMARY

Overall, the data are usable for evaluating the presence or absence of PFAS at the Facility. Sufficient usable data were obtained to meet the objectives of the SI and to complete the comparison to risk-based screening levels.

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Data Validation Report

Kalaeloa Army Aviation Support Facility #1-JRF
Oahu, Hawaii
Project # 3031200026.3000.****

Prepared for:

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

7/26/2022

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List of Tables

List of Acronyms

°C	degrees Celsius
%	percent
ARNG	Army National Guard
CCV	continuing calibration verification
COC	chain of custody
DoD	Department of Defense
EA	EA Engineering, Science, and Technology, Inc., PBC
EIS	extracted internal standard
EPA	United States Environmental Protection Agency
Eurofins	Eurofins Environment Testing America
Eurofins - Sacramento	Eurofins Environment Testing America – Sacramento
FOSA	perfluorooctanesulfonamide
FTS	fluorotelomer sulfonic acid
g	grams
ICAL	initial calibration
ICV	initial calibration verification
ID	identification
ISC	instrument sensitivity check
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
mL	milliliters
MS	matrix spike
MSD	matrix spike duplicate
NEtFOSAA	ethyl perfluorooctanesulfonamidoacetic acid
ng/g	nanograms per gram
ng/L	nanograms per liter
NMeFOSAA	methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFDA	perfluorodecanoic acid
PFDoDA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid

PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFPeA	perfluoropentanoic acid
PFUnA	perfluoroundecanoic acid
QAPP	quality assurance project plan
QC	quality control
QSM	Quality Systems Manual for Environmental Laboratories
RPD	relative percent difference
RSD	relative standard deviation
TOC	total organic carbon
UFP	Uniform Federal Policy
Wood	Wood Environment & Infrastructure, Solutions, Inc.

1.0 Introduction

EA Engineering, Science, and Technology, Inc., PBC (EA) collected 65 samples (including 35 soil samples, 11 aqueous samples, 6 field duplicates, 12 equipment blanks, and 5 field blanks) between 11 April and 5 May 2022 and submitted samples to Eurofins Environment Testing America (Eurofins), located in Lancaster, Pennsylvania, where the samples were received between 18 and 25 April 2022, and to Eurofins Environment Testing America – Sacramento (Eurofins – Sacramento), located in West Sacramento, California, where the samples were received between 3 and 5 May 2022. Samples were assigned to sample delivery groups (SDGs) 410-80504-1, 410-80506-1, 410-80815-1, 410-81297-1, 410-81415-1, 410-81416-1, 410-81417-1, 410-81418-1, 320-87446-1, and 320-87779-1. Eurofins and Eurofins Sacramento analyzed the samples for per- and polyfluoroalkyl substances (PFAS) by liquid chromatography tandem mass spectrometry compliant with Table B-15 of the Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3, total organic carbon (TOC) by United States Environmental Protection Agency (EPA) method 9060A, pH by EPA Method 9045D, and/or grain size by ASTM International method D422. The field sample identifications (IDs), collection dates and times, and laboratory sample IDs are presented in Table 1.

2.0 Data Validation Methodology

Wood Environment & Infrastructure Solutions, Inc. (Wood) performed DoD Stage 2B validation with review of the manual integration on PFAS data from the samples. The Stage 2B validation includes review of sample and instrument quality control (QC) results in the laboratory's analytical report and reported on QC summary forms, without review or validation of the raw analytical data. Grain size, pH, and TOC data were not validated. This data validation has been performed in accordance with:

- EA, 2020. Final Programmatic Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP), Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, Army National Guard (ARNG) Installations, Nationwide, December.
- EA, 2021. Draft Final UFP QAPP Addendum, Kalaeloa Army Aviation Support Facility #1-JRF, Oahu, Hawaii. November.
- DoD, 2019a. DoD QSM, Version 5.3. May.
- DoD, 2019b. General Data Validation Guidelines, Revision 1. November.
- DoD, 2020a. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15. May.

The laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Laboratory case narrative review;
- Chain of custody (COC) compliance;
- Holding time compliance;
- QC sample frequency;

- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification (CCV) compliance with method specified criteria;
- Presence or absence of laboratory contamination as demonstrated by laboratory blanks;
- Accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control sample (LCS), and matrix spike (MS) samples;
- Internal standard recoveries;
- Analytical precision as relative percent difference (RPD) of analyte concentration between LCS/LCS duplicate (LCSD), laboratory duplicates, or MS/MS duplicate (MSD);
- Sampling and analytical precision as RPD of analyte concentration between primary samples and field duplicates;
- Assessment of field contamination as demonstrated by equipment and field blanks; and
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all QC audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 Explanation of Data Quality Indicators

Summary explanations of the specific data quality indicators reviewed during this data quality review are presented below.

3.1 Laboratory Control Sample Accuracy and Precision

LCSs and LCSDs are aliquots of analyte free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples they accompany. LCS recovery and precision are an indication of a laboratory's ability to successfully perform an analytical method in an interference free matrix.

3.2 Matrix Spike Accuracy and Precision

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

3.3 Blank Detections

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Equipment blanks are prepared by passing analyte free water through or over sample collection equipment and collecting the water in sample containers. Equipment blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

Field blanks are prepared by pouring an aliquot of analyte free water into a sample container in the field. Field blanks are analyzed for the analytical suite required for the project. Field blanks are used to monitor for possible sample contamination originating from the water used for equipment decontamination.

Laboratory blanks are processed by the laboratory using the same procedures as the field samples.

3.4 Laboratory and Field Duplicate Precision

Laboratory and field duplicate analyses verify acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.

4.0 Definitions of Qualifiers that May be Used During Data Validation

The qualifiers used in the text are the qualifiers applied for each individual QC issue and may not reflect the final qualifiers applied to the data.

J The reported result is an estimated quantity with an unknown bias.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

U The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.

UJ The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.

X The sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

5.0 Qualification Reason Codes

Wood applied the following reason codes to the data during validation:

CFD Imprecision between replicate analyses.

EBG The analyte was detected in the associated equipment blank and the concentration detected in the sample was greater than the limit of quantitation (LOQ) and less than five times the concentration detected in the blank.

EBL The analyte was detected in the associated equipment blank and the concentration detected in the sample was less than the LOD or LOQ.

EMPC The ion transition ratio is outside of expected limits.

FBG The analyte was detected in the associated field blank and the concentration detected in the sample was greater than the LOQ and less than five times the concentration detected in the blank.

FDD Imprecision between primary and field duplicate results.

ISH High extracted internal standard (EIS) recovery.

ISL Low EIS recovery.

TH8 Elevated sample receipt temperature.

TR The detected concentration is less than the LOQ.

6.0 Chain of Custody and Sample Receipt Condition Documentation

The sample was received at the laboratory under proper COC, intact, properly preserved, and at temperatures within the QAPP-specified temperature range of 2 to 6 degrees Celsius (°C), with the following exceptions:

- According to the case narrative, samples KAASF-02-SB-01-02, KAASF-02-SB-13-15, and KAASF-02-SB-46-48 arrived at the laboratory with an elevated temperature of 12.2°C and with standing water present in the cooler. Per DoD data validation guidelines, Wood J qualified the detected and UJ qualified the non-detect results from these samples due to the elevated sample receipt temperature. (Qualifier and reason code: J/UJ, TH8)
- According to the case narrative, samples KAASF-01-SB-0TO2, KAASF-01-SB-13-15, and KAASF-01-SB-40-42 arrived at the laboratory with an elevated temperature of 11.5°C and with standing water present in the cooler. Per DoD data validation guidelines, Wood J qualified the detected and UJ qualified the non-detect results from these samples due to elevated sample receipt temperature. (Qualifier and reason code: J/UJ, TH8)
- According to the case narrative, all samples in SDG 320-87779-1 arrived at the laboratory with an elevated temperature of 9.6°C. Per DoD data validation guidelines, Wood J qualified the detected and UJ qualified the non-detect results from these samples due to elevated sample receipt temperature. (Qualifier and reason code: J/UJ, TH8)
- According to the case narrative, all samples in SDG 320-87446-1 arrived at the laboratory with temperatures less than the QAPP-specified minimum of 2°C. There is no evidence that the samples were frozen or otherwise compromised and in accordance with the DoD data validation guidelines, no data were qualified based on the low sample receipt temperature.

7.0 Specific Data Validation Findings

Data validation findings are presented in Sections 7.1 through 8.0.

7.1 Per- and Polyfluoroalkyl Substances Analysis

PFAS results generated by Eurofins may be considered usable with the limitations summarized in Sections 7.1 through 8.0.

7.1.1 Holding Time Compliance

The samples were extracted for PFAS within the QAPP-specified maximum holding time of 14 days from sample collection for water samples or 28 days from collection for soil samples and the extracts were analyzed within the QAPP-specified maximum hold time of 28 days from extraction.

7.1.2 Initial Calibration Compliance

The ICAL associated with the analysis of these samples met the QAPP-specified criteria of the calibration standards calculating to 70 to 130 percent (%) of their true concentrations and either correlation coefficients greater than or equal to 0.99 or relative standard deviations of the response factors less than or equal to 20%.

7.1.3 Initial Calibration Verification Accuracy

ICV recoveries were within the QAPP-specified 70% to 130% limits.

7.1.4 Instrument Sensitivity Check Standard Accuracy

Instrument sensitivity check (ISC) recoveries were within the QSM-specified 70 to 130% limits and samples were analyzed no more than 12 hours after a reported ISC.

7.1.5 Continuing Calibration Verification Accuracy

CCV recoveries were within the QAPP-specified 70 to 130% limits.

7.1.6 Laboratory Blank Detections

PFAS were not detected in the laboratory blanks associated with the samples reviewed in this report.

7.1.7 Equipment and Field Blank Detections

Wood used the following equation to assess the detections in the aqueous equipment blank against detections in the associated solid samples.

$$Concentration\left(\frac{ng}{g}\right) = \frac{Concentration\left(\frac{ng}{L}\right) * 250\ mL * 4\ mL}{1\ mL * 1{,}000\frac{mL}{L} * 1\ g}$$

Where:

ng/g = nanograms per gram

250 mL is a standard aqueous sample volume in milliliters,

4 mL is the standard extract volume for a soil sample,

1 mL is the standard extract volume for a water sample,

1,000 is the conversion from milliliters to liters, and

1 g is the standard soil mass used for extraction in grams.

Target analytes were not detected in the equipment and field blanks associated with the samples reviewed in this report, with the following exceptions:

- Perfluorohexanoic acid (PFHxA) and perfluorooctanesulfonamide (FOSA) were detected at concentrations of 0.53 nanograms per liter (ng/L, equivalent to 0.60 ng/g) and 2.2 ng/L (equivalent to 2.5 ng/g), respectively, in equipment blank KAASF-EB-03, associated with samples AOI02-03-SB-0-2, AOI02-03-SB-13-15, and AOI02-03-SB-36-38. Data limitations are summarized below.
  - Wood J+ qualified the detected PFHxA results from samples AOI02-03-SB-0-2, AOI02-03-SB-13-15 and AOI02-03-SB-36-38 because the concentrations detected in the samples

were greater than the LOQ and less than five times the concentration detected in the blank. (Qualifier and reason code: J+, EBG)

- FOSA was not detected in these samples and data usability is not adversely affected by the blank detection.

- FOSA (6.2 ng/L, equivalent to 7.0 ng/g), PFHxA (0.58 ng/L, equivalent to 0.65 ng/g), perfluorooctanoic acid (PFOA [0.57 ng/L, equivalent to 0.64 ng/g]), and perfluorooctanesulfonic acid (PFOS [0.69 ng/L, equivalent to 0.78 ng/g]) were detected in equipment blank KAASF-EB-05, associated with samples AOI02-01-SB-34-36, AOI02-04-SB-0-2, AOI02-04-SB-13-15, AOI02-04-SB-36-38, and KAASF-DUP-SB-01.
  - Wood J+ qualified the detected PFHxA, PFOA, and PFOS results from samples AOI02-01-SB-34-36, AOI02-04-SB-0-2, AOI02-04-SB-13-15, AOI02-04-SB-36-38, and KAASF-DUP-SB-01 because the concentrations detected in the samples were greater than the LOQ and less than five times the concentrations detected in the blank. (Qualifier and reason code: J+, EBG)
  - Wood U qualified the detected FOSA results from samples AOI02-01-SB-34-36 and AOI02-04-SB-36-38 at the LODs of 0.047 ng/g and 0.053 ng/g, respectively, because the concentrations detected in the samples were less than the LODs. (Qualifier and reason code: U, EBL)
  - FOSA was not detected in the remaining samples and data usability is not adversely affected by the blank detection.
- FOSA was detected at a concentration of 4.1 ng/L (equivalent to 4.6 ng/g) in equipment blank KAASF-EB-06, associated with samples AOI01-02-SB-0-2, AOI01-02-SB-13-15, AOI01-02-SB-32-34, AOI01-03-SB-0-2, AOI01-03-SB-13-15, AOI01-03-SB-34-36, KAASF-DUP-SB-02, and KAASF-DUP-SB-03. Data limitations are summarized below.
  - Wood J+ qualified the detected FOSA results from samples AOI01-02-SB-0-2 and KAASF-DUP-SB-03 because the detected concentrations were greater than the LOQs and less than five times the concentration detected in the blank. (Qualifier and reason code: J+. EBG)
  - Wood U qualified the detected FOSA result from sample AOI01-03-SB-13-15 at the LOQ of 0.063 ng/g because the concentration detected in the sample was greater than the LOD and less than the LOQ. (Qualifier and reason code: U, EBL)
  - Wood U qualified the detected FOSA results from samples AOI01-02-SB-32-34, AOI01-03-SB-34-36, and KAASF-DUP-SB-02 at their respective LODs because the concentrations detected in the samples were either equal to or less than the LODs. (Qualifier and reason code: U, EBL)
  - FOSA not detected in the remaining samples and data usability is not adversely affected by the blank detection.
- FOSA (3.7 ng/L, equivalent to 4.2 ng/g), PFHxA (0.58 ng/L, equivalent to 0.67 ng/g), PFOS (0.96 ng/L, equivalent to 1.1 ng/g), and perfluoropentanoic acid (PFPeA [0.55 ng/L, equivalent to 0.63 ng/g]) were detected in equipment blank KAASF-EB-07, associated with samples AOI01-01-SB-0-2, AOI01-01-SB-13-15, AOI01-01-SB-32-34, AOI01-04-SB-0-2, AOI01-04-SB-13-15, AOI01-04-SB-31-33, AOI01-05-SB-0-2, and KAASF-DUP-SB-04. Data limitations are summarized below.
  - Wood J+ qualified the detected PFHxA and PFOS results from samples AOI01-01-SB-0-2, AOI01-01-SB-13-15, AOI01-01-SB-32-34; the detected PFHxA and PFPeA results from samples

AOI01-04-SB-0-2, AOI01-05-SB-0-2, and KAASF-DUP-SB-04; the detected PFOS result from sample AOI01-04-SB-0-2; and the detected PFPeA result from sample AOI-01-SB-0-2 because the concentrations detected in the samples were greater than the LOQ and less than five times the concentrations detected in the blanks. (Qualifier and reason code: J+, EBG)

- Wood U qualified the detected PFHxA and PFOS results from sample AOI01-04-SB-31-33 at the LOQ of 0.064 ng/g because the concentrations detected in the sample were greater than the LODs and less than the LOQs. (Qualifier and reason code: U, EBL)
- Wood U qualified the detected FOSA result from sample AOI01-01-SB-0-2; the detected PFHxA and PFOS results from sample AOI01-04-SB-13-15; and the detected PFPeA result from sample AOI01-01-SB-13-15 at their respective LODs because the concentrations detected in the samples were less than the LODs. (Qualifier and reason code: U, EBL)
- FOSA and PFPeA were not detected in the remaining samples; and PFOS was detected in the remaining samples at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.

- FOSA (7.5 ng/L, equivalent to 8.1 ng/g), PFHxA (0.70 ng/L, equivalent to 0.75 ng/g), PFOA (0.61 ng/L, equivalent to 0.66 ng/g), and PFOS (0.67 ng/L, equivalent to 0.72 ng/g) were detected in equipment blank KAASF-EB-04, associated with samples AOI02-01-SB-0-2, AOI02-01-SB-13-15, AOI02-02-SB-0-2, AOI02-02-SB-13-15, and AOI02-02-SB-36-38. Data limitations are summarized below.
  - Wood J+ qualified the detected PFHxA results from samples AOI02-01-SB-0-2, AOI02-01-SB-13-15, AOI02-02-SB-0-2, AOI02-02-SB-13-15, and AOI02-02-SB-36-38; the detected PFOA results from samples AOI02-01-SB-0-2, AOI02-02-SB-0-2, and AOI02-02-SB-13-15; and the detected PFOS results from samples AOI02-01-SB-0-2, AOI02-02-SB-0-2, AOI02-02-SB-13-15, and AOI02-02-SB-36-38 because the concentrations detected in the samples were greater than the LOQs and less than five times the concentrations detected in the blank. (Qualifier and reason code: J+, EBG)
  - Wood U qualified the detected PFOA result from sample AOI02-02-SB-36-38 at the LOQ of 0.071 ng/g because the concentration detected in the sample was greater than the LOD and less than the LOQ. (Qualifier and reason code: U, EBL)
  - Wood U qualified the detected FOSA, PFOA, and PFOS results from sample AOI02-01-SB-13-15 at the LOD of 0.044 ng/g because the concentrations detected in the sample were less than the LODs. (Qualifier and reason code: U, EBL)
  - FOSA was not detected in the remaining samples and data usability is not adversely affected by the blank detection.
- FOSA and perfluorobutanoic acid (PFBA) were detected at concentrations of 2.3 ng/L and 0.52 ng/L, respectively, in the field blank KAASF-FB-04, associated with samples AOI01-02-GW, AOI01-03-GW, KAASF-02-GW, and KAASF-DUP-GW-01. Data limitations are summarized below.
  - Wood J+ qualified the detected PFBA result from sample KAASF-02-GW because the concentration detected in the sample was greater than the LOQ and less than five times the concentration detected in the blank. (J+, FBG)
  - PFBA was detected in the remaining samples at concentrations greater than five times the concentration detected in the blank; and FOSA was either not detected in these samples or detected at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.

- FOSA was detected at a concentration of 1.8 ng/L in equipment blank KAASF-EB-01, associated with samples KAASF-01-SB-0TO2, KAASF-01-SB-13-15, and KAASF-01-SB-40-42. FOSA was not detected in these samples and data usability is not adversely affected aby the blank detection.
- FOSA was detected at a concentration of 2.0 ng/L in equipment blank KAASF-EB-02, associated with samples KAASF-02-SB-01-02, KAASF-02-SB-13-15, and KAASF-02-SB-46-48. FOSA was not detected in these samples and data usability is not adversely affected by the blank detection.
- FOSA was detected at a concentration of 3.6 ng/L in equipment blank KAASF-EB-09, associated with sample KAASF-01-GW. FOSA was not detected in this sample and data usability is not adversely affected by the blank detection.
- FOSA and PFBA were detected at concentrations of 4.9 ng/L and 0.44 ng/L, respectively, in equipment blank KAASF-EB-10, associated with samples AOI02-01-GW and AOI02-02-GW. FOSA was not detected in these samples and PFBA were detected at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.
- FOSA and PFBA were detected at concentrations of 5.1 ng/L and 0.30 ng/L, respectively, in equipment blank KAASF-EB-11, associated with sample AOI02-03-GW. FOSA was not detected in this sample and PFBA was detected at a concentration greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.
- FOSA was detected at a concentration of 0.87 ng/L in equipment blank KAASF-EB-12, associated with samples AOI01-02-GW, AOI01-03-GW, KAASF-02-GW, and KAASF-DUP-GW-01. FOSA either was not detected in these samples or was detected at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detection.
- FOSA and perfluorohexanesulfonic acid (PFHxS) were detected at concentrations of 2.0 ng/L and 0.34 ng/L, respectively, in equipment blank KAASF-EB-13, associated with samples AOI01-MW11-GW, AOI01-01-GW, AOI01-04-GW, and KAASF-DUP-GW-02. FOSA was not detected in these samples and PFHxS was detected at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.
- FOSA was detected at a concentration of 5.0 ng/L in field blank KAASF-FB-01, associated with sample KAASF-01-GW. FOSA was not detected in this sample and data usability is not adversely affected by the blank detection.
- FOSA and PFBA were detected at concentrations of 5.7 ng/L and 0.61 ng/L, respectively, in field blank KAASF-FB-02, associated with samples AOI02-01-GW and AOI02-02-GW. FOSA was not detected in these samples and PFBA was detected at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.
- FOSA and PFBA were detected at concentrations of 5.7 ng/L and 0.39 ng/L, respectively, in field blank KAASF-FB-03, associated with sample AOI02-03-GW. FOSA was not detected in this sample and PFBA was detected at a concentration greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.
- FOSA and PFPeA were detected at concentrations of 2.4 ng/L and 0.21 ng/L, respectively, in field blank KAASF-FB-05, associated with samples AOI01-MW11-GW, AOI01-04-GW, AOI01-01-GW, and KAASF-DUP-GW-02. FOSA was not detected in these samples and PFPeA was detected at concentrations greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detections.

7.1.8 Laboratory Control Sample Accuracy and Precision

LCS and LCSD recoveries were within QSM 5.3-specified limits and RPDs between LCS and LCSD results were less than the QAPP-specified maximum of 30%, with the following exceptions:

- 4:2 fluorotelomer sulfonic acid (FTS) recovery was high at 146% in the LCSD associated with the preparation of samples KAASF-01-SB-0TO2, KAASF-01-SB-13-15, KAASF-01-SB-40-42, KAASF-02-SB-01-02, KAASF-02-SB-13-15, KAASF-02-SB-46-48. 4:2 FTS was not detected in these samples and data usability is not adversely affected by the potential high analytical bias.
- 4:2 FTS recovery was high at 149% in the LCS associated with the preparation of samples AOI02-01-SB-0-2, AOI02-01-SB-13-15, AOI02-02-SB-0-2, and AOI02-02-SB-13-15. 4:2 FTS was not detected in these samples and data usability is not adversely affected by the potential high analytical bias.

7.1.9 Matrix Spikes/ Matrix Spike Duplicates Accuracy and Precision

Eurofins performed MS and MSD analyses on sample AOI02-03-SB-36-38, KAASF-DUP-SB-02, and AOI02-04-GW. MS and MSD recoveries were within QSM 5.3-specified limits and RPDs between MS and MSD results were less than the QAPP-specified maximum of 30%, with the following exceptions:

- PFPeA recovery was low at 67% in the MS performed on sample AOI02-03-SB-36-38. Wood J- qualified the detected PFPeA result from this sample due to potential low analytical bias. (Qualifier and reason code: J-, MSL)
- 8:2 FTS recovery was low at 48% in the MSD performed on sample KAASF-DUP-SB-02. Additionally, the RPD for 8:2 FTS was high at 35%. Data limitations are summarized below.
  - Wood UJ qualified the non-detect 8:2 FTS results from the field duplicate and its primary sample AOI01-03-SB-13-15 due to potential low analytical bias. (Qualifier and reason code: UJ, MSL)
  - 8:2 FTS was not detected in this field duplicate or its primary sample. Data usability is not adversely affected by the potential analytical imprecision and results were not additionally qualified because of the high RPD between the MS and MSD results.

7.1.10 Laboratory Triplicate Precision

Eurofins performed triplicate analyses on samples AOI01-01-SB-32-34 and KAASF-01-SB-0TO2. Target analyte detections in the triplicate samples are summarized in Table 2. Relative standard deviations (RSDs) between replicate results were less than the QAPP-specified maximum of 20%, or differences between analyte concentrations were less than the average LOQ, with the following exception:

- RSDs for PFOS and 6:2 FTS were high at 28% and 27%, respectively, in the triplicate analysis of sample AOI01-01-SB-32-34. Wood J qualified the detected PFOS and 6:2 FTS results from this sample due to preparation and/or analytical imprecision. (J, CFD)

7.1.11 Extracted Internal Standard Accuracy

Eurofins' reported EIS recoveries are based on the average response from the initial calibration instead of the area counts from either the ICAL midpoint standard or the areas measured in the initial CCV. For this assessment Wood recalculated EIS recoveries for field samples based on QC summary form VIII.

Wood did not recalculate EISs that were only associated with QC samples because data from field samples would not be qualified based on EIS recoveries in the associated QC samples.

EIS area counts were within the QAPP-specified limits of 50 to 150% of areas measured in the ICAL midpoint standard or 50 to 150% of the areas measured in the initial CCV on days when ICAL is not performed, with the following exception:

- Recoveries of the EISs d_3-N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) and d_5-N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) were extremely low in samples KAASF-02-SB-01-02 (5.9%, 8.8%), KAASF-02-SB-13-15 (3.9%, 6.9%), and KAASF-02-SB-46-48 (3.1%, 6.0%). Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from these samples due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Recoveries of the EISs M_2-4:2 FTS (48%), M_2-6:2 FTS (48%), and M_2-8:2 FTS (44%) were low in the analysis of sample KAASF-02-SB-13-15. Wood J qualified the detected 6:2 FTS result and UJ qualified the non-detect 4:2 FTS and 8:2 FTS results from this sample due to low EIS recoveries. (Qualifiers and reason code: J/UJ, ISL)
- Recoveries of the EISs M_2-4:2 FTS (40%), M_2-6:2 FTS (41%), and M_2-8:2 FTS (35%) were low in the analysis of sample KAASF-02-SB-46-48. Wood UJ qualified the non-detect 4:2 FTS, 6:2 FTS, and 8:2 FTS results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs M_2-4:2 FTS (35%), M_2-6:2 FTS (40%), M_2-8:2 FTS (39%), d_3-NMeFOSAA (3.1%), d_5-NEtFOSAA (4.2%), $^{13}C_4$-PFBA (48%), and $^{13}C_2$-perfluorotetradecanoic acid (PFTeDA [48%]) were low in the analysis of sample KAASF-01-SB-0TO2. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J qualified the detected PFBA result from this sample due to low EIS recovery. (Qualifier and reason code: J, ISL)
  - Wood UJ qualified the non-detect 4:2 FTS, 6:2 FTS, 8:2 FTS, and PFTeDA results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs M_2-4:2 FTS (42%), M_2-6:2 FTS (39%), M_2-8:2 FTS (36%), d_3-NMeFOSAA (5.7%), and d_5-NEtFOSAA (9.1%) were low in the analysis of sample KAASF-01-SB-13-15. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood UJ qualified the non-detect 4:2 FTS, 6:2 FTS, and 8:2 FTS results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs M_2-4:2 FTS (43%), M_2-6:2 FTS (42%), M_2-8:2 FTS (40%), d_3-NMeFOSAA (8.8%), and d_5-NEtFOSAA (15%) were low in the analysis of sample KAASF-01-SB-40-42. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood UJ qualified the non-detect 4:2 FTS, 6:2 FTS, and 8:2 FTS results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)

- Recoveries of the EISs M_2-4:2 FTS (49%), d_3-NMeFOSAA (6.0%), and d_5-NEtFOSAA (7.3%) were low in the analysis of sample AOI02-03-SB-0-2. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood UJ qualified the non-detect 4:2 FTS result from this sample due to low EIS recovery. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs M_2-4:2 FTS (19%), M_2-6:2 FTS (20%), M_2-8:2 FTS (19%), d_3-NMeFOSAA (1.3%), and d_5-NEtFOSAA (2.1%) were low in the analysis of sample AOI02-03-SB-13-15. Data limitations are summarized below.
  - Wood X qualified the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood UJ qualified the non-detect 6:2 FTS result from this sample due to low EIS recovery. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs M_2-4:2 FTS (21%), M_2-6:2 FTS (20%), M_2-8:2 FTS (22%), d_3-NMeFOSAA (1.2%), and d_5-NEtFOSAA (2.5%) were low in the analysis of sample AOI02-03-SB-36-38. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected 4:2 FTS result from this sample due to low EIS recovery. (Qualifier and reason code: J+, ISL)
  - Wood UJ qualified the non-detect 6:2 FTS and 8:2 FTS results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs $^{13}C_2$- perfluorododecanoic acid (PFDoDA [32%]), $^{13}C_2$-PFTeDA (33%), $^{13}C_4$-PFBA (34%), $^{13}C_4$-perfluoroheptanoic acid (PFHpA [37%]), $^{13}C_5$-PFHxA (40%), $^{13}C_5$-PFPeA (36%), $^{13}C_6$-perfluorodecanoic acid (PFDA [38%]), $^{13}C_7$-perfluoroundecanoic acid (PFUnA [36%]), $^{13}C_8$-PFOA (39%), $^{13}C_9$-perfluorononanoic acid (PFNA [38%]), d_3-NMeFOSAA (3.1%), d_5-NEtFOSAA (3.9%), M_2-4:2 FTS (34%), M_2-6:2 FTS (45%), and M_2-8:2 FTS (41%), were low in the analysis of sample AOI02-01-SB-0-2. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFDA, PFDoDA, PFHpA, PFHxA, PFNA, PFOA, PFPeA, and PFUnA results; and UJ qualified the non-detect 4:2 FTS, 6:2 FTS, 8:2 FTS, PFTeDA, and perfluorotridecanoic acid (PFTrDA) results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (18%), $^{13}C_2$-PFTeDA (16%), $^{13}C_4$-PFBA (21%), $^{13}C_4$-PFHpA (20%), $^{13}C_5$-PFHxA (22%), $^{13}C_5$-PFPeA (21%), $^{13}C_6$-PFDA (20%), $^{13}C_7$-PFUnA (18%), $^{13}C_8$-PFOA (20%), $^{13}C_9$-PFNA (20%), d_3-NMeFOSAA (0.52%), d_5-NEtFOSAA (1.0%), M_2-4:2 FTS (0.89%), M_2-6:2 FTS (0.66%), and M_2-8:2 FTS (1.4%) were low in the analysis of sample AOI02-01-SB-13-15. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS results; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, NMeFOSAA, PFDoDA, PFTeDA, PFTrDA, and PFUnA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)

- Wood J+ qualified the detected PFBA and PFHxA results; and UJ qualified the non-detect PFDA, PFHpA, PFNA, PFOA, and PFPeA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)

- Recoveries of the EISs $^{13}C_2$-PFDoDA (33%), $^{13}C_2$-PFTeDA (36%), $^{13}C_4$-PFBA (34%), $^{13}C_4$-PFHpA (38%), $^{13}C_5$-PFHxA (39%), $^{13}C_5$-PFPeA (37%), $^{13}C_6$-PFDA (40%), $^{13}C_7$-PFUnA (34%), $^{13}C_8$-PFOA (40%), $^{13}C_9$-PFNA (39%), d_3-NMeFOSAA (2.7%), d_5-NEtFOSAA (4.0%), M_2-4:2 FTS (32%), M_2-6:2 FTS (43%), and M_2-8:2 FTS (44%) were low in the analysis of sample AOI02-02-SB-0-2. Data limitations are summarized below.
  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFDA, PFHpA, PFHxA, PFNA, PFOA, and PFPeA results; and UJ qualified the non-detect 4:2 FTS, 6:2 FTS, 8:2 FTS, PFDoDA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (33%), $^{13}C_2$-PFTeDA (31%), $^{13}C_4$-PFBA (36%), $^{13}C_4$-PFHpA (35%), $^{13}C_5$-PFHxA (40%), $^{13}C_5$-PFPeA (36%), $^{13}C_6$-PFDA (34%), $^{13}C_7$-PFUnA (32%), $^{13}C_8$-PFOA (35%), $^{13}C_9$-PFNA (34%), d_3-NMeFOSAA (0.38%), d_5-NEtFOSAA (0.80%), M_2-4:2 FTS (2.7%), M_2-6:2 FTS (2.6%), and M_2-8:2 FTS (1.8%) were low in the analysis of sample AOI02-02-SB-13-15. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS and 8:2 FTS results; and the non-detect 4:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFHpA, PFHxA, PFOA, and PFPeA results; and UJ qualified the non-detect PFDA, PFDoDA, PFNA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (46%), $^{13}C_2$-PFTeDA (44%), d_3-NMeFOSAA (2.0%), d_5-NEtFOSAA (4.3%), M_2-4:2 FTS (4.0%), M_2-6:2 FTS (3.8%), and M_2-8:2 FTS (4.2%) were low in the analysis of sample AOI02-02-SB-36-38. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS result; and the non-detect 4:2 FTS, 8:2FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood UJ qualified the non-detect PFDoDA, PFTeDA, and PFTrDA results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs d_3-NMeFOSAA and d_5-NEtFOSAA were extremely low at 9.6% and 15%, respectively, in the analysis of sample AOI02-04-SB-0-2. Wood X qualified the non-detect EtFOSAA and MeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Recoveries of the EISs d_3-NMeFOSAA (43%), d_5-NEtFOSAA (41%), $^{13}C_4$-PFBA (46%), $^{13}C_4$-PFHpA (45%), $^{13}C_5$-PFPeA (47%), $^{13}C_8$-PFOA (49%), M_2-6:2 FTS (48%), and M_2-8:2 FTS (49%) were low in the analysis of sample AOI02-04-SB-13-15. Wood J+ qualified the detected PFBA, PFHpA, and PFOA results; and UJ qualified the non-detect 6:2 FTS, 8:2 FTS, NEtFOSAA, NMeFOSAA, and PFPeA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (21%), $^{13}C_2$-PFTeDA (19%), $^{13}C_4$-PFBA (26%), $^{13}C_4$-PFHpA (23%), $^{13}C_5$-PFHxA (26%), $^{13}C_5$-PFPeA (26%), $^{13}C_6$-PFDA (22%), $^{13}C_7$-PFUnA (23%), $^{13}C_8$-PFOA (24%),

$^{13}C_9$-PFNA (24%), M_2-4:2 FTS (0.81%), M_2-6:2 FTS (1.0%), M_2-8:2 FTS (0.71%), d_3-NMeFOSAA (0.30%), and d_5-NEtFOSAA (0.46%) were low in the analysis of sample AOI02-01-SB-34-36. Data limitations are summarized below.

- Wood X qualified the detected 6:2 FTS and 8:2 FTS; and the non-detect PFTeDA, 4:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Wood J+ qualified the detected PFBA, PFHpA, PFHxA, PFOA, and PFPeA results from this sample due to low EIS recoveries. (Qualifier and reason code: J+, ISL)
- Wood UJ qualified the non-detect PFDA, PFDoDA, PFNA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)

- Recoveries of the EISs d_3-NMeFOSAA (2.3%), d_5-NEtFOSAA (3.2%), M_2-4:2 FTS (17%), M_2-6:2 FTS (18%), and M_2-8:2 FTS (15%) were extremely low in the analysis of sample AOI02-04-SB-36-38. Wood X qualified the detected 6:2 FTS; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Recoveries of the EISs d_3-NMeFOSAA and d_5-NEtFOSAA were extremely low at 9.1% and 12%, respectively, in the analysis of sample KAASF-DUP-SB-01. Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Recoveries of the EISs d3-NMeFOSAA (1.7%), d5-NEtFOSAA (2.7%), M_2-4:2 FTS (15%), M_2-6:2 FTS (14%), and M_2-8:2 FTS (15%) were extremely low in the analysis of sample AOI01-01-SB-0-2. Wood X qualified the detected 6:2 FTS and 8:2 FTS results; and the non-detect 4:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (22%), $^{13}C_2$-PFTeDA (19%), $^{13}C_4$-PFBA (23%), $^{13}C_4$-PFHpA (22%), $^{13}C_5$-PFHxA (24%), $^{13}C_5$-PFPeA (23%), $^{13}C_6$-PFDA (21%), $^{13}C_7$-PFUnA (23%), $^{13}C_8$-PFOA (21%), $^{13}C_9$-PFNA (21%), d_3-NMeFOSAA (0.24%), d_5-NEtFOSAA (0.55%), M_2-4:2 FTS (1.0%), M_2-6:2 FTS (1.5%), and M_2-8:2 FTS (1.8%) were low in the analysis of sample AOI01-01-SB-13-15. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS and 8:2 FTS results; and the non-detected 4:2 FTS, NEtFOSAA, NMeFOSAA, and PFTeDA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFHxA, and PFOA results; and UJ qualified the non-detect PFDA, PFDoDA, PFHpA, PFNA, PFPeA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (37%), $^{13}C_2$-PFTeDA (32%), $^{13}C_4$-PFBA (43%), $^{13}C_4$-PFHpA (40%), $^{13}C_5$-PFHxA (43%), $^{13}C_5$-PFPeA (44%), $^{13}C_6$-PFDA (39%), $^{13}C_7$-PFUnA (43%), $^{13}C_8$-PFOA (42%), $^{13}C_9$-PFNA (42%), d_3-NMeFOSAA (0.62%), d_5-NEtFOSAA (1.4%), M_2-4:2 FTS (2.5%), M_2-6:2 FTS (1.8%), and M_2-8:2 FTS (1.7%) were low in the analysis of sample AOI01-01-SB-32-34. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS and 8:2 FTS results; and the non-detect 4:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)

  - Wood J+ qualified the detected PFBA, PFDA, PFHxA, and PFOA results; and UJ qualified the non-detect PFDoDA, PFHpA, PFNA, PFPeA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifier and reason code: J+/UJ, ISL)

- Recoveries of the EISs d_3-NMeFOSAA (10%), d_5-NEtFOSAA (16%), and M_2-6:2 FTS (223%) were outside of limits in the analysis of sample AOI01-02-SB-0-2. Data limitations are summarized below.

  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)

  - Wood J- qualified the detected 6:2 FTS result from this sample due to high EIS recovery. (Qualifier and reason code: J-, ISH)

- Recoveries of the EISs $^{13}C_8$-PFOS (168%), d_3-NMeFOSAA (5.6%), d_5-NEtFOSAA (10%), M_2-4:2 FTS (44%), M_2-6:2 FTS (308%) were outside of limits in the analysis of sample KAASF-DUP-SB-03. Data limitations are summarized below.

  - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)

  - Wood J- qualified the detected 6:2 FTS, PFOS, and perfluorononanesulfonic acid results from this sample due high EIS recoveries. (Qualifier and reason code: J-, ISH)

  - Wood J+ qualified the detected 4:2 FTS result from this sample due to low EIS recovery. (Qualifier and reason code: J+, ISL)

  - Perfluorodecanesulfonic acid was not detected in this sample and data usability is not adversely affected by the high EIS recovery.

- Recoveries of the EISs $^{13}C_2$-PFDoDA (35%), $^{13}C_2$-PFTeDA (34%) $^{13}C_4$-PFBA (38%), $^{13}C_4$-PFHpA (37%), $^{13}C_5$-PFHxA (34%), $^{13}C_5$-PFPeA (37%), $^{13}C_6$-PFDA (35%), $^{13}C_7$-PFUnA (37%), $^{13}C_8$-PFOA (36%), $^{13}C_9$-PFNA (36%), d_3-NMeFOSAA (0.57%), d_5-NEtFOSAA (1.1%), M_2-4:2 FTS (4.4%), M_2-6:2 FTS (5.7%), and M_2-8:2 FTS (6.6%) were low in the analysis of sample AOI01-02-SB-13-15. Data limitations are summarized below.

  - Wood X qualified the detected 4:2 FTS and 6:2 FTS results; and the non-detect 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)

  - Wood J+ qualified the detected PFBA, PFHpA, PFHxA, PFOA, and PFPeA results; and UJ qualified the non-detect PFDA, PFDoDA, PFNA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)

- Recoveries of the EISs $^{13}C_2$-PFTeDA (46%), d_3-NMeFOSAA (1.6%), d_5-NEtFOSAA (3.7%), M_2-4:2 FTS (2.6%), M_2-6:2 FTS (2.9%), and M_2-8:2 FTS (1.8%) were low in the analysis of sample AOI01-02-SB-32-34. Data limitations are summarized below.

  - Wood X qualified the detected 6:2 FTS and 8:2 FTS results; and the non-detect 4:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)

  - Wood UJ qualified the non-detect PFTeDA result from this sample due to low EIS recovery. (Qualifier and reason code: UJ, ISL)

- Recoveries of the EISs $^{13}C_2$-PFDoDA (41%), $^{13}C_2$-PFTeDA (34%), $^{13}C_4$-PFBA (42%), $^{13}C_4$-PFHpA (39%), $^{13}C_5$-PFHxA (45%), $^{13}C_5$-PFPeA (41%), $^{13}C_6$-PFDA (41%), $^{13}C_7$-PFUnA (42%), $^{13}C_8$-PFOA (42%),

$^{13}C_9$-PFNA (43%), d_3-NMeFOSAA (0.66%), d_5-NEtFOSAA (1.3%), M_2-4:2 FTS (6.6%), M_2-6:2 FTS (7.8%), and M_2-8:2 FTS (9.1%) were low in the analysis of sample AOI01-03-SB-0-2. Data limitations are summarized below.

- Wood X qualified the detected 6:2 FTS result; and the non-detect NMeFOSAA, NEtFOSAA, 4:2 FTS, and 8:2 FTS results because of extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Wood J+ qualified the detected PFBA, PFHpA, PFHxA, PFOA, PFPeA; and UJ qualified the non-detect PFDA, PFDoDA, PFNA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)

- Recoveries of the EISs $^{13}C_2$-PFDoDA (40%), $^{13}C_2$-PFTeDA (34%), $^{13}C_4$-PFBA (42%), $^{13}C_4$-PFHpA (41%), $^{13}C_5$-PFHxA (44%), $^{13}C_5$-PFPeA (40%), $^{13}C_6$-PFDA (41%), $^{13}C_7$-PFUnA (42%), $^{13}C_8$-PFOA (42%), $^{13}C_9$-PFNA (40%), d_3-NMeFOSAA (0.52%), d_5-NEtFOSAA (1.1%), M_2-4:2 FTS (4.1%), M_2-6:2 FTS (3.9%), and M_2-8:2 FTS (3.8%), were low in the analysis of sample AOI01-03-SB-13-15. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS result; and the non-detect NEtFOSAA, NMeFOSAA, 4:2 FTS, and 8:2 FTS results because of extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFHxA, PFOA, PFPeA results; and UJ qualified the non-detect PFDA, PFDoDA, PFHpA, PFNA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (31%), $^{13}C_2$-PFTeDA (25%), $^{13}C_4$-PFBA (32%), $^{13}C_4$-PFHpA (31%), $^{13}C_5$-PFHxA (33%), $^{13}C_5$-PFPeA (32%), $^{13}C_6$-PFDA (29%), $^{13}C_7$-PFUnA (31%), $^{13}C_8$-PFOA (32%), $^{13}C_9$-PFNA (33%), d_3-NMeFOSAA (0.32%), d_5-NEtFOSAA (0.57%), M_2-4:2 FTS (1.9%), M_2-6:2 FTS (1.8%), and M_2-8:2 FTS (1.5%) were low in the analysis of sample AOI01-03-SB-34-36. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS result; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFHpA, PFHxA, PFOA, and PFPeA results; and UJ qualified the non-detect PFDA, PFDoDA, PFNA, PFTeDA, PFTrDA, and PFUnA results from this sample because of low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_2$-PFDoDA (38%), $^{13}C_2$-PFTeDA (35%), $^{13}C_4$-PFBA (41%), $^{13}C_4$-PFHpA (38%), $^{13}C_5$-PFHxA (43%), $^{13}C_5$-PFPeA (41%), $^{13}C_6$-PFDA (40%), $^{13}C_7$-PFUnA (41%), $^{13}C_8$-PFOA (41%), $^{13}C_9$-PFNA (41%), d_3-NMeFOSAA (0.56%), d_5-NEtFOSAA (0.99%), M_2-4:2 FTS (3.0%), M_2-6:2 FTS (2.7%), and M_2-8:2 FTS (1.7%) were low in the analysis of sample KAASF-DUP-SB-02. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS results; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected PFBA, PFHxA, PFOA, and PFPeA results; and UJ qualified the non-detect PFDA, PFDoDA, PFHpA, PFNA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs $^{13}C_4$-PFBA (42%), d_3-NMeFOSAA (1.3%), d_5-NEtFOSAA (2.4%), M_2-4:2 FTS (16%), M_2-6:2 FTS (18%), and M_2-8:2 FTS (13%) were low in the analysis of sample KAASF-DUP-SB-04. Data limitations are summarized below.

- Wood X qualified the detected 6:2 FTS result; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Wood J+ qualified the detected PFBA result from this sample due to low EIS recovery. (Qualifier and reason code: J+, ISL)

- Recoveries of the EISs d_3-NMeFOSAA (25%), d_5-NEtFOSAA (35%), and M_2-6:2 FTS (158%) were outside of limits in the analysis of sample AOI01-04-SB-0-2. Data limitations are summarized below.
  - Wood UJ qualified the non-detect NEtFOSAA and NMeFOSAA results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
  - 6:2 FTS was not detected in this sample and data usability is not adversely affected by the high EIS recovery.
- Recoveries of the EISs $^{13}C_2$-PFDoDA (42%), $^{13}C_2$-PFTeDA (42%), $^{13}C_4$-PFBA (48%), $^{13}C_4$-PFHpA (49%), $^{13}C_5$-PFHxA (48%), $^{13}C_6$-PFDA (48%), $^{13}C_7$-PFUnA (47%), d_3-NMeFOSAA (1.0%), d_5-NEtFOSAA (1.8%), M_2-4:2 FTS (6.1%), M_2-6:2 FTS (6.1%), and M_2-8:2 FTS (7.7%) were low in the analysis of sample AOI01-04-SB-31-33. Data limitations are summarized below.
  - Wood X qualified the detected 6:2 FTS result; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood UJ qualified the non-detect PFBA, PFDA, PFDoDA, PFHpA, PFHxA, PFTeDA, PFTrDA, and PFUnA results from this sample due to low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs d_3-NMeFOSAA (1.3%), d_5-NEtFOSAA (2.7%), M_2-4:2 FTS (9.2%), M_2-6:2 FTS (10%), and M_2-8:2 FTS (8.4%) were extremely low in the analysis of sample AOI01-04-SB-13-15. Wood X qualified the detected 6:2 FTS result; and the non-detect 4:2 FTS, 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
- Recoveries of the EISs $^{13}C_4$-PFBA (48%), d_3-NMeFOSAA (1.6%), d_5-NEtFOSAA (3.0%), M_2-4:2 FTS (21%), M_2-6:2 FTS (20%), and M_2-8:2 FTS (19%) were low in the analysis of sample AOI01-05-SB-0-2. Data limitations are summarized below.
  - Wood X qualified the non-detect 8:2 FTS, NEtFOSAA, and NMeFOSAA results from this sample due to extremely low EIS recoveries. (Qualifier and reason code: X, ISL)
  - Wood J+ qualified the detected 6:2 FTS and PFBA results; and UJ qualified the non-detect 4:2 FTS result from this sample due to low EIS recoveries. (Qualifiers and reason code: J+/UJ, ISL)
- Recoveries of the EISs d_5-NEtFOSAA (164%), $^{13}C_2$-PFDA (169%), $^{13}C_2$-PFDoDA (162%), $^{13}C_2$-PFTeDA (153%), $^{13}C_2$-PFUnA (162%), and $^{13}C_8$-FOSA (181%) were high in the standard analysis; and M_2-6:2 FTS recovery was high at 289% in the dilution analysis of sample AOI01-02-GW. Data limitations are summarized below.
  - Wood J- qualified the detected FOSA, PFDA, PFDoDA, and PFUnA results from the standard analysis; and the detected 6:2 FTS result from the dilution analysis due to high EIS recoveries. (Qualifier and reason code: J-, ISH)
  - NEtFOSAA, PFTeDA, and PFTrDA were not detected in this analysis and data usability is not adversely affected by the high EIS recoveries.

- Recoveries of the EISs d_3-NMeFOSAA (173%), d_5-NEtFOSAA (167%), $^{13}C_2$-PFDA (158%), $^{13}C_2$-PFDoDA (172%), $^{13}C_2$-PFTeDA (158%), $^{13}C_2$-PFUnA (165%), and $^{13}C_8$-FOSA (170%) were high in the standard analysis; and M_2-6:2 FTS recovery was high at 287% in the dilution analysis of sample KAASF-DUP-GW-01. Data limitations are summarized below.
  - Wood J- qualified the detected FOSA, PFDA, PFDoDA, and PFUnA results from the standard analysis; and J- qualified the detected 6:2 FTS result from the dilution analysis of this sample due to high EIS recoveries. (Qualifier and reason code: J-, ISH)
  - NEtFOSAA, NMeFOSAA, PFTeDA, and PFTrDA were not detected in this sample and data usability is not adversely affected by the high EIS recoveries.
- Recovery of the EIS M_2-4:2 FTS was high at 159% in the analysis of sample AOI02-04-GW. 4:2 FTS was not detected in this sample and data usability is not adversely affected by the high EIS recovery.

7.1.12 Data Reporting and Analytical Procedures

Eurofins I qualified results when ion transition ratios were outside of expected limits. Wood J qualified Eurofins' I qualified results. (Qualifier and reason code: J, EMPC)

Eurofins J qualified results with detected concentrations less than the LOQ. Wood agrees these results are quantitatively uncertain and has maintained the laboratory's J qualifiers. (Qualifier and reason code: J, TR)

8.0 Field Duplicate Precision

Wood collected field duplicates with samples:

- AOI02-04-SB-0-2 (KAASF-DUP-SB-01),
- AOI01-03-SB-13-15 (KAASF-DUP-SB-02),
- AOI01-02-SB-0-2 (KAASF-DUP-SB-03),
- AOI01-05-SB-0-2 (KAASF-DUP-SB-04),
- AOI01-02-GW (KAASF-DUP-GW-01), and
- AOI02-04-GW (KAASF-DUP-GW-02).

Target analyte detections are summarized in Table 3. Precision values were less than the QAPP-specified maximum of 30% for aqueous samples and 50% for soil samples, or differences between analyte concentrations were less than the LOQ, with the following exception:

- The RPD between PFHxA results from sample AOI01-02-GW and its field duplicate KAASF-DUP-GW-01 was high at 35%. Wood J qualified the detected PFHxA results from these samples due to analytical and/or sampling imprecision. (J, FDD)

9.0 Summary and Conclusions

Wood reviewed a total of 1,152 records from field samples during the validation and applied the following qualifiers to the data:

- X: Wood X qualified 126 records (11%) due to extremely low EIS recoveries.

- J+: Wood J+ qualified 99 records (8.6%) as having potential high analytical bias due to analyte detection in an associated equipment blank and/or low EIS recoveries.
- J-: Wood J- qualified 15 records (1.3%) as having potential low analytical bias due to high EIS recoveries or low matrix spike recoveries.
- J/UJ: Wood J or UJ qualified 498 results (43%) due to receipt temperature exceedances, analyte detections in an associated equipment blank coupled with low EIS recoveries, low EIS recoveries, detected concentrations less than the LOQ, and/or an ion transition ratio outside of expected limits.
- U: Wood U qualified 13 records (1.1%) due to analyte detections in an associated equipment blank.

Data qualified during validation are summarized in Table 3.

10.0 References

EA, 2020. Final Programmatic UFP-QAPP, Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide, December.

EA, 2021. Draft Final UFP QAPP Addendum, Kalaeloa Army Aviation Support Facility #1-JRF, Oahu, Hawaii. November.

DoD, 2019a. DoD QSM, Version 5.3. May.

DoD, 2019b. General Data Validation Guidelines, Revision 1. November.

DoD, 2020a. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15. May.

11.0 Limitations

This report was prepared for EA by Wood Environment & Infrastructure Solutions, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Wood services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This Data Validation report is intended to be used by EA for the Nationwide ARNG Installations Site Inspections for Per- and Polyfluoroalkyl Substances project only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

Tables

Table 1
Field Samples Submitted to Eurofins Environment Testing America
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Field Sample Identification	Matrix	Collection Date and Time	Laboratory Sample Identification	Notes
KAASF-EB-09	Water	4/29/2022 13:09	320-87446-1	Equipment Blank
KAASF-01-GW	Water	4/29/2022 12:43	320-87446-2	
KAASF-FB-01	Water	4/29/2022 13:16	320-87446-3	Field Blank
AOI02-02-GW	Water	5/2/2022 13:24	320-87446-4	
KAASF-EB-10	Water	5/2/2022 14:00	320-87446-5	Equipment Blank
AOI02-01-GW	Water	5/2/2022 15:23	320-87446-6	
AOI02-03-GW	Water	5/3/2022 10:25	320-87446-7	
KAASF-FB-02	Water	5/2/2022 8:40	320-87446-8	Field Blank
KAASF-FB-03	Water	5/3/2022 13:50	320-87446-9	Field Blank
KAASF-EB-11	Water	5/3/2022 13:45	320-87446-10	Equipment Blank
AOI01-03-GW	Water	5/4/2022 10:37	320-87779-1	
AOI01-MW11-GW	Water	5/5/2022 14:34	320-87779-2	
AOI01-04-GW	Water	5/5/2022 8:26	320-87779-3	
AOI02-04-GW	Water	5/5/2022 13:02	320-87779-4	
AOI01-02-GW	Water	5/4/2022 12:46	320-87779-5	
AOI01-01-GW	Water	5/5/2022 10:45	320-87779-6	
KAASF-FB-04	Water	5/4/2022 8:19	320-87779-7	Field Blank
KAASF-FB-05	Water	5/5/2022 14:52	320-87779-8	Field Blank
KAASF-EB-12	Water	5/4/2022 9:34	320-87779-9	Equipment Blank
KAASF-EB-13	Water	5/5/2022 12:03	320-87779-10	Equipment Blank
KAASF-02-GW	Water	5/4/2022 8:12	320-87779-11	
KAASF-DUP-GW-01	Water	5/4/2022 12:00	320-87779-12	Field Duplicate of AOI01-02-GW
KAASF-DUP-GW-02	Water	5/5/2022 12:00	320-87779-13	Field Duplicate of AOI02-04-GW
KAASF-02-SB-01-02	Solid	4/12/2022 9:58	410-80504-1	
KAASF-02-SB-13-15	Solid	4/12/2022 10:35	410-80504-2	
KAASF-02-SB-46-48	Solid	4/12/2022 14:15	410-80504-3	
KAASF-EB-02	Water	4/12/2022 11:14	410-80504-4	Equipment Blank
KAASF-01-SB-0TO2	Solid	4/11/2022 9:15	410-80506-1	
KAASF-01-SB-13-15	Solid	4/11/2022 9:45	410-80506-4	
KAASF-01-SB-40-42	Solid	4/11/2022 11:50	410-80506-5	
KAASF-EB-01	Water	4/11/2022 18:20	410-80506-6	Equipment Blank
AOI02-03-SB-0-2	Solid	4/15/2022 10:35	410-80815-1	
AOI02-03-SB-13-15	Solid	4/15/2022 11:25	410-80815-2	
AOI02-03-SB-36-38	Solid	4/15/2022 11:55	410-80815-3	
KAASF-EB-03	Water	4/15/2022 9:15	410-80815-4	Equipment Blank
KAASF-EB-04	Water	4/18/2022 10:08	410-81297-1	Equipment Blank
AOI02-01-SB-13-15	Solid	4/18/2022 14:42	410-81297-2	
AOI02-01-SB-0-2	Solid	4/18/2022 13:54	410-81297-3	
AOI02-02-SB-0-2	Solid	4/18/2022 9:41	410-81297-4	
AOI02-02-SB-36-38	Solid	4/18/2022 11:13	410-81297-5	
AOI02-02-SB-13-15	Solid	4/18/2022 10:21	410-81297-6	

Table 1
Field Samples Submitted to Eurofins Environment Testing America
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Field Sample Identification	Matrix	Collection Date and Time	Laboratory Sample Identification	Notes
KAASF-EB-05	Water	4/19/2022 13:41	410-81415-1	Equipment Blank
AOI02-01-SB-34-36	Solid	4/19/2022 11:21	410-81415-2	
AOI02-04-SB-0-2	Solid	4/19/2022 9:12	410-81415-3	
AOI02-04-SB-36-38	Solid	4/19/2022 16:11	410-81415-4	
AOI02-04-SB-13-15	Solid	4/19/2022 15:27	410-81415-5	
KAASF-DUP-SB-01	Solid	4/19/2022 12:00	410-81415-6	Field Duplicate of AOI02-04-SB-0-2
AOI01-02-SB-0-2	Solid	4/20/2022 13:51	410-81416-1	
AOI01-02-SB-13-15	Solid	4/20/2022 14:19	410-81416-2	
AOI01-02-SB-32-34	Solid	4/20/2022 15:11	410-81416-3	
KAASF-DUP-SB-03	Solid	4/20/2022 12:00	410-81416-4	Field Duplicate of AOI01-02-SB-0-2
AOI01-01-SB-32-34	Solid	4/21/2022 10:41	410-81416-5	
AOI01-01-SB-0-2	Solid	4/21/2022 9:08	410-81416-8	
AOI01-01-SB-13-15	Solid	4/21/2022 9:41	410-81416-9	
AOI01-03-SB-13-15	Solid	4/20/2022 10:36	410-81417-1	
AOI01-03-SB-0-2	Solid	4/20/2022 9:50	410-81417-4	
AOI01-03-SB-34-36	Solid	4/20/2022 13:32	410-81417-5	
KAASF-EB-06	Water	4/20/2022 13:26	410-81417-6	Equipment Blank
KAASF-EB-07	Water	4/21/2022 9:57	410-81417-7	Equipment Blank
KAASF-DUP-SB-02	Solid	4/20/2022 12:00	410-81417-8	Field Duplicate of AOI01-03-SB-13-15
KAASF-DUP-SB-04	Solid	4/21/2022 12:00	410-81418-1	Field Duplicate of AOI01-05-SB-0-2
AOI01-04-SB-0-2	Solid	4/21/2022 10:35	410-81418-2	
AOI01-04-SB-31-33	Solid	4/21/2022 11:55	410-81418-3	
AOI01-04-SB-13-15	Solid	4/21/2022 10:47	410-81418-4	
AOI01-05-SB-0-2	Solid	4/21/2022 15:12	410-81418-5	

Table 2
Laboratory Replicate Precision
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Analyte	Limits of Quantitation				Primary Result	Duplicate Result	Triplicate Result	Relative Standard Deviation	Notes
	Primary	Duplicate	Triplicate	Average					
KAASF-01-SB-0TO2									
Perfluorohexanoic Acid	0.064	0.063	0.063	0.063 ng/g	0.072	0.064	0.070	6%	
Perfluoroheptanoic Acid	0.064	0.063	0.063	0.063 ng/g	0.054 J	0.050 J	0.048 J	6%	
Perfluorooctanoic Acid	0.064	0.063	0.063	0.063 ng/g	0.28	0.26	0.28	4%	
Perfluorobutanesulfonic Acid	0.064	0.063	0.063	0.063 ng/g	0.092	0.094	0.092	1%	
Perfluorohexanesulfonic Acid	0.064	0.063	0.063	0.063 ng/g	0.066	0.079	0.077	9%	
Perfluoroheptanoic Acid	0.064	0.063	0.063	0.063 ng/g	0.090	0.087	0.081	5%	
Perfluorooctanoic Acid	0.064	0.063	0.063	0.063 ng/g	1.1	1.1	1.0	5%	
Perfluorobutanesulfonic Acid	0.064	0.063	0.063	0.063 ng/g	0.17	0.15	0.15	7%	
Perfluorobutanesulfonic Acid	0.064	0.063	0.063	0.063 ng/g	0.036 J	0.032 J	0.034 J	6%	
Perfluorohexanesulfonic Acid	0.064	0.063	0.063	0.063 ng/g	0.023 J	0.026 J	0.023 J	7%	
Perfluorooctanesulfonic Acid	0.064	0.063	0.063	0.063 ng/g	0.030 J	0.021 J	0.028 J	18%	
AOI01-01-SB-32-34									
Perfluorohexanoic acid	0.069	0.070	0.069	0.069 ng/g	0.13	0.13	0.16	12%	
Perfluorooctanoic acid	0.069	0.070	0.069	0.069 ng/g	0.032 J	0.049 J	0.037 J	22%	± Average LOQ
Perfluorohexanesulfonic acid	0.069	0.070	0.069	0.069 ng/g	0.046 U	0.029 J	0.039 J	NC	± Average LOQ
Perfluorooctanesulfonic acid	0.069	0.070	0.069	0.069 ng/g	0.16	0.21	0.28	28%	J-CFD
Perfluorooctanesulfonamide	0.069	0.070	0.069	0.069 ng/g	0.046 U	0.033 J	0.028 J	NC	± Average LOQ
Perfluorobutanoic acid	0.23	0.23	0.23	0.23 ng/g	0.089 J	0.092 J	0.084 J	5%	
Perfluoropentanoic acid	0.069	0.070	0.069	0.069 ng/g	0.046 U	0.047 U	0.028 J	NC	± Average LOQ
6:2 Fluorotelomer sulfonic acid	0.23	0.23	0.23	0.23 ng/g	1.3	0.78	0.90	27%	J-CFD
8:2 Fluorotelomer sulfonic acid	0.35	0.35	0.34	0.35 ng/g	0.14 J	0.16 J	0.18 U	NC	

Notes:
NC = not calculable
ng/g = nanograms per gram

Qualifier Definitions:
J = The reported result is an estimated quantity.
U = The analyte was not detected and is reported as less than the limit of detection.

Reason Codes:
CFD = Imprecision between primary, duplicate, and triplicate results.
± Average LOQ = The average difference between results is less than the average limit of quantitation, indicating acceptable sampling and analytical precision.

Table 3
Target Analyte Detections in Primary and Field Duplicate Samples
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Analyte	Average Limit of Quantitation	Primary Result	Field Duplicate Result	Relative Percent Difference	Notes
Samples AOI02-04-SB-0-2 and KAASF-DUP-SB-01					
Perfluorohexanoic acid	0.063 ng/g	0.27	0.41	41%	
Perfluoroheptanoic acid	0.063 ng/g	0.066	0.08	19%	
Perfluorooctanoic acid	0.063 ng/g	0.87	0.88	1.1%	
Perfluorononanoic acid	0.063 ng/g	0.043 J	0.041 J	4.8%	
Perfluorodecanoic acid	0.063 ng/g	0.041 J	0.045 J	9.3%	
Perfluorohexanesulfonic acid	0.063 ng/g	0.35	0.35	0%	
Perfluorooctanesulfonic acid	0.063 ng/g	2.7	2.8	3.6%	
Perfluoroheptanesulfonic acid	0.063 ng/g	0.022 J	0.042 U	NC	± LOQ
Perfluorobutanoic acid	0.21 ng/g	0.16 J	0.2 J	22%	
Perfluoropentanoic acid	0.063 ng/g	0.065	0.078	18%	
6:2 Fluorotelomer sulfonic acid	0.21 ng/g	0.097 J	0.088 J	9.7%	
Samples AOI01-03-SB-13-15 and KAASF-DUP-SB-02					
Perfluorohexanoic acid	0.063 ng/g	0.09	0.096	7.6%	
Perfluorooctanoic acid	0.063 ng/g	0.054 J	0.061 J	12%	
Perfluorobutanesulfonic acid	0.21 ng/g	0.047 J	0.049 J	4.2%	
Perfluorohexanesulfonic acid	0.063 ng/g	0.13	0.13	0%	
Perfluorooctanesulfonic acid	0.063 ng/g	0.07	0.059 J	17%	
Perfluorooctanesulfonamide	0.063 ng/g	0.046 J	0.042 J	9.1%	
Perfluorobutanoic acid	0.21 ng/g	0.11 J	0.13 J	17%	
Perfluoropentanoic acid	0.063 ng/g	0.11	0.13	17%	
6:2 Fluorotelomer sulfonic acid	0.21 ng/g	0.27	0.38	34%	

Table 3
Target Analyte Detections in Primary and Field Duplicate Samples
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Analyte	Average Limit of Quantitation	Primary Result	Field Duplicate Result	Relative Percent Difference	Notes
Samples AOI01-02-SB-0-2 and KAASF-DUP-SB-03					
Perfluoroheptanoic acid	0.63 ng/g	19	22	15%	
Perfluorooctanoic acid	0.63 ng/g	100	110	10%	
Perfluorononanoic acid	0.63 ng/g	12	12	0%	
Perfluorodecanoic acid	0.63 ng/g	11	11	0%	
Perfluorotridecanoic acid	0.63 ng/g	0.78	0.78	0%	
Perfluorotetradecanoic acid	0.63 ng/g	0.78	0.82	5.0%	
Perfluorobutanesulfonic acid	2.1 ng/g	19	25	27%	
Perfluoropentanesulfonic acid	3.2 ng/g	17	22	26%	
Perfluoroheptanesulfonic acid	0.63 ng/g	56	55	1.8%	
Perfluorononanesulfonic acid	0.63 ng/g	0.82	0.84	2.4%	
Perfluorodecanesulfonic acid	0.63 ng/g	0.45 J	0.45 J	0%	
Perfluorooctanesulfonamide	0.63 ng/g	12	13.00	8.0%	
Perfluorobutanoic acid	2.1 ng/g	19	23	19%	
Perfluoropentanoic acid	0.63 ng/g	81	99	20%	
Perfluoroundecanoic acid	0.63 ng/g	3.5	3.1	12%	
Perfluorododecanoic acid	0.63 ng/g	2.1	2.2	4.7%	
8:2 Fluorotelomer sulfonic acid	3.2 ng/g	130	120	8.0%	
4:2 Fluorotelomer sulfonic acid	2.1 ng/g	7.6	11	37%	
Perfluorohexanoic acid	3.4 ng/g	190	270	35%	
Perfluorohexanesulfonic acid	6.3 ng/g	340	360	5.7%	
Perfluorooctanesulfonic acid	6.3 ng/g	1500	1500	0%	
6:2 Fluorotelomer sulfonic acid	21 ng/g	550	430	24%	
Samples AOI01-05-SB-0-2 and KAASF-DUP-SB-04					
Perfluorohexanoic acid	0.063 ng/g	0.65	0.79	19%	
Perfluoroheptanoic acid	0.063 ng/g	0.61	0.66	7.9%	
Perfluorooctanoic acid	0.063 ng/g	2.1	2.5	17%	
Perfluorononanoic acid	0.063 ng/g	3.0	2.7	11%	
Perfluorodecanoic acid	0.063 ng/g	0.15	0.12	22%	
Perfluorobutanesulfonic acid	0.21 ng/g	0.11 J	0.15 J	31%	
Perfluorohexanesulfonic acid	0.063 ng/g	2.2	2.6	17%	
Perfluoropentanesulfonic acid	0.32 ng/g	0.086 J	0.11 J	24%	
Perfluoroheptanesulfonic acid	0.063 ng/g	0.21	0.21	0%	
Perfluorononanesulfonic acid	0.063 ng/g	0.028 J	0.024 J	15%	
Perfluorobutanoic acid	0.21 ng/g	0.53	0.48	10%	
Perfluoropentanoic acid	0.063 ng/g	0.93	0.97	4.2%	
Perfluoroundecanoic acid	0.063 ng/g	0.091	0.060 J	41%	
6:2 Fluorotelomer sulfonic acid	0.21 ng/g	0.082 J	0.27	107%	± LOQ
Perfluorooctanesulfonic acid	0.63 ng/g	45	39	14%	

Table 3
Target Analyte Detections in Primary and Field Duplicate Samples
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Analyte	Average Limit of Quantitation	Primary Result	Field Duplicate Result	Relative Percent Difference	Notes
Samples AOI01-02-GW and KAASF-DUP-GW-01					
Perflurodecanesulfonic acid	1.8 ng/L	1.30 U	0.62 J	NC	± LOQ
Perfluorodecanoic acid	1.8 ng/L	19	19	0%	
Perfluorododecanoic acid	1.8 ng/L	1.1 J	0.87 J	23%	
Perfluoroheptanesulfonic acid	1.8 ng/L	140	150	6.9%	
Perfluorononanesulfonic acid	1.8 ng/L	1.3 J	2.1	47%	± LOQ
Perfluorononanoic acid	1.8 ng/L	35	34	2.9%	
Perfluorooctanesulfonamide	1.8 ng/L	32	34	6.1%	
Perfluoroundecanoic acid	1.8 ng/L	3.3	3.3	0%	
4:2 Fluorotelomer sulfonic acid	1.8 ng/L	230	210	9.1%	
Perfluorobutanesulfonic acid	180 ng/L	480	530	10%	
Perfluorobutanoic acid	180 ng/L	640	600	6.5%	
Perfluoroheptanoic acid	180 ng/L	820	860	4.8%	
Perfluorohexanesulfonic acid	180 ng/L	7,100	6,700	5.8%	
Perfluorohexanoic acid	180 ng/L	4,200	6,000	35%	J, FDD
Perfluorooctanesulfonic acid	180 ng/L	5,700	6,900	19%	
Perfluorooctanoic acid	180 ng/L	740	710	4.1%	
Perfluoropentanesulfonic acid	180 ng/L	520	550	5.6%	
Perfluoropentanoic acid	180 ng/L	2,500	2,600	3.9%	
8:2 Fluorotelomer sulfonic acid	180 ng/L	340	330	3.0%	
6:2 Fluorotelomer sulfonic acid	445 ng/L	8,700	8,100	7.1%	
Samples AOI02-04-GW and KAASF-DUP-GW-02					
Perfluorobutanesulfonic acid	1.8 ng/g	13	12	8.0%	
Perflurobutanoic acid	1.8 ng/g	10	10	0%	
Perfluorodecanoic acid	1.8 ng/g	0.92 U	0.7 J	NC	± LOQ
Perfluoroheptanesulfonic acid	1.8 ng/g	2.0	2	0%	
Perfluoroheptanoic acid	1.8 ng/g	12	11	8.7%	
Perfluorohexanesulfonic acid	1.8 ng/g	140	130	7.4%	
Perfluorohexanoic acid	1.8 ng/g	47	44	6.6%	
Perfluorononanoic acid	1.8 ng/g	1.5 J	1.60 J	6.5%	
Perfluorooctanesulfonic acid	1.8 ng/g	51	51	0%	
Perfluorooctanoic acid	1.8 ng/g	140	150	6.9%	
Perfluoropentanesulfonic acid	1.8 ng/g	7.9	7.8	1.3%	
Perfluoropentanoic acid	1.8 ng/g	21	20	4.9%	

Notes:
NC = not calculable
ng/g = nanograms per gram
ng/L = nanograms per liter

Qualifier Definitions:
J = The reported result is an estimated quantity with an unknown bias.
U = The analyte was not detected and was reported as less than the limit of detection.

Reason Code:
± LOQ = the difference between analyte concentrations is less than the limit of quantitation, indicating acceptable sampling and analytical precision.
FDD = Imprecision between primary sample and field duplicate.

Table 4
Qualifiers Applied During Validation
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-01-GW	4:2 Fluorotelomer sulfonic acid	0.87 ng/l	UJ TH8
AOI01-01-GW	6:2 Fluorotelomer sulfonic acid	9.8 ng/l	J TH8
AOI01-01-GW	8:2 Fluorotelomer sulfonic acid	1.3 ng/l	J TH8, TR
AOI01-01-GW	NEtFOSAA	0.87 ng/l	UJ TH8
AOI01-01-GW	NMeFOSAA	0.87 ng/l	UJ TH8
AOI01-01-GW	Perfluorobutanesulfonic acid	6.6 ng/l	J TH8
AOI01-01-GW	Perfluorobutanoic acid	20 ng/l	J TH8
AOI01-01-GW	Perfluorodecanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-01-GW	Perfluorodecanoic acid	0.87 ng/l	UJ TH8
AOI01-01-GW	Perfluorododecanoic acid	0.87 ng/l	UJ TH8
AOI01-01-GW	Perfluoroheptanesulfonic acid	0.63 ng/l	J TH8, TR
AOI01-01-GW	Perfluoroheptanoic acid	11 ng/l	J TH8
AOI01-01-GW	Perfluorohexanesulfonic acid	50 ng/l	J TH8
AOI01-01-GW	Perfluorohexanoic acid	38 ng/l	J TH8
AOI01-01-GW	Perfluorononanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-01-GW	Perfluorononanoic acid	0.99 ng/l	J TH8, TR
AOI01-01-GW	Perfluorooctanesulfonamide	1.3 ng/l	UJ TH8
AOI01-01-GW	Perfluorooctanesulfonic acid	25 ng/l	J TH8
AOI01-01-GW	Perfluorooctanoic acid	52 ng/l	J TH8
AOI01-01-GW	Perfluoropentanesulfonic acid	2.6 ng/l	J TH8
AOI01-01-GW	Perfluoropentanoic acid	29 ng/l	J TH8
AOI01-01-GW	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
AOI01-01-GW	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
AOI01-01-GW	Perfluoroundecanoic acid	1.3 ng/l	UJ TH8
AOI01-01-SB-0-2	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	X ISL
AOI01-01-SB-0-2	6:2 Fluorotelomer sulfonic acid	1.3 ng/g	X ISL
AOI01-01-SB-0-2	8:2 Fluorotelomer sulfonic acid	0.42 ng/g	X ISL
AOI01-01-SB-0-2	NEtFOSAA	0.046 ng/g	X ISL
AOI01-01-SB-0-2	NMeFOSAA	0.046 ng/g	X ISL
AOI01-01-SB-0-2	Perfluorobutanesulfonic acid	0.084 ng/g	J TR
AOI01-01-SB-0-2	Perfluorodecanoic acid	0.033 ng/g	J TR
AOI01-01-SB-0-2	Perfluoroheptanesulfonic acid	0.061 ng/g	J TR
AOI01-01-SB-0-2	Perfluorohexanoic acid	1.1 ng/g	J+ EBG
AOI01-01-SB-0-2	Perfluorononanoic acid	0.042 ng/g	J TR
AOI01-01-SB-0-2	Perfluorooctanesulfonamide	0.046 ng/g	U EBL
AOI01-01-SB-0-2	Perfluorooctanesulfonic acid	4.7 ng/g	J+ EBG
AOI01-01-SB-0-2	Perfluoropentanesulfonic acid	0.039 ng/g	J TR
AOI01-01-SB-0-2	Perfluoropentanoic acid	0.57 ng/g	J+ EBG
AOI01-01-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-01-SB-13-15	6:2 Fluorotelomer sulfonic acid	3.1 ng/g	X ISL
AOI01-01-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.19 ng/g	X ISL
AOI01-01-SB-13-15	NEtFOSAA	0.042 ng/g	X ISL

Table 4
Qualifiers Applied During Validation
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-01-SB-13-15	NMeFOSAA	0.042 ng/g	X ISL
AOI01-01-SB-13-15	Perfluorobutanoic acid	0.14 ng/g	J+ ISL, TR
AOI01-01-SB-13-15	Perfluorodecanoic acid	0.042 ng/g	UJ ISL
AOI01-01-SB-13-15	Perfluorododecanoic acid	0.042 ng/g	UJ ISL
AOI01-01-SB-13-15	Perfluoroheptanoic acid	0.042 ng/g	UJ ISL
AOI01-01-SB-13-15	Perfluorohexanesulfonic acid	0.045 ng/g	J TR
AOI01-01-SB-13-15	Perfluorohexanoic acid	0.14 ng/g	J+ EBG, ISL
AOI01-01-SB-13-15	Perfluorononanoic acid	0.042 ng/g	UJ ISL
AOI01-01-SB-13-15	Perfluorooctanesulfonic acid	0.15 ng/g	J+ EBG
AOI01-01-SB-13-15	Perfluorooctanoic acid	0.071 ng/g	J+ ISL
AOI01-01-SB-13-15	Perfluoropentanoic acid	0.042 ng/g	UJ EBL, ISL
AOI01-01-SB-13-15	Perfluorotetradecanoic acid	0.042 ng/g	X ISL
AOI01-01-SB-13-15	Perfluorotridecanoic acid	0.042 ng/g	UJ ISL
AOI01-01-SB-13-15	Perfluoroundecanoic acid	0.042 ng/g	UJ ISL
AOI01-01-SB-32-34	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	X ISL
AOI01-01-SB-32-34	6:2 Fluorotelomer sulfonic acid	1.3 ng/g	X CFD, ISL
AOI01-01-SB-32-34	8:2 Fluorotelomer sulfonic acid	0.14 ng/g	X ISL
AOI01-01-SB-32-34	NEtFOSAA	0.046 ng/g	X ISL
AOI01-01-SB-32-34	NMeFOSAA	0.046 ng/g	X ISL
AOI01-01-SB-32-34	Perfluorobutanoic acid	0.089 ng/g	J+ ISL, TR
AOI01-01-SB-32-34	Perfluorodecanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluorododecanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluoroheptanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluorohexanoic acid	0.13 ng/g	J+ EBG, ISL
AOI01-01-SB-32-34	Perfluorononanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluorooctanesulfonic acid	0.16 ng/g	J+ EBG, CFD
AOI01-01-SB-32-34	Perfluorooctanoic acid	0.032 ng/g	J+ ISL, TR
AOI01-01-SB-32-34	Perfluoropentanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluorotetradecanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluorotridecanoic acid	0.046 ng/g	UJ ISL
AOI01-01-SB-32-34	Perfluoroundecanoic acid	0.046 ng/g	UJ ISL
AOI01-02-GW	4:2 Fluorotelomer sulfonic acid	230 ng/l	J TH8
AOI01-02-GW	6:2 Fluorotelomer sulfonic acid	8,700 ng/l	J- TH8, ISH
AOI01-02-GW	8:2 Fluorotelomer sulfonic acid	340 ng/l	J TH8
AOI01-02-GW	NEtFOSAA	0.89 ng/l	UJ TH8
AOI01-02-GW	NMeFOSAA	0.89 ng/l	UJ TH8
AOI01-02-GW	Perfluorobutanesulfonic acid	480 ng/l	J TH8
AOI01-02-GW	Perfluorobutanoic acid	640 ng/l	J TH8
AOI01-02-GW	Perfluorodecanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-02-GW	Perfluorodecanoic acid	19 ng/l	J- TH8, ISH
AOI01-02-GW	Perfluorododecanoic acid	1.1 ng/l	J- TH8, ISH, TR
AOI01-02-GW	Perfluoroheptanesulfonic acid	140 ng/l	J TH8

Table 4
Qualifiers Applied During Validation
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Oahu, Hawaii

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-02-GW	Perfluoroheptanoic acid	820 ng/l	J TH8
AOI01-02-GW	Perfluorohexanesulfonic acid	7,100 ng/l	J TH8
AOI01-02-GW	Perfluorohexanoic acid	4,200 ng/l	J TH8, FDD
AOI01-02-GW	Perfluorononanesulfonic acid	1.3 ng/l	J TH8, TR
AOI01-02-GW	Perfluorononanoic acid	35 ng/l	J TH8
AOI01-02-GW	Perfluorooctanesulfonamide	32 ng/l	J- TH8, ISH
AOI01-02-GW	Perfluorooctanesulfonic acid	5,700 ng/l	J TH8
AOI01-02-GW	Perfluorooctanoic acid	740 ng/l	J TH8
AOI01-02-GW	Perfluoropentanesulfonic acid	520 ng/l	J TH8
AOI01-02-GW	Perfluoropentanoic acid	2,500 ng/l	J TH8
AOI01-02-GW	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
AOI01-02-GW	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
AOI01-02-GW	Perfluoroundecanoic acid	3.3 ng/l	J- TH8, ISH
AOI01-02-SB-0-2	6:2 Fluorotelomer sulfonic acid	550 ng/g	J- ISH
AOI01-02-SB-0-2	NEtFOSAA	0.42 ng/g	X ISL
AOI01-02-SB-0-2	NMeFOSAA	0.42 ng/g	X ISL
AOI01-02-SB-0-2	Perfluorodecanesulfonic acid	0.45 ng/g	J TR
AOI01-02-SB-0-2	Perfluorooctanesulfonamide	12 ng/g	J+ EBG
AOI01-02-SB-13-15	4:2 Fluorotelomer sulfonic acid	2.7 ng/g	X ISL
AOI01-02-SB-13-15	6:2 Fluorotelomer sulfonic acid	2.9 ng/g	X ISL
AOI01-02-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-02-SB-13-15	NEtFOSAA	0.043 ng/g	X ISL
AOI01-02-SB-13-15	NMeFOSAA	0.043 ng/g	X ISL
AOI01-02-SB-13-15	Perfluorobutanoic acid	5.3 ng/g	J+ ISL
AOI01-02-SB-13-15	Perfluorodecanoic acid	0.043 ng/g	UJ ISL
AOI01-02-SB-13-15	Perfluorododecanoic acid	0.043 ng/g	UJ ISL
AOI01-02-SB-13-15	Perfluoroheptanoic acid	0.94 ng/g	J+ ISL
AOI01-02-SB-13-15	Perfluorohexanoic acid	66 ng/g	J+ ISL
AOI01-02-SB-13-15	Perfluorononanoic acid	0.043 ng/g	UJ ISL
AOI01-02-SB-13-15	Perfluorooctanoic acid	0.20 ng/g	J+ ISL
AOI01-02-SB-13-15	Perfluoropentanoic acid	18 ng/g	J+ ISL
AOI01-02-SB-13-15	Perfluorotetradecanoic acid	0.043 ng/g	UJ ISL
AOI01-02-SB-13-15	Perfluorotridecanoic acid	0.043 ng/g	UJ ISL
AOI01-02-SB-13-15	Perfluoroundecanoic acid	0.043 ng/g	UJ ISL
AOI01-02-SB-32-34	4:2 Fluorotelomer sulfonic acid	0.19 ng/g	X ISL
AOI01-02-SB-32-34	6:2 Fluorotelomer sulfonic acid	0.75 ng/g	X ISL
AOI01-02-SB-32-34	8:2 Fluorotelomer sulfonic acid	0.16 ng/g	X ISL
AOI01-02-SB-32-34	NEtFOSAA	0.049 ng/g	X ISL
AOI01-02-SB-32-34	NMeFOSAA	0.049 ng/g	X ISL
AOI01-02-SB-32-34	Perfluorobutanesulfonic acid	0.075 ng/g	J TR
AOI01-02-SB-32-34	Perfluoroheptanoic acid	0.051 ng/g	J TR
AOI01-02-SB-32-34	Perfluorooctanesulfonamide	0.049 ng/g	U EBL

Table 4
Qualifiers Applied During Validation
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-02-SB-32-34	Perfluorotetradecanoic acid	0.049 ng/g	UJ ISL
AOI01-03-GW	4:2 Fluorotelomer sulfonic acid	0.86 ng/l	UJ TH8
AOI01-03-GW	6:2 Fluorotelomer sulfonic acid	0.86 ng/l	UJ TH8
AOI01-03-GW	8:2 Fluorotelomer sulfonic acid	1.3 ng/l	UJ TH8
AOI01-03-GW	NEtFOSAA	0.86 ng/l	UJ TH8
AOI01-03-GW	NMeFOSAA	0.86 ng/l	UJ TH8
AOI01-03-GW	Perfluorobutanesulfonic acid	8.0 ng/l	J TH8
AOI01-03-GW	Perfluorobutanoic acid	33 ng/l	J TH8
AOI01-03-GW	Perfluorodecanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-03-GW	Perfluorodecanoic acid	1.2 ng/l	J TH8, TR
AOI01-03-GW	Perfluorododecanoic acid	0.86 ng/l	UJ TH8
AOI01-03-GW	Perfluoroheptanesulfonic acid	0.90 ng/l	J TH8, TR
AOI01-03-GW	Perfluoroheptanoic acid	19 ng/l	J TH8
AOI01-03-GW	Perfluorohexanesulfonic acid	64 ng/l	J TH8
AOI01-03-GW	Perfluorohexanoic acid	43 ng/l	J TH8
AOI01-03-GW	Perfluorononanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-03-GW	Perfluorononanoic acid	2.3 ng/l	J TH8
AOI01-03-GW	Perfluorooctanesulfonamide	1.3 ng/l	UJ TH8
AOI01-03-GW	Perfluorooctanesulfonic acid	50 ng/l	J TH8
AOI01-03-GW	Perfluorooctanoic acid	55 ng/l	J TH8
AOI01-03-GW	Perfluoropentanesulfonic acid	6.4 ng/l	J TH8
AOI01-03-GW	Perfluoropentanoic acid	52 ng/l	J TH8
AOI01-03-GW	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
AOI01-03-GW	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
AOI01-03-GW	Perfluoroundecanoic acid	1.3 ng/l	UJ TH8
AOI01-03-SB-0-2	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-03-SB-0-2	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-03-SB-0-2	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-03-SB-0-2	NEtFOSAA	0.042 ng/g	X ISL
AOI01-03-SB-0-2	NMeFOSAA	0.042 ng/g	X ISL
AOI01-03-SB-0-2	Perfluorobutanoic acid	0.17 ng/g	J+ ISL, TR
AOI01-03-SB-0-2	Perfluorodecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-0-2	Perfluorododecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-0-2	Perfluoroheptanoic acid	0.096 ng/g	J+ ISL
AOI01-03-SB-0-2	Perfluorohexanoic acid	0.18 ng/g	J+ ISL
AOI01-03-SB-0-2	Perfluorononanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-0-2	Perfluorooctanoic acid	0.33 ng/g	J+ ISL
AOI01-03-SB-0-2	Perfluoropentanoic acid	0.14 ng/g	J+ ISL
AOI01-03-SB-0-2	Perfluorotetradecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-0-2	Perfluorotridecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-0-2	Perfluoroundecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL

Table 4
Qualifiers Applied During Validation
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-03-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.27 ng/g	X ISL
AOI01-03-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X MSL, ISL
AOI01-03-SB-13-15	NEtFOSAA	0.042 ng/g	X ISL
AOI01-03-SB-13-15	NMeFOSAA	0.042 ng/g	X ISL
AOI01-03-SB-13-15	Perfluorobutanesulfonic acid	0.047 ng/g	J TR
AOI01-03-SB-13-15	Perfluorobutanoic acid	0.11 ng/g	J+ ISL, TR
AOI01-03-SB-13-15	Perfluorodecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	Perfluorododecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	Perfluoroheptanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	Perfluorohexanoic acid	0.089 ng/g	J+ ISL, EMPC
AOI01-03-SB-13-15	Perfluorononanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	Perfluorooctanesulfonamide	0.063 ng/g	U EBL
AOI01-03-SB-13-15	Perfluorooctanoic acid	0.054 ng/g	J+ ISL, TR
AOI01-03-SB-13-15	Perfluoropentanoic acid	0.11 ng/g	J+ ISL
AOI01-03-SB-13-15	Perfluorotetradecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	Perfluorotridecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-13-15	Perfluoroundecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-34-36	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-03-SB-34-36	6:2 Fluorotelomer sulfonic acid	0.62 ng/g	X ISL
AOI01-03-SB-34-36	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-03-SB-34-36	NEtFOSAA	0.042 ng/g	X ISL
AOI01-03-SB-34-36	NMeFOSAA	0.042 ng/g	X ISL
AOI01-03-SB-34-36	Perfluorobutanoic acid	0.11 ng/g	J+ ISL, TR
AOI01-03-SB-34-36	Perfluorodecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-34-36	Perfluorododecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-34-36	Perfluoroheptanoic acid	0.032 ng/g	J+ ISL, TR
AOI01-03-SB-34-36	Perfluorohexanoic acid	0.090 ng/g	J+ ISL
AOI01-03-SB-34-36	Perfluorononanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-34-36	Perfluorooctanesulfonamide	0.042 ng/g	U EBL
AOI01-03-SB-34-36	Perfluorooctanoic acid	0.055 ng/g	J+ ISL, TR
AOI01-03-SB-34-36	Perfluoropentanoic acid	0.079 ng/g	J+ ISL
AOI01-03-SB-34-36	Perfluorotetradecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-34-36	Perfluorotridecanoic acid	0.042 ng/g	UJ ISL
AOI01-03-SB-34-36	Perfluoroundecanoic acid	0.042 ng/g	UJ ISL
AOI01-04-GW	4:2 Fluorotelomer sulfonic acid	0.87 ng/l	UJ TH8
AOI01-04-GW	6:2 Fluorotelomer sulfonic acid	8.4 ng/l	J TH8
AOI01-04-GW	8:2 Fluorotelomer sulfonic acid	1.3 ng/l	UJ TH8
AOI01-04-GW	NEtFOSAA	0.87 ng/l	UJ TH8
AOI01-04-GW	NMeFOSAA	0.87 ng/l	UJ TH8
AOI01-04-GW	Perfluorobutanesulfonic acid	4.8 ng/l	J TH8
AOI01-04-GW	Perfluorobutanoic acid	7.6 ng/l	J TH8
AOI01-04-GW	Perfluorodecanesulfonic acid	1.3 ng/l	UJ TH8

Table 4
Qualifiers Applied During Validation
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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-04-GW	Perfluorodecanoic acid	0.87 ng/l	UJ TH8
AOI01-04-GW	Perfluorododecanoic acid	0.87 ng/l	UJ TH8
AOI01-04-GW	Perfluoroheptanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-04-GW	Perfluoroheptanoic acid	4.8 ng/l	J TH8
AOI01-04-GW	Perfluorohexanesulfonic acid	14 ng/l	J TH8
AOI01-04-GW	Perfluorohexanoic acid	13 ng/l	J TH8
AOI01-04-GW	Perfluorononanesulfonic acid	1.3 ng/l	UJ TH8
AOI01-04-GW	Perfluorononanoic acid	0.90 ng/l	J TH8, TR
AOI01-04-GW	Perfluorooctanesulfonamide	1.3 ng/l	UJ TH8
AOI01-04-GW	Perfluorooctanesulfonic acid	16 ng/l	J TH8
AOI01-04-GW	Perfluorooctanoic acid	18 ng/l	J TH8
AOI01-04-GW	Perfluoropentanesulfonic acid	1.3 ng/l	J TH8, TR
AOI01-04-GW	Perfluoropentanoic acid	13 ng/l	J TH8
AOI01-04-GW	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
AOI01-04-GW	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
AOI01-04-GW	Perfluoroundecanoic acid	1.3 ng/l	UJ TH8
AOI01-04-SB-0-2	NEtFOSAA	0.041 ng/g	UJ ISL
AOI01-04-SB-0-2	NMeFOSAA	0.041 ng/g	UJ ISL
AOI01-04-SB-0-2	Perfluorohexanoic acid	0.36 ng/g	J+ EBG
AOI01-04-SB-0-2	Perfluorooctanesulfonic acid	0.50 ng/g	J+ EBG
AOI01-04-SB-0-2	Perfluoropentanesulfonic acid	0.024 ng/g	J TR
AOI01-04-SB-0-2	Perfluoropentanoic acid	0.33 ng/g	J+ EBG
AOI01-04-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-04-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-04-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-04-SB-13-15	NEtFOSAA	0.042 ng/g	X ISL
AOI01-04-SB-13-15	NMeFOSAA	0.042 ng/g	X ISL
AOI01-04-SB-13-15	Perfluorohexanesulfonic acid	0.022 ng/g	J TR
AOI01-04-SB-13-15	Perfluorohexanoic acid	0.042 ng/g	U EBL
AOI01-04-SB-13-15	Perfluorooctanesulfonic acid	0.042 ng/g	U EBL
AOI01-04-SB-31-33	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-04-SB-31-33	6:2 Fluorotelomer sulfonic acid	0.20 ng/g	X ISL
AOI01-04-SB-31-33	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-04-SB-31-33	NEtFOSAA	0.043 ng/g	X ISL
AOI01-04-SB-31-33	NMeFOSAA	0.043 ng/g	X ISL
AOI01-04-SB-31-33	Perfluorobutanoic acid	0.17 ng/g	UJ ISL
AOI01-04-SB-31-33	Perfluorodecanoic acid	0.043 ng/g	UJ ISL
AOI01-04-SB-31-33	Perfluorododecanoic acid	0.043 ng/g	UJ ISL
AOI01-04-SB-31-33	Perfluoroheptanoic acid	0.043 ng/g	UJ ISL
AOI01-04-SB-31-33	Perfluorohexanesulfonic acid	0.041 ng/g	J TR
AOI01-04-SB-31-33	Perfluorohexanoic acid	0.064 ng/g	UJ EBL, ISL
AOI01-04-SB-31-33	Perfluorooctanesulfonic acid	0.064 ng/g	U EBL

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-04-SB-31-33	Perfluorooctanoic acid	0.024 ng/g	J TR
AOI01-04-SB-31-33	Perfluorotetradecanoic acid	0.043 ng/g	UJ ISL
AOI01-04-SB-31-33	Perfluorotridecanoic acid	0.043 ng/g	UJ ISL
AOI01-04-SB-31-33	Perfluoroundecanoic acid	0.043 ng/g	UJ ISL
AOI01-05-SB-0-2	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI01-05-SB-0-2	6:2 Fluorotelomer sulfonic acid	0.082 ng/g	J+ ISL, TR
AOI01-05-SB-0-2	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI01-05-SB-0-2	NEtFOSAA	0.042 ng/g	X ISL
AOI01-05-SB-0-2	NMeFOSAA	0.042 ng/g	X ISL
AOI01-05-SB-0-2	Perfluorobutanesulfonic acid	0.11 ng/g	J TR
AOI01-05-SB-0-2	Perfluorobutanoic acid	0.53 ng/g	J+ ISL
AOI01-05-SB-0-2	Perfluorohexanoic acid	0.65 ng/g	J+ EBG
AOI01-05-SB-0-2	Perfluorononanesulfonic acid	0.028 ng/g	J TR
AOI01-05-SB-0-2	Perfluoropentanesulfonic acid	0.086 ng/g	J TR
AOI01-05-SB-0-2	Perfluoropentanoic acid	0.93 ng/g	J+ EBG
AOI01-MW11-GW	4:2 Fluorotelomer sulfonic acid	50 ng/l	UJ TH8
AOI01-MW11-GW	6:2 Fluorotelomer sulfonic acid	50 ng/l	UJ TH8
AOI01-MW11-GW	8:2 Fluorotelomer sulfonic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	NEtFOSAA	50 ng/l	UJ TH8
AOI01-MW11-GW	NMeFOSAA	50 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorobutanesulfonic acid	50 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorobutanoic acid	54 ng/l	J TH8, TR
AOI01-MW11-GW	Perfluorodecanesulfonic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorodecanoic acid	50 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorododecanoic acid	50 ng/l	UJ TH8
AOI01-MW11-GW	Perfluoroheptanesulfonic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluoroheptanoic acid	50 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorohexanesulfonic acid	36 ng/l	J TH8, TR
AOI01-MW11-GW	Perfluorohexanoic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorononanesulfonic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorononanoic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorooctanesulfonamide	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorooctanesulfonic acid	200 ng/l	J TH8
AOI01-MW11-GW	Perfluorooctanoic acid	36 ng/l	J TH8, TR
AOI01-MW11-GW	Perfluoropentanesulfonic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluoropentanoic acid	57 ng/l	J TH8, TR
AOI01-MW11-GW	Perfluorotetradecanoic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluorotridecanoic acid	75 ng/l	UJ TH8
AOI01-MW11-GW	Perfluoroundecanoic acid	75 ng/l	UJ TH8
AOI02-01-GW	Perfluorodecanoic acid	0.50 ng/l	J TR
AOI02-01-GW	Perfluorononanoic acid	1.2 ng/l	J TR
AOI02-01-GW	Perfluoropentanesulfonic acid	1.6 ng/l	J TR

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI02-01-SB-0-2	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-01-SB-0-2	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-01-SB-0-2	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-01-SB-0-2	NEtFOSAA	0.043 ng/g	X ISL
AOI02-01-SB-0-2	NMeFOSAA	0.043 ng/g	X ISL
AOI02-01-SB-0-2	Perfluorobutanesulfonic acid	0.043 ng/g	J TR
AOI02-01-SB-0-2	Perfluorobutanoic acid	0.11 ng/g	J+ ISL, TR
AOI02-01-SB-0-2	Perfluorodecanoic acid	0.15 ng/g	J+ ISL
AOI02-01-SB-0-2	Perfluorododecanoic acid	0.049 ng/g	J+ ISL, TR
AOI02-01-SB-0-2	Perfluoroheptanoic acid	0.042 ng/g	J+ ISL, TR
AOI02-01-SB-0-2	Perfluorohexanoic acid	0.075 ng/g	J+ EBG, ISL
AOI02-01-SB-0-2	Perfluorononanoic acid	0.10 ng/g	J+ ISL
AOI02-01-SB-0-2	Perfluorooctanesulfonic acid	2.3 ng/g	J+ EBG
AOI02-01-SB-0-2	Perfluorooctanoic acid	0.26 ng/g	J+ EBG, ISL
AOI02-01-SB-0-2	Perfluoropentanoic acid	0.040 ng/g	J+ ISL, TR
AOI02-01-SB-0-2	Perfluorotetradecanoic acid	0.043 ng/g	UJ ISL
AOI02-01-SB-0-2	Perfluorotridecanoic acid	0.043 ng/g	UJ ISL
AOI02-01-SB-0-2	Perfluoroundecanoic acid	0.052 ng/g	J+ ISL, TR
AOI02-01-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI02-01-SB-13-15	6:2 Fluorotelomer sulfonic acid	2.2 ng/g	X ISL
AOI02-01-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI02-01-SB-13-15	NEtFOSAA	0.044 ng/g	X ISL
AOI02-01-SB-13-15	NMeFOSAA	0.044 ng/g	X ISL
AOI02-01-SB-13-15	Perfluorobutanoic acid	0.11 ng/g	J+ ISL, TR
AOI02-01-SB-13-15	Perfluorodecanoic acid	0.044 ng/g	UJ ISL
AOI02-01-SB-13-15	Perfluorododecanoic acid	0.044 ng/g	X ISL
AOI02-01-SB-13-15	Perfluoroheptanoic acid	0.044 ng/g	UJ ISL
AOI02-01-SB-13-15	Perfluorohexanesulfonic acid	0.039 ng/g	J TR
AOI02-01-SB-13-15	Perfluorohexanoic acid	0.11 ng/g	J+ EBG, ISL
AOI02-01-SB-13-15	Perfluorononanoic acid	0.044 ng/g	UJ ISL
AOI02-01-SB-13-15	Perfluorooctanesulfonamide	0.044 ng/g	U EBL
AOI02-01-SB-13-15	Perfluorooctanesulfonic acid	0.044 ng/g	U EBL
AOI02-01-SB-13-15	Perfluorooctanoic acid	0.044 ng/g	UJ EBL, ISL
AOI02-01-SB-13-15	Perfluoropentanoic acid	0.044 ng/g	UJ ISL
AOI02-01-SB-13-15	Perfluorotetradecanoic acid	0.044 ng/g	X ISL
AOI02-01-SB-13-15	Perfluorotridecanoic acid	0.044 ng/g	X ISL
AOI02-01-SB-13-15	Perfluoroundecanoic acid	0.044 ng/g	X ISL
AOI02-01-SB-34-36	4:2 Fluorotelomer sulfonic acid	0.19 ng/g	X ISL
AOI02-01-SB-34-36	6:2 Fluorotelomer sulfonic acid	16 ng/g	X ISL
AOI02-01-SB-34-36	8:2 Fluorotelomer sulfonic acid	1.4 ng/g	X ISL
AOI02-01-SB-34-36	NEtFOSAA	0.047 ng/g	X ISL
AOI02-01-SB-34-36	NMeFOSAA	0.047 ng/g	X ISL

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI02-01-SB-34-36	Perfluorobutanoic acid	0.25 ng/g	J+ ISL
AOI02-01-SB-34-36	Perfluorodecanoic acid	0.047 ng/g	UJ ISL
AOI02-01-SB-34-36	Perfluorododecanoic acid	0.047 ng/g	UJ ISL
AOI02-01-SB-34-36	Perfluoroheptanoic acid	0.036 ng/g	J+ ISL, TR
AOI02-01-SB-34-36	Perfluorohexanoic acid	0.29 ng/g	J+ EBG, ISL
AOI02-01-SB-34-36	Perfluorononanoic acid	0.047 ng/g	UJ ISL
AOI02-01-SB-34-36	Perfluorooctanesulfonamide	0.047 ng/g	U EBL
AOI02-01-SB-34-36	Perfluorooctanesulfonic acid	0.50 ng/g	J+ EBG
AOI02-01-SB-34-36	Perfluorooctanoic acid	0.12 ng/g	J+ EBG, ISL
AOI02-01-SB-34-36	Perfluoropentanoic acid	0.065 ng/g	J+ ISL, TR
AOI02-01-SB-34-36	Perfluorotetradecanoic acid	0.047 ng/g	X ISL
AOI02-01-SB-34-36	Perfluorotridecanoic acid	0.047 ng/g	UJ ISL
AOI02-01-SB-34-36	Perfluoroundecanoic acid	0.047 ng/g	UJ ISL
AOI02-02-GW	Perfluorodecanoic acid	0.63 ng/l	J TR
AOI02-02-SB-0-2	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-02-SB-0-2	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-02-SB-0-2	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-02-SB-0-2	NEtFOSAA	0.042 ng/g	X ISL
AOI02-02-SB-0-2	NMeFOSAA	0.042 ng/g	X ISL
AOI02-02-SB-0-2	Perfluorobutanesulfonic acid	0.043 ng/g	J TR
AOI02-02-SB-0-2	Perfluorobutanoic acid	0.19 ng/g	J+ ISL, TR
AOI02-02-SB-0-2	Perfluorodecanoic acid	0.045 ng/g	J+ ISL, TR
AOI02-02-SB-0-2	Perfluorododecanoic acid	0.042 ng/g	UJ ISL
AOI02-02-SB-0-2	Perfluoroheptanoic acid	0.10 ng/g	J+ ISL
AOI02-02-SB-0-2	Perfluorohexanesulfonic acid	0.045 ng/g	J TR
AOI02-02-SB-0-2	Perfluorohexanoic acid	0.18 ng/g	J+ EBG, ISL
AOI02-02-SB-0-2	Perfluorononanoic acid	0.067 ng/g	J+ ISL
AOI02-02-SB-0-2	Perfluorooctanesulfonic acid	1.0 ng/g	J+ EBG
AOI02-02-SB-0-2	Perfluorooctanoic acid	0.21 ng/g	J+ EBG, ISL
AOI02-02-SB-0-2	Perfluoropentanoic acid	0.18 ng/g	J+ ISL
AOI02-02-SB-0-2	Perfluorotetradecanoic acid	0.042 ng/g	UJ ISL
AOI02-02-SB-0-2	Perfluorotridecanoic acid	0.042 ng/g	UJ ISL
AOI02-02-SB-0-2	Perfluoroundecanoic acid	0.042 ng/g	UJ ISL
AOI02-02-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	X ISL
AOI02-02-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.33 ng/g	X ISL
AOI02-02-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.69 ng/g	X ISL
AOI02-02-SB-13-15	NEtFOSAA	0.045 ng/g	X ISL
AOI02-02-SB-13-15	NMeFOSAA	0.045 ng/g	X ISL
AOI02-02-SB-13-15	Perfluorobutanoic acid	0.20 ng/g	J+ ISL, TR
AOI02-02-SB-13-15	Perfluorodecanoic acid	0.045 ng/g	UJ ISL
AOI02-02-SB-13-15	Perfluorododecanoic acid	0.045 ng/g	UJ ISL
AOI02-02-SB-13-15	Perfluoroheptanoic acid	0.053 ng/g	J+ ISL, TR

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI02-02-SB-13-15	Perfluorohexanesulfonic acid	0.025 ng/g	J TR
AOI02-02-SB-13-15	Perfluorohexanoic acid	0.096 ng/g	J+ EBG, ISL
AOI02-02-SB-13-15	Perfluorononanoic acid	0.045 ng/g	UJ ISL
AOI02-02-SB-13-15	Perfluorooctanesulfonic acid	0.13 ng/g	J+ EBG
AOI02-02-SB-13-15	Perfluorooctanoic acid	0.11 ng/g	J+ EBG, ISL
AOI02-02-SB-13-15	Perfluoropentanoic acid	0.10 ng/g	J+ ISL
AOI02-02-SB-13-15	Perfluorotetradecanoic acid	0.045 ng/g	UJ ISL
AOI02-02-SB-13-15	Perfluorotridecanoic acid	0.045 ng/g	UJ ISL
AOI02-02-SB-13-15	Perfluoroundecanoic acid	0.045 ng/g	UJ ISL
AOI02-02-SB-36-38	4:2 Fluorotelomer sulfonic acid	0.19 ng/g	X ISL
AOI02-02-SB-36-38	6:2 Fluorotelomer sulfonic acid	0.18 ng/g	X ISL
AOI02-02-SB-36-38	8:2 Fluorotelomer sulfonic acid	0.19 ng/g	X ISL
AOI02-02-SB-36-38	NEtFOSAA	0.047 ng/g	X ISL
AOI02-02-SB-36-38	NMeFOSAA	0.047 ng/g	X ISL
AOI02-02-SB-36-38	Perfluorobutanoic acid	0.18 ng/g	J TR
AOI02-02-SB-36-38	Perfluorododecanoic acid	0.047 ng/g	UJ ISL
AOI02-02-SB-36-38	Perfluoroheptanoic acid	0.040 ng/g	J TR
AOI02-02-SB-36-38	Perfluorohexanesulfonic acid	0.029 ng/g	J TR
AOI02-02-SB-36-38	Perfluorohexanoic acid	0.12 ng/g	J+ EBG
AOI02-02-SB-36-38	Perfluorononanoic acid	0.047 ng/g	J TR
AOI02-02-SB-36-38	Perfluorooctanesulfonic acid	0.74 ng/g	J+ EBG
AOI02-02-SB-36-38	Perfluorooctanoic acid	0.071 ng/g	U EBL
AOI02-02-SB-36-38	Perfluoropentanoic acid	0.058 ng/g	J TR
AOI02-02-SB-36-38	Perfluorotetradecanoic acid	0.047 ng/g	UJ ISL
AOI02-02-SB-36-38	Perfluorotridecanoic acid	0.047 ng/g	UJ ISL
AOI02-03-GW	Perfluoroheptanoic acid	11 ng/l	J TR
AOI02-03-GW	Perfluorooctanesulfonic acid	13 ng/l	J TR
AOI02-03-SB-0-2	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-03-SB-0-2	6:2 Fluorotelomer sulfonic acid	0.090 ng/g	J TR
AOI02-03-SB-0-2	8:2 Fluorotelomer sulfonic acid	0.23 ng/g	J TR
AOI02-03-SB-0-2	NEtFOSAA	0.042 ng/g	X ISL
AOI02-03-SB-0-2	NMeFOSAA	0.042 ng/g	X ISL
AOI02-03-SB-0-2	Perfluorodecanesulfonic acid	0.021 ng/g	J TR
AOI02-03-SB-0-2	Perfluorododecanoic acid	0.059 ng/g	J TR
AOI02-03-SB-0-2	Perfluoroheptanesulfonic acid	0.022 ng/g	J TR
AOI02-03-SB-0-2	Perfluorohexanoic acid	0.65 ng/g	J+ EBG
AOI02-03-SB-0-2	Perfluoropentanesulfonic acid	0.026 ng/g	J TR
AOI02-03-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI02-03-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-03-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
AOI02-03-SB-13-15	NEtFOSAA	0.042 ng/g	X ISL
AOI02-03-SB-13-15	NMeFOSAA	0.042 ng/g	X ISL

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI02-03-SB-13-15	Perfluorobutanesulfonic acid	0.18 ng/g	J TR
AOI02-03-SB-13-15	Perfluorohexanoic acid	0.77 ng/g	J+ EBG
AOI02-03-SB-36-38	4:2 Fluorotelomer sulfonic acid	0.089 ng/g	J+ ISL, TR
AOI02-03-SB-36-38	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-03-SB-36-38	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ ISL
AOI02-03-SB-36-38	NEtFOSAA	0.044 ng/g	X ISL
AOI02-03-SB-36-38	NMeFOSAA	0.044 ng/g	X ISL
AOI02-03-SB-36-38	Perfluorohexanoic acid	2.0 ng/g	J+ EBG
AOI02-03-SB-36-38	Perfluoropentanesulfonic acid	0.12 ng/g	J TR
AOI02-03-SB-36-38	Perfluoropentanoic acid	6.6 ng/g	J- MSL
AOI02-04-GW	4:2 Fluorotelomer sulfonic acid	0.92 ng/l	UJ TH8
AOI02-04-GW	6:2 Fluorotelomer sulfonic acid	0.92 ng/l	UJ TH8
AOI02-04-GW	8:2 Fluorotelomer sulfonic acid	1.4 ng/l	UJ TH8
AOI02-04-GW	NEtFOSAA	0.92 ng/l	UJ TH8
AOI02-04-GW	NMeFOSAA	0.92 ng/l	UJ TH8
AOI02-04-GW	Perfluorobutanesulfonic acid	13 ng/l	J TH8
AOI02-04-GW	Perfluorobutanoic acid	10 ng/l	J TH8
AOI02-04-GW	Perfluorodecanesulfonic acid	1.4 ng/l	UJ TH8
AOI02-04-GW	Perfluorodecanoic acid	0.92 ng/l	UJ TH8
AOI02-04-GW	Perfluorododecanoic acid	0.92 ng/l	UJ TH8
AOI02-04-GW	Perfluoroheptanesulfonic acid	2.0 ng/l	J TH8
AOI02-04-GW	Perfluoroheptanoic acid	12 ng/l	J TH8
AOI02-04-GW	Perfluorohexanesulfonic acid	140 ng/l	J TH8
AOI02-04-GW	Perfluorohexanoic acid	47 ng/l	J TH8
AOI02-04-GW	Perfluorononanesulfonic acid	1.4 ng/l	UJ TH8
AOI02-04-GW	Perfluorononanoic acid	1.5 ng/l	J TH8, TR
AOI02-04-GW	Perfluorooctanesulfonamide	1.4 ng/l	UJ TH8
AOI02-04-GW	Perfluorooctanesulfonic acid	51 ng/l	J TH8
AOI02-04-GW	Perfluorooctanoic acid	140 ng/l	J TH8
AOI02-04-GW	Perfluoropentanesulfonic acid	7.9 ng/l	J TH8
AOI02-04-GW	Perfluoropentanoic acid	21 ng/l	J TH8
AOI02-04-GW	Perfluorotetradecanoic acid	1.4 ng/l	UJ TH8
AOI02-04-GW	Perfluorotridecanoic acid	1.4 ng/l	UJ TH8
AOI02-04-GW	Perfluoroundecanoic acid	1.4 ng/l	UJ TH8
AOI02-04-SB-0-2	6:2 Fluorotelomer sulfonic acid	0.097 ng/g	J TR
AOI02-04-SB-0-2	NEtFOSAA	0.041 ng/g	X ISL
AOI02-04-SB-0-2	NMeFOSAA	0.041 ng/g	X ISL
AOI02-04-SB-0-2	Perfluorobutanoic acid	0.16 ng/g	J TR
AOI02-04-SB-0-2	Perfluorodecanoic acid	0.041 ng/g	J TR
AOI02-04-SB-0-2	Perfluoroheptanesulfonic acid	0.022 ng/g	J TR
AOI02-04-SB-0-2	Perfluorohexanoic acid	0.27 ng/g	J+ EBG
AOI02-04-SB-0-2	Perfluorononanoic acid	0.043 ng/g	J TR

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI02-04-SB-0-2	Perfluorooctanesulfonic acid	2.7 ng/g	J+ EBG
AOI02-04-SB-0-2	Perfluorooctanoic acid	0.87 ng/g	J+ EBG
AOI02-04-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.20 ng/g	UJ ISL
AOI02-04-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.20 ng/g	UJ ISL
AOI02-04-SB-13-15	NEtFOSAA	0.051 ng/g	UJ ISL
AOI02-04-SB-13-15	NMeFOSAA	0.051 ng/g	UJ ISL
AOI02-04-SB-13-15	Perfluorobutanesulfonic acid	0.056 ng/g	J TR
AOI02-04-SB-13-15	Perfluorobutanoic acid	0.21 ng/g	J+ ISL, TR
AOI02-04-SB-13-15	Perfluoroheptanoic acid	0.035 ng/g	J+ ISL, TR
AOI02-04-SB-13-15	Perfluorohexanoic acid	0.32 ng/g	J+ EBG
AOI02-04-SB-13-15	Perfluorooctanesulfonic acid	0.39 ng/g	J+ EBG
AOI02-04-SB-13-15	Perfluorooctanoic acid	0.16 ng/g	J+ EBG, ISL
AOI02-04-SB-13-15	Perfluoropentanesulfonic acid	0.042 ng/g	J TR
AOI02-04-SB-13-15	Perfluoropentanoic acid	0.051 ng/g	UJ ISL
AOI02-04-SB-36-38	4:2 Fluorotelomer sulfonic acid	0.21 ng/g	X ISL
AOI02-04-SB-36-38	6:2 Fluorotelomer sulfonic acid	0.53 ng/g	X ISL
AOI02-04-SB-36-38	8:2 Fluorotelomer sulfonic acid	0.21 ng/g	X ISL
AOI02-04-SB-36-38	NEtFOSAA	0.053 ng/g	X ISL
AOI02-04-SB-36-38	NMeFOSAA	0.053 ng/g	X ISL
AOI02-04-SB-36-38	Perfluorobutanesulfonic acid	0.078 ng/g	J TR
AOI02-04-SB-36-38	Perfluorohexanoic acid	2.5 ng/g	J+ EBG
AOI02-04-SB-36-38	Perfluorooctanesulfonamide	0.053 ng/g	U EBL
AOI02-04-SB-36-38	Perfluorooctanesulfonic acid	0.89 ng/g	J+ EBG
AOI02-04-SB-36-38	Perfluorooctanoic acid	0.64 ng/g	J+ EBG
AOI02-04-SB-36-38	Perfluoropentanesulfonic acid	0.048 ng/g	J TR
KAASF-01-GW	Perfluorononanoic acid	0.75 ng/l	J TR
KAASF-01-GW	Perfluoropentanesulfonic acid	0.94 ng/l	J TR
KAASF-01-SB-0TO2	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ TH8, ISL
KAASF-01-SB-0TO2	6:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ TH8, ISL
KAASF-01-SB-0TO2	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ TH8, ISL
KAASF-01-SB-0TO2	NEtFOSAA	0.043 ng/g	X TH8, ISL
KAASF-01-SB-0TO2	NMeFOSAA	0.043 ng/g	X TH8, ISL
KAASF-01-SB-0TO2	Perfluorobutanesulfonic acid	0.17 ng/g	UJ TH8
KAASF-01-SB-0TO2	Perfluorobutanoic acid	0.17 ng/g	J TH8, ISL, TR
KAASF-01-SB-0TO2	Perfluorodecanesulfonic acid	0.043 ng/g	UJ TH8
KAASF-01-SB-0TO2	Perfluorodecanoic acid	0.066 ng/g	J TH8
KAASF-01-SB-0TO2	Perfluorododecanoic acid	0.030 ng/g	J TH8, TR
KAASF-01-SB-0TO2	Perfluoroheptanesulfonic acid	0.043 ng/g	UJ TH8
KAASF-01-SB-0TO2	Perfluoroheptanoic acid	0.054 ng/g	J TH8, TR
KAASF-01-SB-0TO2	Perfluorohexanesulfonic acid	0.090 ng/g	J TH8
KAASF-01-SB-0TO2	Perfluorohexanoic acid	0.072 ng/g	J TH8
KAASF-01-SB-0TO2	Perfluorononanesulfonic acid	0.043 ng/g	UJ TH8

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
KAASF-01-SB-0TO2	Perfluorononanoic acid	0.092 ng/g	J TH8
KAASF-01-SB-0TO2	Perfluorooctanesulfonamide	0.043 ng/g	UJ TH8
KAASF-01-SB-0TO2	Perfluorooctanesulfonic acid	1.1 ng/g	J TH8
KAASF-01-SB-0TO2	Perfluorooctanoic acid	0.28 ng/g	J TH8
KAASF-01-SB-0TO2	Perfluoropentanesulfonic acid	0.043 ng/g	UJ TH8
KAASF-01-SB-0TO2	Perfluoropentanoic acid	0.036 ng/g	J TH8, TR
KAASF-01-SB-0TO2	Perfluorotetradecanoic acid	0.043 ng/g	UJ TH8, ISL
KAASF-01-SB-0TO2	Perfluorotridecanoic acid	0.043 ng/g	UJ TH8
KAASF-01-SB-0TO2	Perfluoroundecanoic acid	0.023 ng/g	J TH8, TR
KAASF-01-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-01-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-01-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-01-SB-13-15	NEtFOSAA	0.045 ng/g	X TH8, ISL
KAASF-01-SB-13-15	NMeFOSAA	0.045 ng/g	X TH8, ISL
KAASF-01-SB-13-15	Perfluorobutanesulfonic acid	0.18 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorobutanoic acid	0.18 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorodecanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorodecanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorododecanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluoroheptanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluoroheptanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorohexanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorohexanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorononanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorononanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorooctanesulfonamide	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorooctanesulfonic acid	0.071 ng/g	J TH8
KAASF-01-SB-13-15	Perfluorooctanoic acid	0.037 ng/g	J TH8, TR
KAASF-01-SB-13-15	Perfluoropentanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluoropentanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorotetradecanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluorotridecanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-13-15	Perfluoroundecanoic acid	0.045 ng/g	UJ TH8
KAASF-01-SB-40-42	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-01-SB-40-42	6:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-01-SB-40-42	8:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-01-SB-40-42	NEtFOSAA	0.046 ng/g	X TH8, ISL
KAASF-01-SB-40-42	NMeFOSAA	0.046 ng/g	X TH8, ISL
KAASF-01-SB-40-42	Perfluorobutanesulfonic acid	0.18 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorobutanoic acid	0.18 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorodecanesulfonic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorodecanoic acid	0.046 ng/g	UJ TH8

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
KAASF-01-SB-40-42	Perfluorododecanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluoroheptanesulfonic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluoroheptanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorohexanesulfonic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorohexanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorononanesulfonic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorononanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorooctanesulfonamide	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorooctanesulfonic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorooctanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluoropentanesulfonic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluoropentanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorotetradecanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluorotridecanoic acid	0.046 ng/g	UJ TH8
KAASF-01-SB-40-42	Perfluoroundecanoic acid	0.046 ng/g	UJ TH8
KAASF-02-GW	4:2 Fluorotelomer sulfonic acid	0.87 ng/l	UJ TH8
KAASF-02-GW	6:2 Fluorotelomer sulfonic acid	0.87 ng/l	UJ TH8
KAASF-02-GW	8:2 Fluorotelomer sulfonic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	NEtFOSAA	0.87 ng/l	UJ TH8
KAASF-02-GW	NMeFOSAA	0.87 ng/l	UJ TH8
KAASF-02-GW	Perfluorobutanesulfonic acid	0.38 ng/l	J TH8, TR
KAASF-02-GW	Perfluorobutanoic acid	1.8 ng/l	J+ TH8, FBG
KAASF-02-GW	Perfluorodecanesulfonic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluorodecanoic acid	0.64 ng/l	J TH8, TR
KAASF-02-GW	Perfluorododecanoic acid	0.87 ng/l	UJ TH8
KAASF-02-GW	Perfluoroheptanesulfonic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluoroheptanoic acid	0.52 ng/l	J TH8, TR
KAASF-02-GW	Perfluorohexanesulfonic acid	0.61 ng/l	J TH8, TR
KAASF-02-GW	Perfluorohexanoic acid	1.2 ng/l	J TH8, TR
KAASF-02-GW	Perfluorononanesulfonic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluorononanoic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluorooctanesulfonamide	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluorooctanesulfonic acid	4.6 ng/l	J TH8
KAASF-02-GW	Perfluorooctanoic acid	1.8 ng/l	J TH8
KAASF-02-GW	Perfluoropentanesulfonic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluoropentanoic acid	1.2 ng/l	J TH8, TR
KAASF-02-GW	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
KAASF-02-GW	Perfluoroundecanoic acid	1.3 ng/l	UJ TH8
KAASF-02-SB-01-02	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ TH8
KAASF-02-SB-01-02	6:2 Fluorotelomer sulfonic acid	0.079 ng/g	J TH8, TR
KAASF-02-SB-01-02	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	UJ TH8

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
KAASF-02-SB-01-02	NEtFOSAA	0.044 ng/g	X TH8, ISL
KAASF-02-SB-01-02	NMeFOSAA	0.044 ng/g	X TH8, ISL
KAASF-02-SB-01-02	Perfluorobutanesulfonic acid	0.17 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluorobutanoic acid	0.10 ng/g	J TH8, TR
KAASF-02-SB-01-02	Perfluorodecanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluorodecanoic acid	0.022 ng/g	J TH8, TR
KAASF-02-SB-01-02	Perfluorododecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluoroheptanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluoroheptanoic acid	0.60 ng/g	J TH8
KAASF-02-SB-01-02	Perfluorohexanesulfonic acid	0.20 ng/g	J TH8
KAASF-02-SB-01-02	Perfluorohexanoic acid	0.061 ng/g	J TH8, TR
KAASF-02-SB-01-02	Perfluorononanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluorononanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluorooctanesulfonamide	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluorooctanesulfonic acid	2.2 ng/g	J TH8
KAASF-02-SB-01-02	Perfluorooctanoic acid	1.2 ng/g	J TH8
KAASF-02-SB-01-02	Perfluoropentanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluoropentanoic acid	0.045 ng/g	J TH8, TR
KAASF-02-SB-01-02	Perfluorotetradecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluorotridecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-01-02	Perfluoroundecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-02-SB-13-15	6:2 Fluorotelomer sulfonic acid	0.067 ng/g	J TH8, ISL, TR
KAASF-02-SB-13-15	8:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-02-SB-13-15	NEtFOSAA	0.044 ng/g	X TH8, ISL
KAASF-02-SB-13-15	NMeFOSAA	0.044 ng/g	X TH8, ISL
KAASF-02-SB-13-15	Perfluorobutanesulfonic acid	0.18 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorobutanoic acid	0.18 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorodecanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorodecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorododecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluoroheptanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluoroheptanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorohexanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorohexanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorononanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorononanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorooctanesulfonamide	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorooctanesulfonic acid	0.068 ng/g	J TH8
KAASF-02-SB-13-15	Perfluorooctanoic acid	0.024 ng/g	J TH8, TR
KAASF-02-SB-13-15	Perfluoropentanesulfonic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluoropentanoic acid	0.044 ng/g	UJ TH8

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
KAASF-02-SB-13-15	Perfluorotetradecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluorotridecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-13-15	Perfluoroundecanoic acid	0.044 ng/g	UJ TH8
KAASF-02-SB-46-48	4:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-02-SB-46-48	6:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-02-SB-46-48	8:2 Fluorotelomer sulfonic acid	0.18 ng/g	UJ TH8, ISL
KAASF-02-SB-46-48	NEtFOSAA	0.045 ng/g	X TH8, ISL
KAASF-02-SB-46-48	NMeFOSAA	0.045 ng/g	X TH8, ISL
KAASF-02-SB-46-48	Perfluorobutanesulfonic acid	0.18 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorobutanoic acid	0.18 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorodecanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorodecanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorododecanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluoroheptanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluoroheptanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorohexanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorohexanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorononanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorononanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorooctanesulfonamide	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorooctanesulfonic acid	0.38 ng/g	J TH8
KAASF-02-SB-46-48	Perfluorooctanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluoropentanesulfonic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluoropentanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorotetradecanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluorotridecanoic acid	0.045 ng/g	UJ TH8
KAASF-02-SB-46-48	Perfluoroundecanoic acid	0.045 ng/g	UJ TH8
KAASF-DUP-GW-01	4:2 Fluorotelomer sulfonic acid	210 ng/l	J TH8
KAASF-DUP-GW-01	6:2 Fluorotelomer sulfonic acid	8,100 ng/l	J- TH8, ISH
KAASF-DUP-GW-01	8:2 Fluorotelomer sulfonic acid	330 ng/l	J TH8
KAASF-DUP-GW-01	NEtFOSAA	0.88 ng/l	UJ TH8
KAASF-DUP-GW-01	NMeFOSAA	0.88 ng/l	UJ TH8
KAASF-DUP-GW-01	Perfluorobutanesulfonic acid	530 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorobutanoic acid	600 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorodecanesulfonic acid	0.62 ng/l	J TH8, TR
KAASF-DUP-GW-01	Perfluorodecanoic acid	19 ng/l	J- TH8, ISH
KAASF-DUP-GW-01	Perfluorododecanoic acid	0.87 ng/l	J- TH8, ISH, TR
KAASF-DUP-GW-01	Perfluoroheptanesulfonic acid	150 ng/l	J TH8
KAASF-DUP-GW-01	Perfluoroheptanoic acid	860 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorohexanesulfonic acid	6,700 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorohexanoic acid	6,000 ng/l	J TH8, FDD
KAASF-DUP-GW-01	Perfluorononanesulfonic acid	2.1 ng/l	J TH8

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Sample Identification	Analyte	Concentration	Qualifier and Reason Code
KAASF-DUP-GW-01	Perfluorononanoic acid	34 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorooctanesulfonamide	34 ng/l	J- TH8, ISH
KAASF-DUP-GW-01	Perfluorooctanesulfonic acid	6,900 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorooctanoic acid	710 ng/l	J TH8
KAASF-DUP-GW-01	Perfluoropentanesulfonic acid	550 ng/l	J TH8
KAASF-DUP-GW-01	Perfluoropentanoic acid	2,600 ng/l	J TH8
KAASF-DUP-GW-01	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-01	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-01	Perfluoroundecanoic acid	3.3 ng/l	J- TH8, ISH
KAASF-DUP-GW-02	4:2 Fluorotelomer sulfonic acid	0.87 ng/l	UJ TH8
KAASF-DUP-GW-02	6:2 Fluorotelomer sulfonic acid	0.87 ng/l	UJ TH8
KAASF-DUP-GW-02	8:2 Fluorotelomer sulfonic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-02	NEtFOSAA	0.87 ng/l	UJ TH8
KAASF-DUP-GW-02	NMeFOSAA	0.87 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluorobutanesulfonic acid	12 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorobutanoic acid	10 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorodecanesulfonic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluorodecanoic acid	0.67 ng/l	J TH8, TR
KAASF-DUP-GW-02	Perfluorododecanoic acid	0.87 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluoroheptanesulfonic acid	2.0 ng/l	J TH8
KAASF-DUP-GW-02	Perfluoroheptanoic acid	11 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorohexanesulfonic acid	130 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorohexanoic acid	44 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorononanesulfonic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluorononanoic acid	1.6 ng/l	J TH8, TR
KAASF-DUP-GW-02	Perfluorooctanesulfonamide	1.3 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluorooctanesulfonic acid	51 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorooctanoic acid	150 ng/l	J TH8
KAASF-DUP-GW-02	Perfluoropentanesulfonic acid	7.8 ng/l	J TH8
KAASF-DUP-GW-02	Perfluoropentanoic acid	20 ng/l	J TH8
KAASF-DUP-GW-02	Perfluorotetradecanoic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluorotridecanoic acid	1.3 ng/l	UJ TH8
KAASF-DUP-GW-02	Perfluoroundecanoic acid	1.3 ng/l	UJ TH8
KAASF-DUP-SB-01	6:2 Fluorotelomer sulfonic acid	0.088 ng/g	J TR
KAASF-DUP-SB-01	NEtFOSAA	0.042 ng/g	X ISL
KAASF-DUP-SB-01	NMeFOSAA	0.042 ng/g	X ISL
KAASF-DUP-SB-01	Perfluorobutanoic acid	0.20 ng/g	J TR
KAASF-DUP-SB-01	Perfluorodecanoic acid	0.045 ng/g	J TR
KAASF-DUP-SB-01	Perfluorohexanoic acid	0.41 ng/g	J+ EBG
KAASF-DUP-SB-01	Perfluorononanoic acid	0.041 ng/g	J TR
KAASF-DUP-SB-01	Perfluorooctanesulfonic acid	2.8 ng/g	J+ EBG
KAASF-DUP-SB-01	Perfluorooctanoic acid	0.88 ng/g	J+ EBG

Table 4
Qualifiers Applied During Validation
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
KAASF-DUP-SB-02	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
KAASF-DUP-SB-02	6:2 Fluorotelomer sulfonic acid	0.38 ng/g	X ISL
KAASF-DUP-SB-02	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X MSL, ISL
KAASF-DUP-SB-02	NEtFOSAA	0.042 ng/g	X ISL
KAASF-DUP-SB-02	NMeFOSAA	0.042 ng/g	X ISL
KAASF-DUP-SB-02	Perfluorobutanesulfonic acid	0.049 ng/g	J TR
KAASF-DUP-SB-02	Perfluorobutanoic acid	0.13 ng/g	J+ ISL, TR
KAASF-DUP-SB-02	Perfluorodecanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-02	Perfluorododecanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-02	Perfluoroheptanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-02	Perfluorohexanoic acid	0.096 ng/g	J+ ISL
KAASF-DUP-SB-02	Perfluorononanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-02	Perfluorooctanesulfonamide	0.042 ng/g	U EBL
KAASF-DUP-SB-02	Perfluorooctanesulfonic acid	0.059 ng/g	J TR
KAASF-DUP-SB-02	Perfluorooctanoic acid	0.061 ng/g	J+ ISL, TR
KAASF-DUP-SB-02	Perfluoropentanoic acid	0.13 ng/g	J+ ISL
KAASF-DUP-SB-02	Perfluorotetradecanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-02	Perfluorotridecanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-02	Perfluoroundecanoic acid	0.042 ng/g	UJ ISL
KAASF-DUP-SB-03	4:2 Fluorotelomer sulfonic acid	11 ng/g	J+ ISL
KAASF-DUP-SB-03	6:2 Fluorotelomer sulfonic acid	430 ng/g	J- ISH
KAASF-DUP-SB-03	NEtFOSAA	0.42 ng/g	X ISL
KAASF-DUP-SB-03	NMeFOSAA	0.42 ng/g	X ISL
KAASF-DUP-SB-03	Perfluorodecanesulfonic acid	0.45 ng/g	J- ISH, TR
KAASF-DUP-SB-03	Perfluorooctanesulfonic acid	1,500 ng/g	J- ISH
KAASF-DUP-SB-04	4:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
KAASF-DUP-SB-04	6:2 Fluorotelomer sulfonic acid	0.27 ng/g	X ISL
KAASF-DUP-SB-04	8:2 Fluorotelomer sulfonic acid	0.17 ng/g	X ISL
KAASF-DUP-SB-04	NEtFOSAA	0.042 ng/g	X ISL
KAASF-DUP-SB-04	NMeFOSAA	0.042 ng/g	X ISL
KAASF-DUP-SB-04	Perfluorobutanesulfonic acid	0.15 ng/g	J TR
KAASF-DUP-SB-04	Perfluorobutanoic acid	0.48 ng/g	J+ ISL
KAASF-DUP-SB-04	Perfluorohexanoic acid	0.79 ng/g	J+ EBG
KAASF-DUP-SB-04	Perfluorononanesulfonic acid	0.024 ng/g	J TR
KAASF-DUP-SB-04	Perfluoropentanesulfonic acid	0.11 ng/g	J TR
KAASF-DUP-SB-04	Perfluoropentanoic acid	0.97 ng/g	J+ EBG
KAASF-DUP-SB-04	Perfluoroundecanoic acid	0.060 ng/g	J TR

Notes:
NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid
ng/g = nanograms per gram
ng/L = nanograms per liter

Table 4
Qualifiers Applied During Validation
Kalaeloa Army Aviation Support Facility
Oahu, Hawaii

NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid

Qualifier Definitions:

J = The reported result is an estimated quantity with an unknown bias.

J+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

U = The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.

UJ = The analyte was not detected and was reported as less than the limit of detection. However, the associated numerical value is approximate.

X = The sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Reason Codes:

CFD = Imprecision between primary, duplicate, and triplicate results.

EBG = The analyte was detected in the associated equipment blank and the concentration detected in the sample was greater than the limit of quantitation (LOQ) and less than five times the concentration detected in the blank.

EBL = The analyte was detected in the associated equipment blank and the concentration detected in the sample was less than the LOQ and less than five times the concentration detected in the blank.

EMPC = The ion transition ratio is outside of expected limits.

FBG = The analyte was detected in the associated field blank and the concentration detected in the sample was less than the LOQ and less than five times the concentration detected in the blank.

FDD = Imprecision between primary and field duplicate results.

ISH = High extracted internal standard (EIS) recovery.

ISL = Low EIS recovery.

TH8 = Elevated sample receipt temperature.

TR = The detected concentration is less than the LOQ.

Appendix B

Field Documentation

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Appendix B1

Logs of Daily Notice of Field Activities

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Log of Daily Notice of Field Activity
Kalaeloa AASF, HI

Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/5/2022	Catharine Creadick, Teresa Quiniola	82 degrees sunny	EA's field team arrived onsite at 0700. The Team proceeded to collect a groundwater sample at AOI01-04, AOI01-01, AOI02-04 and MW-11. The Team also collected an equipment blank and field blank. Team offsite at 1530.	None.	Installation of 10 permanent groundwater wells completed, soil sampling completed, and development completed. Collection of 11 of 11 groundwater samples completed.	Leslie Chau (HIARNG)
5/4/2022	Catharine Creadick, Teresa Quiniola	84 degrees sunny	EA's field team arrived onsite at 0700. The Team proceeded to collect a groundwater sample at KAASF-02, AOI01-03, and AOI01-02. The Team also collected an equipment blank and field blank. Team offsite at 1400.	None.	Installation of 10 permanent groundwater wells completed, soil sampling completed, and development completed. Collection of 7 of 11 groundwater samples completed.	None
5/3/2022	Chris Ma, Teresa Quiniola	78 degrees cloudy	EA's field team arrived onsite at 0900. The Team proceeded to the airfield to collect a groundwater sample at AOI02-03. The Team also collected an equipment blank and field blank. Groundwater samples collected from 29 April, 2 May, and 5/3 were then shipped out for analysis. Team offsite at 1230.	None.	Installation of 10 permanent groundwater wells completed, soil sampling completed, and development completed. Collection of 4 of 11 groundwater samples completed.	Leslie Chau (HIARNG)
5/2/2022	Catharine Creadick, Teresa Quiniola	78 degrees sunny; some rain	EA's field team arrived onsite at 0830. Team collected a field blank and then proceeded to conduct the synoptic water level survey of all wells. Then Team proceeded to AOI02-02 to collect a groundwater sample and equipment blank. Team then proceeded to AOI02-01 to collect a groundwater sample. Team offsite at 1652.	None.	Installation of 10 permanent groundwater wells completed, soil sampling completed, and development completed. Collection of 3 of 11 groundwater samples completed.	Leslie Chau (HIARNG)
4/29/2022	Catharine Creadick, Teresa Quiniola	80 degrees sunny	EA's field team arrived onsite at 0845. Team developed well AOI01-04. Then Team proceeded to KAASF-01. Groundwater sample, equipment blank, and field blank collected from KAASF-01. Team offsite at 1400.	None.	Installation of 10 permanent groundwater wells completed, soil sampling completed, and development completed. Collection of 1 of 11 groundwater samples completed.	Leslie Chau (HIARNG)
4/28/2022	Catharine Creadick, Teresa Quiniola	84 degrees sunny	EA's field team arrived onsite at 0900. Team developed wells AOI01-01, AOI01-03 and AOI01-02. NOTAMS closed out with an end date of 22 April 2022. Team offsite at 1600.	Turbidity is very high in wells during development. Fines clog the intake of the bladder pump, so wells are being manually surged and bailed.	Installation of 10 out of 10 permanent groundwater wells and soil sampling complete. Development for 9 of 11 wells completed.	None
4/26/2022	Chris Ma, Teresa Quiniola	81 degrees sunny (with occasional cloud cover)	EA's field team arrived onsite at 0730. Team developed well KAASF-02. Then the team mobilized to the airfield to develop wells AOI02-01 and AOI02-04. Team offsite at 1315.	Turbidity is very high in wells during development. Fines clog the intake of the bladder pump, so wells are being manually surged and bailed.	Installation of 10 out of 10 permanent groundwater wells and soil sampling complete. Development for 6 of 11 wells completed.	Leslie Chau (HIARNG) Kaulana Kanno (HIARNG)
4/25/2022	Catharine Creadick, Teresa Quiniola	81 degrees sunny (with occasional cloud cover)	EA's field team arrived onsite at 0745. The surveyors arrived onsite and located their control points. Team mobilized to the airfield to survey in well locations. Well development was conducted at wells AOI02-03 and AOI02-02. Survey team completed data collection of all well locations and primary site features. Team offsite at 1630.	Turbidity is very high in wells during development. Fines clog the intake of the bladder pump, so wells are being manually surged and bailed.	Installation of 10 out of 10 permanent groundwater wells and soil sampling complete. Surveying completed. Development for 3 of the 11 wells completed.	Leslie Chau (HIARNG) Kaulana Kanno (HIARNG) Mika Tisdale (Park Surveyor) Jensen Miyasoto (Park Surveyor) Ethan Crowell (Park Surveyor)
4/22/2022	Teresa Quiniola	82 degrees sunny (with occasional cloud cover) and breezy	EA's field team arrived onsite at 0745. The team proceeded to AOI01-02 and AOI01-04 to finish the well completions. Then the Team mobilized to the airfield to finish completions at AOI02-01, AOI02-02, and AOI01-4. Team offsite at 1030.	None	Installation of 10 out of 10 permanent groundwater wells complete. Soil sampling complete.	Leslie Chau (HIARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller)
4/21/2022	Catharine Creadick, Teresa Quiniola	82 degrees sunny (with occasional cloud cover) and breezy	EA's field team arrived onsite at 0745. One drill rig proceeded to complete the installation of a groundwater monitoring well at AOI01-02. The other rig began drilling at AOI01-01. Three soil samples and were collected at AOI01-01 and the well was installed. Regulators conducted a site visit. Augers and drilling equipment were decontaminated after wells were finished. Equipment blank was collected from sampling equipment following decontamination process, prior to drilling. Drilling at AOI01-04 began and three soil samples were collected. After finishing that well, the team proceeded to the airfield to collect a surface soil sample and one duplicate at AOI01-05. Investigation derived waste was placed in the drum staging area. Team offsite at 1700.	None	Installation of 10 out of 10 permanent groundwater wells complete. Three soil samples and were collected at AOI01-01, three soil samples were collected at AOI01-04, and a surface soil sample and one duplicate were collected at AOI01-05. Soil sampling is now complete.	Karl Motoyama (HIARNG) Sven Lindstrom (Hawaii DOH) Roger Brewer (Hawaii DOH) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller) Kevin Rogers (GeoTek Driller) Kendall Bane (GeoTek Driller) Zachary Tullis (GeoTek Driller)
4/20/2022	Catharine Creadick, Teresa Quiniola	84 degrees sunny and breezy	EA's field team arrived onsite at 0745. One drill rig proceeded to airfield to complete the installation of a groundwater monitoring well at AOI02-04. The other rig began drilling at AOI01-03. Three soil samples and one duplicate sample were collected at AOI01-03 and the well was installed. Augers and drilling equipment were decontaminated. Equipment blank was collected from sampling equipment following decontamination process, prior to drilling. Three soil samples and one duplicate were collected at AOI01-02 and drilling will resume at that location tomorrow to complete the well. Investigation derived waste was placed in the drum staging area. Team offsite at 1630.	A field change request was completed to use an existing well instead if installing an 11th new well at AOI01-05. A groundwater sample will be collected from existing well MW-11. A surface soil sample will be collected from location AOI01-05.	Installation of 7 out of 10 permanent groundwater wells. Three soil samples and one duplicate sample were collected at AOI01-03 and three soil samples and one duplicate were collected at AOI01-02.	Leslie Chau (HIARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller) Kendall Bane (GeoTek Driller) Zachary Tullis (GeoTek Driller)

Log of Daily Notice of Field Activity
Kalaeloa AASF, HI

Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
4/19/2022	Teresa Quiniola	81 degrees sunny and breezy with occasional shower	EA's field team arrived onsite at 0730. Team proceeded to airfield, but were delayed due to flight operations. Team collected a surface soil sample and duplicate at AOI02-04. Then the Team resumed drilling at AOI02-01. One additional soil sample was collected at AOI02-01 and the well was installed. Augers and drilling equipment were decontaminated. Equipment blank was collected from sampling equipment following decontamination process, prior to drilling. Two more soil samples were collected at AOI02-04 and drilling will resume at that location tomorrow to complete the well. Investigation derived waste was placed in the drum staging area. Team offsite at 1640.	In order to complete the drilling/well installation this week, a second rig will be mobilized to the site tomorrow.	Installation of 5 out of 11* permanent groundwater wells. The last (third) sample was collected from AOI02-01 and three soil samples were collected at AOI02-04.	Leslie Chau (HIARNG) Kaulana Kanno (HIARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller)
4/18/2022	Catharine Creadick, Teresa Quiniola	82 degrees sunny and breezy	EA's field team arrived onsite at 0730. Team began decontamination of drilling equipment. Equipment blank collected from sampling equipment following decontamination process, prior to drilling. Team proceeded to airfield to begin drilling. Three soil samples were collected at AOI02-02 and the well was installed. Two soil samples were collected at AOI02-01 and drilling will resume at that location tomorrow. Augers and drilling equipment were decontaminated and investigation derived waste was placed in the drum staging area. Team offsite at 1630.	Identified an existing well MW-11 installed by the Navy within approximately 30 ft of a newly planned well AOI01-05. Requested consideration of collected in a groundwater sample from the existing well instead of AOI01-05.	Installation of 4 out of 11* permanent groundwater wells. Three soil samples were collected at AOI02-02.	Leslie Chau (HIARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller)
4/15/2022	Catharine Creadick, Teresa Quiniola	81 degrees sunny; partly cloudy	EA's field team arrived onsite at 0745. Team began decontamination of drilling equipment. Equipment blank collected from sampling equipment following decontamination process, prior to drilling. Team proceeded to airfield to begin drilling which was completed by the end of the day. Three soil samples were collected at AOI02-03. Well KAASF-01 was surged and bailed. Team offsite at 1630.	None	Installation of 3 out of 11 permanent groundwater wells. Three soil samples were collected at AOI02-03.	Karl Motoyama (HIARNG) Mandy Sullivan (G9 ARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller)
4/14/2022	Teresa Quiniola	84 degrees sunny; partly cloudy	EA's field team arrived onsite at 1200. Team proceeded to airfield to complete geophysical survey/utility clearance. Team offsite at 14300.	Thick concrete rubble at AOI02-04. Surface soil sample collection depth may need modification or sample may need to be offset. To be determined when drilling.	Installation of 2 out of 11* permanent groundwater wells.	Leslie Chau (HIARNG) Kevin Rogers (GeoTek Geophysical) Rorey Kanemoto (GeoTek Geophysical)
4/13/2022	Catharine Creadick, Teresa Quiniola	83 degrees sunny	EA's field team arrived onsite at 0730. Team began well development of KAASF-01. Fines in well prevented proper development. Team offsite at 1200. Six soil samples and two equipment blanks were shipped to Eurofins Lancaster for PFAS analysis.	Well development not possible with bladder pump. Surge block and bailers may be needed.	Installation of 2 out of 11* permanent groundwater wells.	None
4/12/2022	Catharine Creadick, Teresa Quiniola	82 degrees sunny	EA's field team arrived onsite at 0745. Decontamination of drilling equipment was conducted. Drilling began at KAASF-02 and was completed at the end of the day. Equipment blank collected from sampling equipment following decontamination process, prior to drilling. Three soil samples were collected at KAASF-02. Groundwater was encountered at 48 feet bgs. Team offsite at 1830.	Boring location was KAASF-02 shifted north after toning (alert) do to a subsurface feature which was likely a utility.	Installation of 2 out of 11* permanent groundwater wells. Collected 3 soil samples from KAASF-02.	Leslie Chau (HIARNG) Kaulana Kanno (HIARNG) Mandy Sullivan (G9 ARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller)
4/11/2022	Catharine Creadick, Teresa Quiniola	86 degrees sunny	EA's field team arrived onsite at 0730. Geophysical contractor began clearing drilling locations. Drilling began at KAASF-01 and was completed at the end of the day. Equipment blank collected from sampling equipment. Groundwater was encountered at 42 feet bgs. Three soil samples were collected at KAASF-01.Geophysical cleared completed at all locations except those in secure airfield area. Request to move drum storage outside secure airfield area was approved. Team offsite at 1700.	Primary site POC was unavailable. Escort to secure airfield was delayed, including access to drum storage area.	Installation of 1 out of 11* permanent groundwater wells. Collected 3 soil samples from KAASF-01.	Karl Bromwell (HIARNG) Karl Motoyama (HIARNG) Mandy Sullivan (G9 ARNG) Jon Sjegstad (GeoTek Driller) Gabe Gutierrez (GeoTek Driller) Kevin Rogers (GeoTek Geophysical) Rorey Kanemoto (GeoTek Geophysical)
3/24/2022	Teresa Quiniola	80 degrees, sunny	EA's field team arrived onsite at Building 1903 at 1400. Team was escorted by HIARNG to proposed drilling locations for One-Call notification and utility clearance. Team offsite at 1630.	Some locations may require an escort or additional coordination for drill rig access. KAASF-02 moved to inside of facility fencing. AOI01-05 moved northwest.	All well locations observed and marked for utility clearance.	Karl Bromwell (HIARNG) Mandy Sullivan (G9 ARNG)
11/18/2021	Teresa Quiniola	78 degrees, sunny	EA's field team arrived onsite at Building 1903 at 1400. Team was escorted to potential source water spigot by HIARNG. Potential source water samples were collected from spigot, placed on ice, and sent to mainland laboratory under chain of custody.	None.	Source water spigot identified and sampled	Karl Bromwell (HIARNG)

Notes:
* = Used existing well MW-11 so only installed 10 wells. Refer to Field Change Request (FCR) No. 1 for additional details

Appendix B2

Sampling Forms

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EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 29 April 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 1129
Weather/Temperature: Sunny, 80 degrees			

Well No.: KAASF-01		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 44.54		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 48.12		Flow Rate (mL/minute): 350	Per 5 min: 1.75 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1139	44.62	1.75	>1000	26.60	7.62	41	1.22	8.23	0.6
1144	44.65	3.50	>1000	26.26	7.65	11	1.17	8.57	0.6
1149	44.60	5.25	708	26.18	7.66	12	1.15	9.25	0.6
1154	44.65	7.00	498	25.96	7.67	15	1.14	9.39	0.6
1159	44.65	8.75	363	25.99	7.68	20	1.13	9.22	0.6
1204	44.65	10.50	320	26.10	7.68	24	1.13	9.49	0.6
1209	44.65	12.25	292	26.02	7.68	27	1.13	9.65	0.6
1214	44.65	14.00	269	26.01	7.68	30	1.13	9.7	0.6
1219	44.65	15.75	251	25.91	7.68	33	1.13	10.07	0.6
1224	44.65	17.50	236	25.87	7.68	34	1.13	9.66	0.6
1229	44.65	19.25	227	25.81	7.68	36	1.12	9.91	0.6
1234	44.65	21.00	218	25.82	7.69	37	1.12	9.74	0.6
1239	44.65	22.75	214	25.83	7.68	39	1.13	9.95	0.6

Total Quantity of Water Removed (L): 23	Sampling Time (Start): 1243
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: KAASF-01-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments:

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 4 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 0742
Weather/Temperature: Sunny, 84 degrees			

Well No.: KAASF-02		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 47.94		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 56.89		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
750	47.94	3.00	48.3	24.56	7.30	105	0.368	5.46	0.2
755	47.95	5.25	46.0	24.51	7.40	108	0.357	4.11	0.2
800	47.95	7.50	53.7	24.53	7.44	105	0.355	4.08	0.2
805	47.95	9.75	43.2	24.56	7.45	103	0.352	4.02	0.2
810	47.95	12.00	43.9	24.57	7.46	102	0.349	4.06	0.2

Total Quantity of Water Removed (L): 12	Sampling Time (Start): 1812
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: KAASF-02-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments:

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 5 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 0951
Weather/Temperature: Sunny, 82 degrees			

Well No.: AOI01-01		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 38.38		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 41.66		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1012	34.40	2.50	305.0	26.09	6.82	159	1.74	2.97	0.9
1017	34.40	4.75	122.0	25.83	7.18	130	1.7	2.37	0.9
1022	34.40	7.00	115.0	25.77	7.23	115	1.68	2.61	0.9
1027	34.40	9.25	54.0	25.75	7.22	105	1.65	3.60	0.8
1032	34.40	11.50	46.7	25.73	7.22	102	1.64	4.00	0.8
1037	34.40	13.75	42.0	25.69	7.20	101	1.62	4.20	0.8
1042	34.40	16.00	40.5	25.70	7.20	102	1.62	4.35	0.8

Total Quantity of Water Removed (L): 16	Sampling Time (Start): 1045
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI01-01-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments: Bubble observed on DO sensor; after sampling will soak in Auto-Cal solution and re-calibrate Horiba prior to next well.

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 4 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 1138
Weather/Temperature: Sunny, 84 degrees			

Well No.: AOI01-02		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 34.03		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 41.45		Flow Rate (mL/minute): 425	Per 5 min: 2.125 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1200	34.03	2.50	628	27.21	7.48	36	1.89	12.43	1.0
1205	34.04	4.63	128	26.36	7.27	22	1.89	1.39	1.0
1210	34.03	6.75	26.8	26.50	7.24	11	1.89	1.08	1.0
1215	Discharge rate dropped to 125 mL/minute; swapped controller to run off Tacoma battery.								
1222	Flow rate restored to 425 mL/minute.								
1223	34.03	8.88	18.1	26.44	7.23	-20	1.89	-	1.0
1228	34.04	11.00	12	26.24	7.20	-93	1.89	-	1.0
1233	34.03	13.13	9.8	26.22	7.19	-168	1.89	-	1.0
1238	34.03	15.25	9.2	26.19	7.17	-224	1.89	-	1.0
1243	34.04	17.38	10.1	26.12	7.15	-236	1.89	-	1.0

Total Quantity of Water Removed (L): 17	Sampling Time (Start): 1246
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI01-02-GW; KAASF-DUP-GW-01 (@1200)
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments: Slight petroleum odor form purged water; however, PID readings = 0 ppm. DO sensor on Horiba stopped working.
Powering unit on and off did not restore DO readings.

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 4 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 0941
Weather/Temperature: Sunny, 84 degrees			

Well No.: AOI01-03		Well Condition: Permanent - newly installed
Well Diameter: 2-inch		PID reading (ppm): 0 ppm

Depth To Water (ft): 34.61		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 44.20		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
958	34.61	1.50	29.9	26.87	7.36	-2	1.42	9.51	0.7
1003	34.62	3.75	142	26.51	7.13	19	1.74	0	0.9
1006	*DO sensor dropped to zero and stopped working; powered Horiba off and back on.*								
1008	34.62	6.00	122	26.57	7.11	33	1.82	0.37	0.9
1013	34.62	8.25	60.1	26.51	7.10	43	1.85	1.13	0.9
1018	34.62	10.50	32.5	26.54	7.11	41	1.87	1.38	0.9
1023	34.62	12.75	26.1	26.50	7.12	34	1.88	1.56	1.0
1028	34.62	15.00	24.5	26.52	7.12	24	1.88	1.7	1.0
1033	34.62	17.25	22	26.55	7.13	22	1.89	1.85	1.0

Total Quantity of Water Removed (L): 17	Sampling Time (Start): 1037
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI01-03-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments:

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 5 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 0738
Weather/Temperature: Sunny, 82 degrees			

Well No.: AOI01-04		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 34.82		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 41.36		Flow Rate (mL/minute): 425	Per 5 min: 2.125 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
750	34.87	4.00	40.7	25.36	6.72	124	1.75	-	0.9
755	34.88	6.13	101.0	25.57	6.98	23	1.73	-	0.9
800	34.88	8.25	25.0	25.63	7.03	-40	1.74	0.47	0.9
805	34.88	10.38	11.6	25.64	7.10	-81	1.73	0.88	0.9
810	34.89	12.50	14.7	25.72	7.14	-106	1.73	1.43	0.9
815	34.89	14.63	9.6	25.70	7.17	-104	1.73	1.4	0.9
820	34.89	16.75	8.1	25.70	7.22	-122	1.73	1.62	0.9

Total Quantity of Water Removed (L): 17	Sampling Time (Start): 0826
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI01-04-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments: Bubble observed on DO sensor; after sampling will soak in Auto-Cal solution and re-calibrate Horiba prior to next well.

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 2 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 1441
Weather/Temperature: Sunny with some rain, 78 degrees			

Well No.: AOI02-01		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 34.92		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 43.28		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1450	34.92	2.00	117	26.84	8.26	-78	0.683	3.13	0.3
1455	34.92	4.25	33.1	26.22	7.94	-126	0.612	1.77	0.3
1500	34.92	6.50	23.1	26.09	7.88	-100	0.584	2.88	0.3
1505	34.92	8.75	22.9	26.01	7.86	-69	0.571	3.51	0.3
1510	34.92	11.00	22.7	26.03	7.85	-43	0.566	3.73	0.3
1515	34.92	13.25	24.6	26.01	7.83	-25	0.565	3.87	0.3

Total Quantity of Water Removed (L): 13	Sampling Time (Start): 1523
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI02-01-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments:

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 2 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 1230
Weather/Temperature: Sunny with some rain, 78 degrees			

Well No.: AOI02-02		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 37.15		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 44.10		Flow Rate (mL/minute): 400	Per 5 min: 2 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1240	37.15	1.50	192	26.60	7.62	41	1.22	8.23	0.6
1245	37.15	3.50	116	26.26	7.65	11	1.17	8.57	0.6
150	37.16	5.50	85.5	26.18	7.66	12	1.15	9.25	0.6
1255	37.17	7.50	76.3	25.96	7.67	15	1.14	9.39	0.6
1300	37.16	9.50	63.6	25.99	7.68	20	1.13	9.22	0.6
1305	37.16	11.50	56.2	26.10	7.68	24	1.13	9.49	0.6
1310	* Adjusted leak in Horiba flow cell								
1315	37.16	15.50	55.2	26.01	7.68	30	1.13	9.7	0.6
1320	37.16	17.50	51.8	25.91	7.68	33	1.13	10.07	0.6

Total Quantity of Water Removed (L): 18	Sampling Time (Start): 1324
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI02-02-GW
QC Samples: None	Sample Bottles: 2 250-mL poly

Comments: Starts to rain at 1300

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 3 May 2022
EA Personnel: T. Quiniola			Time: 0948
Weather/Temperature: Cloudy, 78 degrees			

Well No.: AOI02-03		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 37.91		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 44.79		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (μs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1000	37.95	1.50	90.3	25.95	7.18	119	1.46	1.85	0.7
1005	37.95	3.75	47	25.59	7.25	109	1.43	1.8	0.7
1010	37.94	6.00	43.2	25.54	7.24	108	1.4	1.99	0.7
1015	37.95	8.25	37	25.52	7.26	107	1.39	2.36	0.7
1020	37.95	10.50	33.2	25.51	7.25	108	1.37	2.28	0.7

Total Quantity of Water Removed (L): 11	Sampling Time (Start): 1025
Samplers: TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI02-03-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments:

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 5 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 1149
Weather/Temperature: Sunny, 82 degrees			

Well No.: AOI02-04		Well Condition: Permanent - newly installed	
Well Diameter: 2-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 38.82		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): 46.37		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (μs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1225	38.90	2.00	661	27.84	7.52	61	1.53	7.96	0.8
1230	38.90	4.25	162	25.88	7.21	78	1.5	3.2	0.8
1235	38.90	6.50	131	25.74	7.17	83	1.51	3.11	0.8
1240	38.90	8.75	111	25.63	7.14	86	1.51	3.26	0.8
1245	38.90	11.00	102	25.57	7.12	89	1.52	3.46	0.8
1250	38.90	13.25	102	25.56	7.10	91	1.52	3.5	0.8
1255	38.90	15.50	97.6	25.58	7.09	91	1.52	3.54	0.8

Total Quantity of Water Removed (L): 16	Sampling Time (Start): 1302
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI02-03-GW; KAASF-DUP-GW-02 (@1200)
QC Samples: None	Sample Bottles: 2 250-mL poly (4 bottles total); prescreen vial

Comments: Also collected KAASF-MSD-GW (1 250-mL poly bottle)

EA Engineering, Science, and Technology, Inc., PBC

WELL PURGING AND SAMPLING RECORD

Project Name: Kalaeloa AASF PFAS		Project No: 634250383	Date: 5 May 2022
EA Personnel: C. Creadick, T. Quiniola			Time: 1350
Weather/Temperature: Sunny, 82 degrees			

Well No.: AOI01-MW11		Well Condition: Permanent - newly installed	
Well Diameter: 4-inch		PID reading (ppm): 0 ppm	

Depth To Water (ft): 35.12		Measurement Reference: Top of casing (notch on north side)	
Total Well Depth (ft): > 100		Flow Rate (mL/minute): 450	Per 5 min: 2.25 L

Time (min.)	Depth to Water (ft)	Total Volume Purged (L)	Turbidity (NTU)	Temperature (°C)	pH	ORP (mV)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Salinity (ppt)
1412	35.14	4.00	1.8	27.39	7.28	67	0.339	3.25	0.2
1417	35.14	6.25	1	27.20	7.16	84	0.335	2.2	0.2
1422	35.19	8.50	0	27.07	7.09	94	0.334	2.15	0.2
1427	35.19	10.75	0	26.98	7.04	99	0.333	2.15	0.2
1432	35.20	13.00	0	27.04	7.03	102	0.333	2.62	0.2

Total Quantity of Water Removed (L): 13	Sampling Time (Start): 1434
Samplers: CC/TQ	Decon: Alconox and Site source water
Sample Analysis: PFAS DoD List	Sample IDs: AOI01-MW11-GW
QC Samples: None	Sample Bottles: 2 250-mL poly; prescreen vial

Comments:

Appendix B3

Survey Data

Kalaeloa Army Aviation Support Facility #1-JRF
Monitoring Well Locations
NAD83 HAWAII STATE PLANE ZONE 3

Pt No.	North (ft)	East (ft)	Elevation (ft)	Name	Description
15000	55379.57	1620891.74	39.55	A0I02-03	Notch
15001	55379.50	1620891.66	39.99	A0I02-03	Top well cover
15002	55284.27	1620784.51	39.12	A0I02-02	Top well cover
15003	55284.47	1620784.54	38.76	A0I02-02	Notch
15004	55806.91	1620992.49	40.78	A0I02-04	Top well cover
15005	55806.99	1620992.47	40.46	A0I02-04	Top Casing
15010	54998.67	1620468.41	36.50	A0I02-01	Notch
15011	54998.61	1620468.42	36.76	A0I02-01	Top well cover
15012	54993.88	1619941.88	37.24	A0I01-05	ground test drill
15013	55025.21	1619947.03	37.18	MW-05	Notch
15014	55024.99	1619946.98	37.99	MW-05	Top well cover
15015	56940.10	1620245.23	49.62	KAASF-02	Notch
15016	56940.00	1620245.24	50.11	KAASF-02	Top well cover
15017	56239.92	1619194.18	46.45	KAASF-01	Top well cover
15018	56239.95	1619194.28	46.17	KAASF-01	Notch
15019	54518.47	1619794.68	35.80	DW-1	intake
15020	54516.38	1619796.13	35.79	DW-2	intake
15021	54514.95	1619794.04	35.88	DW-3	intake
15022	54516.97	1619792.55	35.91	DW-4	intake
15025	54631.88	1619976.40	36.53	A0I01-03	Top well cover
15026	54631.98	1619976.49	36.23	A0I01-03	Notch
15027	54507.34	1619817.60	35.92	A0I01-02	Top well cover
15028	54507.40	1619817.62	35.62	A0I01-02	Notch
15029	54568.70	1619768.05	36.65	A0I01-04	Top well cover
15030	54568.70	1619768.13	36.46	A0I01-04	Notch
15031	54396.39	1619548.11	36.28	A0I01-01	Top well cover
15032	54396.47	1619548.15	35.97	A0I01-01	Notch

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Appendix B4

Field Change Request Form

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FIELD CHANGE REQUEST FORM

ARNG PFAS SITE INSPECTION PROGRAM

Contract: W912DR-19-D-0005

Installation: Kalaeloa Army Aviation Support Facility #1-JRF

Project No. 634250383

Requested By: Teresa Quiniola, Task Manager

Field Change Request Number: 01

Description of Modification: The plan was to install an 11th well at location AOI01-05 in the Area of AOI-01 and collect three soil samples from this location. This plan is being modified and a GW sample will be collected from an existing well MW-11 in the vicinity of the proposed location for AOI01-05. One surface soil sample will be collected at location AOI01-05. Also duplicate QC soil samples were planned to be randomly collected in accordance with the frequency described in the UFP QAPP at random depths. For any duplicate subsurface soil sample core materials will be augmented with spoils from the augers coming from the desired depth to ensure enough volume is collected.

Reason for Modification: Location AOI01-05 was requested by HIDOH during TPP#1/2. During utility clearance of the area, an existing monitoring well (MW-11) was discovered in the immediate vicinity of the planned location for the new monitoring well (AOI01-05). MW-11 is located on HIARNG property and it is under control of the HIARNG. Groundwater monitoring of this well ceased in 2003 after BRAC removal actions were completed. A surface soil sample will still be collected at the location of AOI01-05 to assess any soil impacts. HIDOH personnel visited the site on 4/21/22 and were informed of this plan and they offered no objections. This will ensure field work is completed quicker to minimize impacts to HIARNG operations and reduce costs for abandonment.

Also duplicate QC soil samples were planned to be randomly collected in accordance with the frequency described in the UFP QAPP at random depths. Due to the presence of Coral from the subsurface (greater than 2 ft below ground surface), extending to the groundwater, there is a potential issue recovering enough material for duplicate samples. Therefore, the field team will augment core materials with spoils from the augers coming from that desired depth for any duplicate subsurface soil sample that is being collected.

Note: Existing groundwater well is a groundwater monitoring well.

FIELD CHANGE REQUEST FORM

ARNG PFAS SITE INSPECTION PROGRAM

Approval

Representing: EA

By: ____________________

Title: Task Manager

Date: 4/22/2022

Representing: EA

By: ____________________

Title: Project Manager

Date: 4/22/2022

Representing: ARNG

By: *Amanda Sullivan*

Title: PFAS Project Manager

Date: 26 April 2022

Representing: USACE

By: *Tim Peck*

Title: Program Manager

Date: 04/25/2022

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Appendix C

Photographic Log

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Appendix C - Photographic Log

Site Inspection for PFAS	Kalaeloa Army Aviation Support Facility	Kapolei, Hawaii

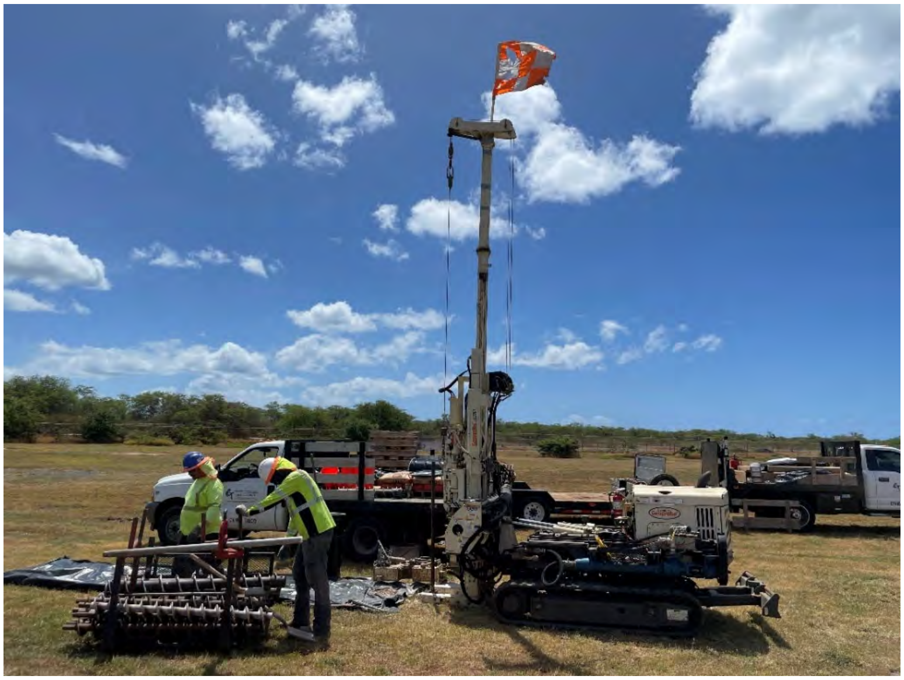
Photograph No. 01

Date: 15 April 2022

Time: 1015

Description:
Drilling team (GeoTek Hawaii) direct push drilling through subsurface at boring AOI02-03.

Orientation:
South/southeast



Photograph No. 02

Date: 19 April 2022

Time: 1029

Description:
GeoTek Hawaii team performing hollow stem auger drilling at AOI02-04.

Orientation:
South

Appendix C - Photographic Log

Site Inspection for PFAS	Kalaeloa Army Aviation Support Facility	Kapolei, Hawaii

Photograph No. 03

Date: 20 April 2022

Time: 1411

Description:
Subsurface soil MacroCore® from boring AOI01-02 (collected from 10 to 15 feet below ground surface). After photographing for documentation, soil was characterized and described in boring logs then sampled for laboratory analysis.

Orientation:
Down

Photograph No. 04

Date: 22 April 2022

Time: 1022

Description:
Completed well installation at AOI02-04.

Orientation:
Down

Appendix C - Photographic Log

Site Inspection for PFAS	Kalaeloa Army Aviation Support Facility	Kapolei, Hawaii

Photograph No. 05

Date: 3 May 2022
Time: 1003

Description:
Groundwater sampling at well AOI02-03.

Orientation:
Down

Photograph No. 06

Date: 5 May 2022
Time: 1030

Description:
EA personnel performing groundwater sampling at AOI01-01.

Orientation:
Down

Appendix C - Photographic Log

Site Inspection for PFAS	Kalaeloa Army Aviation Support Facility	Kapolei, Hawaii

Photograph No. 07	
Date: 4 May 2022 **Time:** 0901	
Description: Spigot used as decontamination water source. Hose disconnected prior to using spigot.	
Orientation: North/northeast	
Photograph No. 08	
Date: 5 May 2022 **Time:** 1521	
Description: Storage of investigation-derived waste near employee parking lot. Drums in foreground on palettes contain soil cuttings, and the drums in background corner contain decontamination water and are stored on spill palettes underneath blue tarp.	
Orientation: Northeast	

Appendix D

Technical Project Planning Meeting Minutes

Meeting Minutes
Technical Project Planning (TPP) – Meeting 3
Kalaeloa Army Aviation Support Facility (AASF) #1 – John Rodgers Field (JRF), Hawai‘i
Site Inspection (SI) for Per- and Polyfluoroalkyl Substances Impacted Sites, Army National Guard (ARNG) Installations, Nationwide
Contract Number (No.) W912DR-19-D-0005, Task Order No. W912DR20F0383
Friday, 29 September 2023
9:00 a.m. to 10:35 a.m. Hawai‘i Standard Time (HST)

Participants			
Name	Affiliation*	Phone	E-Mail
Sven Lindstrom	HDOH	808- 586-4249	Sven.lindstrom@doh.hawaii.gov
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Karl Bromwell	HIARNG	808-672-1282	karl.b.bromwell.nfg@army.mil
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Mike O’Neill	EA	410-329-5142	moneill@eaest.com
Teresa Quiniola	EA	808-784-3482	tquiniola@eaest.com
* ARNG G-9 – Army National Guard; HDOH – Hawai‘i Department of Health; HDOT – Hawai’i Department of Transportation; HIARNG – Hawai’i Army national Guard; USACE – United States Army Corps of Engineers; and EA – EA Engineering, Science, and Technology, Inc., PBC			

<u>Introductions, Safety Moment, and Agenda:</u>

Ms. Teresa Quiniola (EA SI Task Manager) welcomed participants and began the meeting with an overview of the agenda and a roll call with introductions. She noted the purpose of the meeting is to discuss the results of the SI for per- and polyfluoroalkyl substance (PFAS) that was conducted to determine presence/absence of releases at the Kalaeloa Army Aviation Support Facility (AASF) #1 – John Rodgers Field (JRF), Hawai‘i. The meeting was held virtually so there is no sign in sheet for attendees, however an attendance record was maintained. The slides presented during the TPP Meeting 3 are included as **Attachment A** to these meeting minutes.

The meeting started with a safety moment regarding safety complacency. Ms. Quiniola noted that because an accident has not happened, that does not dictate prevention. It is easy to become complacent and follow old routines rather than being mindful which could lead to unsafe acts. Therefore, planning, prevention and attention to safety are always necessary.

Ms. Quiniola reviewed what was accomplished during the first TPP 1/2 meeting:

- Provided an overview of the ARNG program/SI process
- Defined the Data Quality Objectives (DQOs)
- Discussed the proposed SI approach
- Provided an opportunity for stakeholders to discuss the SI Work Plan.

Ms. Quiniola proceeded to present the TPP #3 Meeting Goals:

- Review ARNG Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process
- Revisit the PA findings
- Present results of SI and the updated conceptual site model (CSM)
- Resolve comments / concerns and gain concurrence of findings presented in the Draft Final SI
- Discuss future actions at the site
- Present the Relative Risk Site Evaluation (RRSE)

Key points discussed during the presentation are summarized below.

Programmatic Discussion:

- The purpose of the TPP3 meeting is to present the SI results and revised CSM and afford the stakeholders opportunity to comment on the SI Report.
- ARNG Preliminary Assessment (PA)/SI Overview – The ARNG follows the CERCLA process. The SI was completed and typically the next step is an RI, unless "no further action" is determined to be appropriate.
- Ms. Quiniola noted that EA would be discussing the findings of the PA/SI process as follows:
    - PA for Kalaeloa AASF #1 completed by ARNG (October 2020)
    - SI fieldwork completed (11 April to 5 May 2022)
    - Draft Final SI Report provided to HDOH (August 2023)

Kalaeloa AASF PA Findings and SI Approach:

Ms. Quiniola noted that there were two (2) potential per- and polyfluoroalkyl substances (PFAS) release areas identified for further investigation during the PA:

- AOI 1: Former Fuel Farm
    - The former fuel farm was land located adjacent to the northern side of the Kalaeloa Airport along the fence line on property owned by HDOT but controlled by HIARNG.
    - In October 2017, a (Hawaiʻi Dept. of Transportation unit [HDOT]) firetruck discharged the contents of its water tank during pump testing along the fence line.
    - The foam mixture flowed into the fuel farm area and it is suspected the aqueous film forming foam (AFFF) mixture may have also entered the underground injection control (UIC) Well #73.
    - The tank reportedly contained 1.6% solution Chemguard C301MS Aqueous Film-Forming Foam (AFFF) mixed with water (25 gallons AFFF with 1,500 gallons water).
    - Mr. Lindstrom asked how the type of 1.6% AFFF was identified.
    - Ms. Quiniola noted that it was documented in the PA and reported in the SI Report.
    - Ms. Paquette indicated to her knowledge, the percent of AFFF was not confirmed.
    - Mr. Motoyama noted that he reported the release (spill report) and that he had talked to the Fire Battalion Chief of HDOT. Mr. Motoyama noted that the Chief

was under the impression the discharge area was still part of the DOT property.
    - Ms. Chau offered to provide the safety data sheet that was included with the spill release report.[1]
- AOI 2: Hangar Suppression System and Storage
    - The hangar was constructed in 2017 and is equipped with an AFFF fire suppression system consisting of an 800-gal tank containing 440-gal of Ansulite AFC-3MS 3% AFFF.
    - Prior to 2022, eight 55-gallon drums of the same Ansulite 3% AFFF were stored on secondary containment pallets within the Facility's hangar. The drums of AFFF were reportedly moved within the hangar as needed and had temporarily been stored outside the hangar on at least one occasion (AECOM 2020). In January 2022, the 800-gallon bladder tank was replaced. The foam in the tank was disposed of at PVT Landfill, consistent with current laws and regulations. The tank was refilled to full capacity (800 gallons) and the facility now stores twenty 55-gal drums of the Ansulite 3% AFFF at its vehicle wash rack equipment room, constructed in September 2022.
    - There have been no known instances of leaks or spills from either the system or the drums of AFFF.

Ms. Quiniola noted that there are two (2) suspected PFAS sources adjacent to the HIARNG Facility as follows:
- Building 117
    - Identified during the Navy's PA which was part of the U.S. Navy's Base-wide Investigation for PFAS at the Former Naval Air Station (NAS) Barbers Point (NAVFAC 2022).
    - Building 117 is a former plating facility. No specifics associated with the plating operations and types of wastes created were identified.
    - The former Navy property where this facility was located was transferred to the HIARNG in September 2001.
    - This source was not identified until after the SI field activities. At the time of the investigation this was considered an "adjacent" source, but moving forward it is noted that it lies within the ARNG facility boundary and will be subject to investigation.
- Kalaeloa Airport
    - Hawai'i Department of Transportation (HDOT) operates the adjacent Kalaeloa Airport and maintains an aircraft rescue and fire training (ARFF) unit.
    - During the PA, interviewees indicated that the ARFF Unit conducts pump tests of their firetrucks at random locations surrounding the adjacent airport runway. Pump testing is sometimes conducted with AFFF mixed into the water tank of the trucks (as reported in the Oct. 2017 tests).

[1] A copy of the Safety Data Sheet for the Chemguard C301MS AFFF was sent to the TPP participants by Ms. Chau during the call.

  - No specific records were found regarding the ARFF Unit's use, storage, disposal, or AFFF testing areas at the airport. No visual site inspection of the airport was performed during the ARNG PA.
  - Ms. Paquette noted that DOT-A (Department of Transportation – Airports) has only done testing in one small area in addition to the 2017 release which was one occurrence. She also stated that prior to DOT-A's ownership, the land was military (Navy). She noted that a Navy report states that the Navy used to spray the runways and taxiways with foam every time an aircraft landed. She also stated that no foam testing or fire training has been done by DOT at JRF.
  - Ms. Sullivan acknowledged that the information regarding DOT testing of equipment may have come from the Final PA for the former NAS at Barber's Point.

- The SI programmatic DQOs were reviewed which include:
  - Determining the presence or absence of relevant PFAS compounds related to the potential release at the AOIs,
  - Refining the CSMs, and
  - Checking for alternate sources of PFAS contamination.

- The screening levels (SLs) used for this SI program were reviewed. The soil data obtained during the SI were compared to Office of the Assistant Secretary of Defense (OSD) SLs summarized in a memorandum dated 06 July 2022.
  - Soil from the 0 to 2 feet depth interval was compared to residential SLs
  - Soil from the 2 to 15 feet depth interval was compared to industrial SLs.
  - Soil deeper than 15 feet below ground surface does not have an exposure pathway and, therefore, no screening criteria for comparison.
  - Groundwater was compared to tap water SLs.
  - SLs for PFOA, PFOS, perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), and perfluorononanoic acid (PFNA) were established for the SI.

Kalaeloa AASF CSM, Field Activities, and SI Results:

Ms. Quiniola presented surface water and groundwater maps for Kalaeloa AASF. With regards to surface water and groundwater, it was noted that generally both flow from the mountains (mauka) to the ocean (makai) in a southerly direction. However, Mr. Lindstrom noted that there are dry wells throughout the site. Mr. Motoyama indicated that there are approximately 80 underground injection control (UIC) wells throughout the property that capture much of the surface water flow. Ms. Sullivan acknowledged that ARNG had received a comment from HDOH requesting drainage towards the UICs be shown; however, due to security concerns, these UIC wells cannot be identified on the maps and the surface flows need to been generalized.

- EA reviewed the screening criteria used for the SI: Office of the Secretary of Defense Screening levels for soil and groundwater. Ms. Sullivan noted that new screening levels for PFBA and PFHxA were released in August. Although the SI reports will not be revised based on these new levels, the updates will be captured in tech memos and carried through into the remedial investigation (RI). Mr. Lindstrom noted that the screening levels have been discussed and they agree with how the screening was done.

- EA summarized the SI sampling approach for Kalaeloa. As part of the investigation, EA collected thirty-one (31) surface and subsurface soil samples from nine (11) locations using a hollow-stem auger and ten (10) permanent groundwater monitoring wells were installed. EA collected surface soil (0 to 2 feet [ft] below ground surface [bgs]), shallow subsurface soil (13 to 15 ft bgs), and deep subsurface soil sample (in two foot intervals ranging from 31 to 48 ft bgs) as well as eleven (11) groundwater samples (including one from a pre-existing well). It was noted that two (2) kilograms of soil were collected at each interval in order for the lab to perform a multi-increment subsampling procedure on each sample. A total of twenty-six (26) quality control samples were also collected.

- EA summarized the results for the soil and groundwater samples:
    - For AOI 1 soil results:
        - All five relevant compounds were detected in surface soil in three locations, PFOA, PFOS, and PFHxS were detected in the remaining two locations.
        - Three relevant compounds were detected above their respective SLs in three surface soil locations: PFOA [one location at 100 µg/kg and 110 µg/kg in the duplicate], PFOS [two locations, highest was 1,500 J+ µg/kg and 1,500 J- µg/kg in its duplicate], and PFHxS [one location at 340 µg/kg and 360 µg/kg in the duplicate]).
        - No relevant compounds were detected above their respective SLs in shallow subsurface soil; PFOA, PFOS, PFHxS, and PFBS were detected below their respective SLs.
        - No relevant compounds were detected above their respective SLs in deep subsurface soil; PFOA, PFOS, PFHxS, and PFBS were detected below their respective SLs.
    - For AOI02 soil results:
        - All five relevant compounds (PFOA, PFOS, PFBS, PFHxS, and PFNA) were detected, but below their respective SLs in surface soil.
        - Four of the five relevant compounds (PFOA, PFOS, PFBS, and PFHxS) were detected in shallow subsurface soil below their respective SLs.
        - All five relevant compounds (PFOA, PFOS, PFBS, PFHxS, and PFNA) were detected below their respective SLs in deep subsurface soil.
    - For the facility boundary soil results:
        - Four of the five relevant compounds (PFOA, PFOS, PFHxS, and PFNA) were detected below their respective SLs in surface soil.
        - Two of the five relevant compounds (PFOA, and PFOS,) were detected in shallow subsurface soil below their respective SLs.
        - One of five relevant compounds (PFOS) was detected below their respective SLs in deep subsurface soil.

- Mr. Lindstrom noted that DOH has their own sampling methods and screening criteria that were not followed. However, detections of the various PFAS compounds indicate a potential source of contamination at the site.
- For AOI 1 groundwater results:
  - All five relevant compounds (PFOA, PFOS, PFHxS, PFBS, and PFNA) were detected in groundwater samples.
  - PFOA, PFOS, PFHxS, and PFNA were detected above their respective SLs; PFBS was detected below the SL.
  - Mr. Lindstrom inquired about the potential source of contamination in MW-11 [previously installed].
  - Ms. Sullivan noted that this would be further evaluated during the RI, especially since there are exceedances throughout the entire property and additional AOIs may be identified.
- For AOI 2 groundwater results:
  - All five relevant compounds (PFOA, PFOS, PFHxS, PFBS, and PFNA) were detected in groundwater samples.
  - PFOA, PFOS, PFHxS, and PFNA were detected above their respective SLs; PFBS was detected below the SL.
- For the facility boundary groundwater results:
  - All five relevant compounds were detected in boundary locations.
  - PFOA was detected above the SL in KAASF-01.
  - PFOS was detected above the SL in both KAASF-01 and KAASF-02.
  - PFNA, PFBS, and PFHxS were detected below their respective SLs.
- Ms. Quiniola presented the figures and noted that the halo around colored circles indicates an exceedance of the SLs, with the large circles indicating higher concentrations.

- EA reviewed the conceptual site models (CSMs). Mr. Lindstrom asked why ecological receptors were not included. Ms. Sullivan noted that risk assessments for both human and ecological health would be conducted during the RI. Mr. Lindstrom agreed this would be acceptable.

- Ms. Paquette asked if the former fuel farm was Navy and therefore, DoD. Ms. Sullivan responded this is correct. However, in the final PA for Barber’s Point, no information regarding AFFF use was noted in the tank farm area. Mr. Linstrom noted that although there is a lack of documentation, it should be moved forward to the RI by DoD, especially since historical PFAS compounds in the area may not be related to the 2017 incident. The area may need to be investigated further as part of a different AOI. He also asked if the National Guard would be responsible for any historic DoD release or just a release by the National Guard. Ms. Sullivan responded that the RI may need to include the metal plating facility and SI level sampling may need to be conducted for other parts of the site as well. Mr. Lindstrom asked why no further action was identified at the Former Fuel Farm Area when there is known contamination. Ms. Sullivan noted that according to the DERP manual, DoD will proceed to an RI if there is a known release, spill, or storage resulting from the DoD operations. However, if there is a known discharge from an adjacent entity, the DoD would not proceed. Mr. Lindstrom noted that there is a known release due to the Navy spraying down the runways. Ms. Sullivan responded that she can only speak for the Army National Guard and not the Base realignment and Closure (BRAC) team or the Navy. She indicated that ARNG would only be pursuing sources within their property boundary.

- Ms. Paquette suggested that another meeting including DOT-A, Navy, National Guard, etc. may be necessary since HDOT-A will be using state funds to sample the entire runway and taxiway areas and it is unknown what action may be necessary if contamination is found.

- Mr. Lindstrom asked about the sulfonates that were found, and if they were more likely to be related to more historic operations since sulfonates were phased out in the 1990s and 2000s. If material used by DOT in the 2017 incident did not have any sulfonates, then the PFOS and PFBS found many not have been associated with the 2017 release. Ms. Sullivan indicated that this would need further discussion for the RI and that fingerprinting which had not been used during the SIs could be discussed/used. Mr. Lindstrom requested more information about what no further action under CERCLA means for this area. Ms. Sullivan noted that ARNG will not be pursuing an RI for the area impacted by DOT. Ms. Paquette indicated that they would be characterizing the runway and taxiway areas for PFAS during a paving project.

- Ms. Sullivan provided an overview of the RRSE for Kalaeloa AASF #1.
    - SI data is put into a screening tool to determine relative risk (ratio to SLs) in order to rank the sites, but these are not risk assessments.
    - Ms. Sullivan noted that ARNG was asking for stakeholder feedback on the rankings.
    - The contaminant hazard factor for groundwater at AOI 2 was sixty-two (62) which is moderate.
    - The migration pathway factor and the receptor factors were both potential.
    - This results in a score of medium.
    - The contaminant hazard factor for soil at AOI 2 was forty-two (42) which is minimal.
    - The migration pathway factor is potential since the surface has mixed conditions including concrete, gravel, and grass.
    - The receptor factor is limited because security and fences restrict access to the areas.
    - This results in a score of low.
    - The overall AOI 2 rating is medium.

- Ms. Sullivan asked if there were any questions about the RRSE for Kalaeloa AASF #1.

- Mr. Bromwell asked for confirmation that agriculture exists to the south. Ms. Sullivan confirmed that based on data from the Department of Agriculture, two agricultural parcels were identified.
- Ms. Sullivan noted that IDW [investigation-derived waste] is in the process of being transported off-island to a Subtitle C landfill.

ATTACHEMNT A
TPP 3 SLIDES

Kalaeloa
Army Aviation Support Facility (AASF) #1 – JRF
Hawai‘i, Site Inspection
Hawai‘i Army National Guard (HIARNG)
Technical Project Planning (TPP) Meeting 3

Preliminary Assessments and Site Inspections (PA/SI) for Perfluorooctanoic Acid (PFOA), Perfluorooctanesulfonic Acid (PFOS), Perfluorohexanesulfonic Acid (PFHxS), Perfluorononanoic Acid (PFNA), Hexafluoropropylene oxide dimer Acid (HFPO-DA), and Perfluorobutanesulfonic Acid (PFBS)

29 September 2023

EA Engineering, Science, and Technology, Inc., PBC

Agenda

- Introductions
- Safety Moment
- TPP Meeting Goals
- Army National Guard (ARNG) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process Overview
- PA Overview
- SI Results
- Relative Risk Site Evaluation (RRSE)
- Next Steps
- Questions and Open Discussion

Introductions

- Army National Guard (ARNG) – G-9
  - Jennifer Solomon, Per- and Polyfluoroalkyl Substances (PFAS) Program Manager
  - Bonnie Packer, Nationwide Technical Lead
  - Amanda Sullivan, SI Project Manager
- United States Army Corps of Engineers (USACE)
  - Emily Cline, Program Manager
  - Andrea Beausang, SI Project Manager, Alaska District
- Hawaii ARNG (HIARNG)
  - Karl Motoyama, Environmental Program Manager
  - Leslie Chau, Installation Restoration Program Manager
  - Karl Bromwell, Environmental Compliance Manager
- Hawaii State Department of Health (HDOH)
  - Sven Lindstrom, Remedial Project Manager
  - Roger Brewer, Senior Environmental Scientist
- Hawai'i Department of Transportation (HDOT)
  - Stacy Paquette, Environmental Health Specialist
  - Kylie Emily
- EA Engineering, Science, and Technology, Inc., PBC (EA)
  - Mike O’Neill, SI Project Manager
  - Teresa Quiniola, SI Task Manager

Safety Moment

"Do not think because an accident hasn't happened to you that it can't happen." – **Safety saying, circa early 1900s**

Meeting Goals

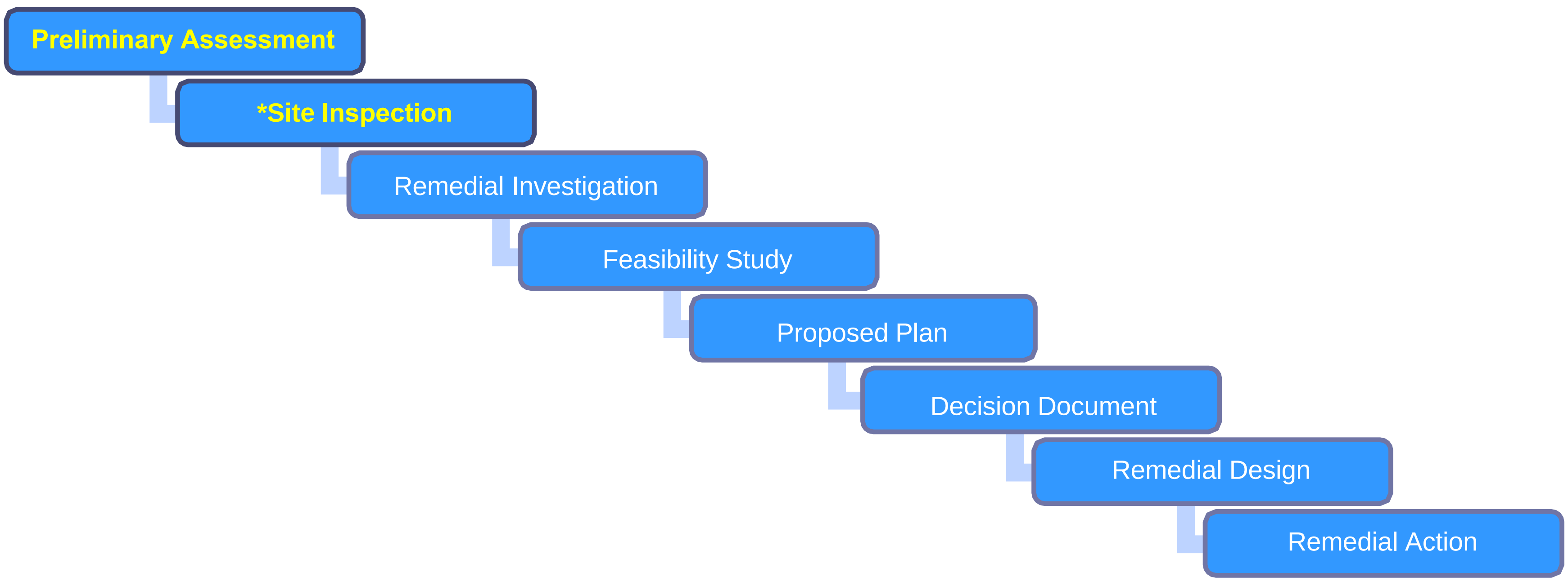
TPP 1 & 2 Review

- Provided an overview of ARNG PA/SI Program
- Defined objectives for SI data collection
- Encouraged stakeholder involvement
- Reviewed project schedule
- Captured action items
- Discussed proposed SI approach

TPP 3

- ARNG CERCLA program overview
- Revisit the PA findings
- Present SI Results and revised conceptual site model (CSM)
- Resolve comments/concerns and gain concurrence on presentation of findings in Draft Final SI Reports
- Discuss future actions at the site (including RRSE)

ARNG PA/SI Overview
Work Phases



Notes: *Current stage of activity

- Follows the CERCLA Process
- An interim removal action can be conducted or a No Further Action determination can be made at any phase

ARNG CERCLA Status Overview Kalaeloa AASF #1-JRF

- PA for Kalaeloa AASF #1 completed by ARNG (October 2020)
- SI fieldwork completed (11 April to 5 May 2022)
- Draft Final SI Report provided to HDOH (August 2023); results presented today

Summary of PA Findings Kalaeloa AASF #1-JRF

- Potential per- and polyfluoroalkyl substances (PFAS) release areas: Two areas identified during the PA grouped into two areas of   interest (AOIs):
- AOI 1: Former Fuel Farm
  - The former fuel farm was a 10-acre area of land located adjacent to the northern side of the Kalaeloa Airport along the fenceline owned by HDOT but controlled by HIARNG.
  - In October 2017, a firetruck (Hawai‘i Dept. of Transportation unit [HDOT]) discharged the contents of it’s water tank during pump testing/repair on the fenceline. The foam mixture flowed into the fuel farm area.
  - The spill report notes that based on the direction of flattened vegetation adjacent to underground injection control (UIC) Well #73, it is suspected the aqueous film forming foam (AFFF) mixture may have also entered the UIC well.
  - The tank reportedly contained 25-gallon (gal) 1.6% AFFF mixed with water.

Summary of PA Findings Kalaeloa AASF #1-JRF

- AOI 2: Hangar Suppression System and Storage
  - AOI 2 encompasses the Hangar and an associated The hangar was constructed in 2017 and is equipped with an AFFF fire suppression system consisting of an 800-gal tank containing 440-gal of Ansulite AFC-3MS 3% AFFF.
  - In 2022, the 800-gal bladder was replaced and refilled to full capacity
  - Eight 55-gal drums of Ansulite 3% AFFF are stored on secondary containment pallets in the hangar.
  - Twenty 55-gal drums of Ansulite 3% AFFF are also stored at the vehicle wash rack equipment room, constructed in September 2022.

Summary of PA Findings
Kalaeloa AASF #1-JRF

- AOI 1: Former Fuel Farm
- AOI 2: Hangar Suppression System and Storage

September 2023

Summary of PA Findings Kalaeloa AASF #1-JRF

Potential Adjacent Sources

- Building 117
  - Identified during the PA for the U.S. Navy's Base-wide Investigation for PFAS at the Former NAS Barbers Point (NAVFAC 2022), Building 117 is a former plating facility. No specifics associated with the plating operations and types of wastes created were identified. The property holding the facility was transferred to the HIARNG and Kalaeloa AASF #1 – JRF in September 2001.

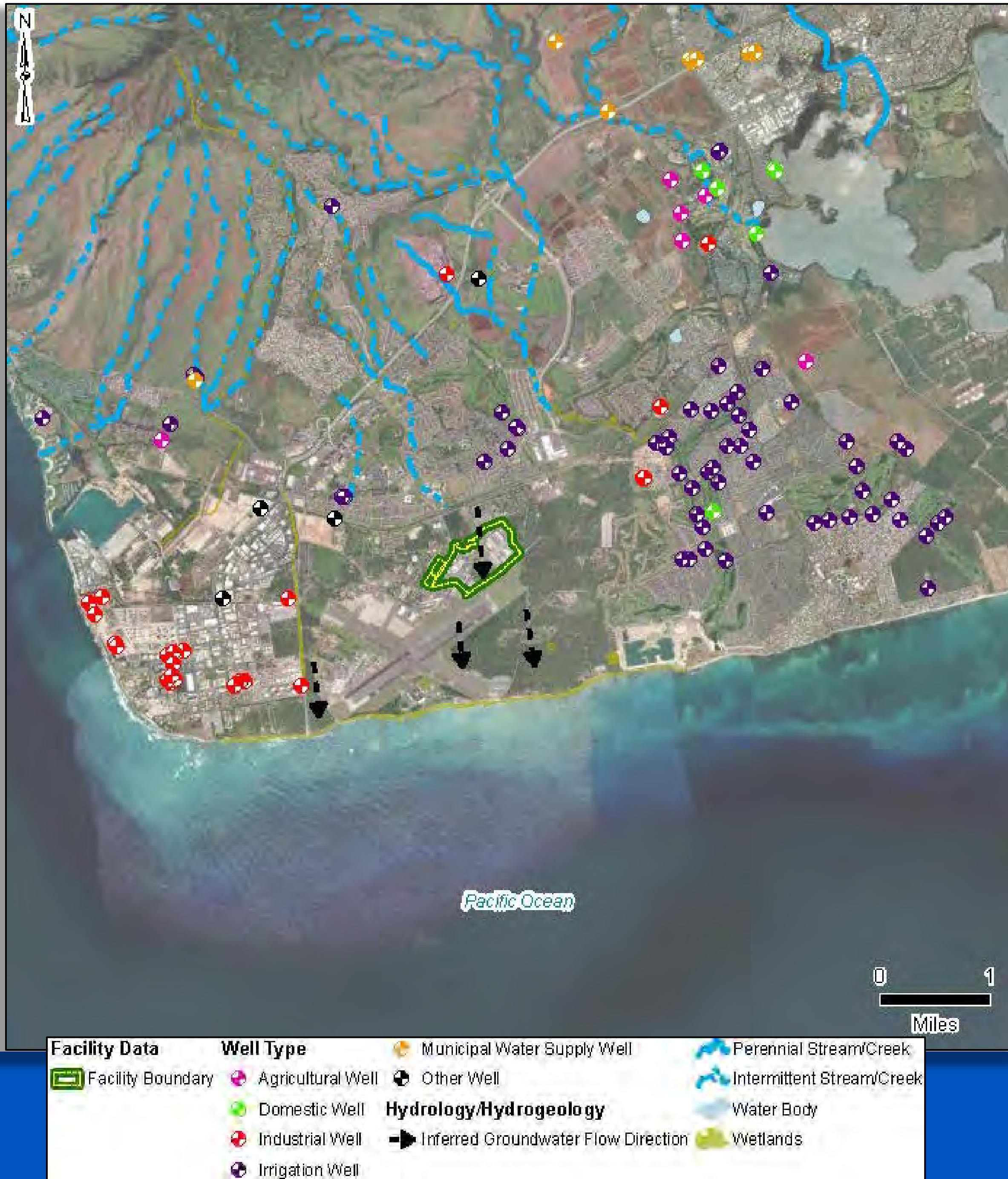
- Kalaeloa Airport
  - Hawai'i Department of Transportation (HDOT) operates the adjacent Kalaeloa Airport and maintains an aircraft rescue and fire training (ARFF) unit.
  - During the PA, interviewees indicated that the ARFF Unit conducts pump tests of their firetrucks at random locations surrounding the adjacent airport runway. Pump testing is sometimes conducted with AFFF mixed into the water tank of the trucks (as reported in the Oct. 2017 tests).
  - No specific records were found regarding the ARFF Unit's use, storage, disposal, or AFFF testing areas at the airport. No visual site inspection was performed during the PA.

Summary of PA Findings Kalaeloa AASF #1-JRF

Potential Adjacent Sources

Kalaeloa AASF #1–JRF CSM – Surface Water

Kalaeloa AASF #1–JRF CSM – Groundwater



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SI Data Quality Objectives

- Primary SI Data Quality Objectives (DQOs)
  - Confirm the presence/ absence of a release of relevant PFAS compounds at potential source areas.
  - Gather data for refinement of CSM (Source-Pathway-Receptor relationships).
- Enhanced SI DQOs
  - Determine the presence/absence of relevant PFAS compounds at the facility boundary.
  - Check for alternate sources.

SI Screening Levels

- Results compared to Office of the Secretary of Defense (OSD) Screening Levels (SLs) for soil and groundwater
  - Memorandum from the OSD dated 6 July 2022
  - SLs for groundwater based on direct ingestion
  - SLs for soil based on incidental ingestion; 0-2 feet (ft) below ground surface (bgs) compared to Residential SL, 2-15 ft bgs compared to Industrial SL, >15 ft bgs not compared to either SL
- AOIs exceeding OSD SLs will proceed to the next phase under CERCLA where releases are attributable to Department of Defense (DOD) (i.e., Remedial Investigation).

Analyte2	Residential (Soil) (µg/kg)[1] 0 to 2 ft bgs	Industrial/Commercial Composite Worker (Soil) (µg/kg)[1] 0 to 15 ft bgs	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. 2022. Risk-Based SLs in Groundwater and Soil using U.S. Environmental Protection Agency's Regional SL Calculator. Hazard Quotient=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 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.

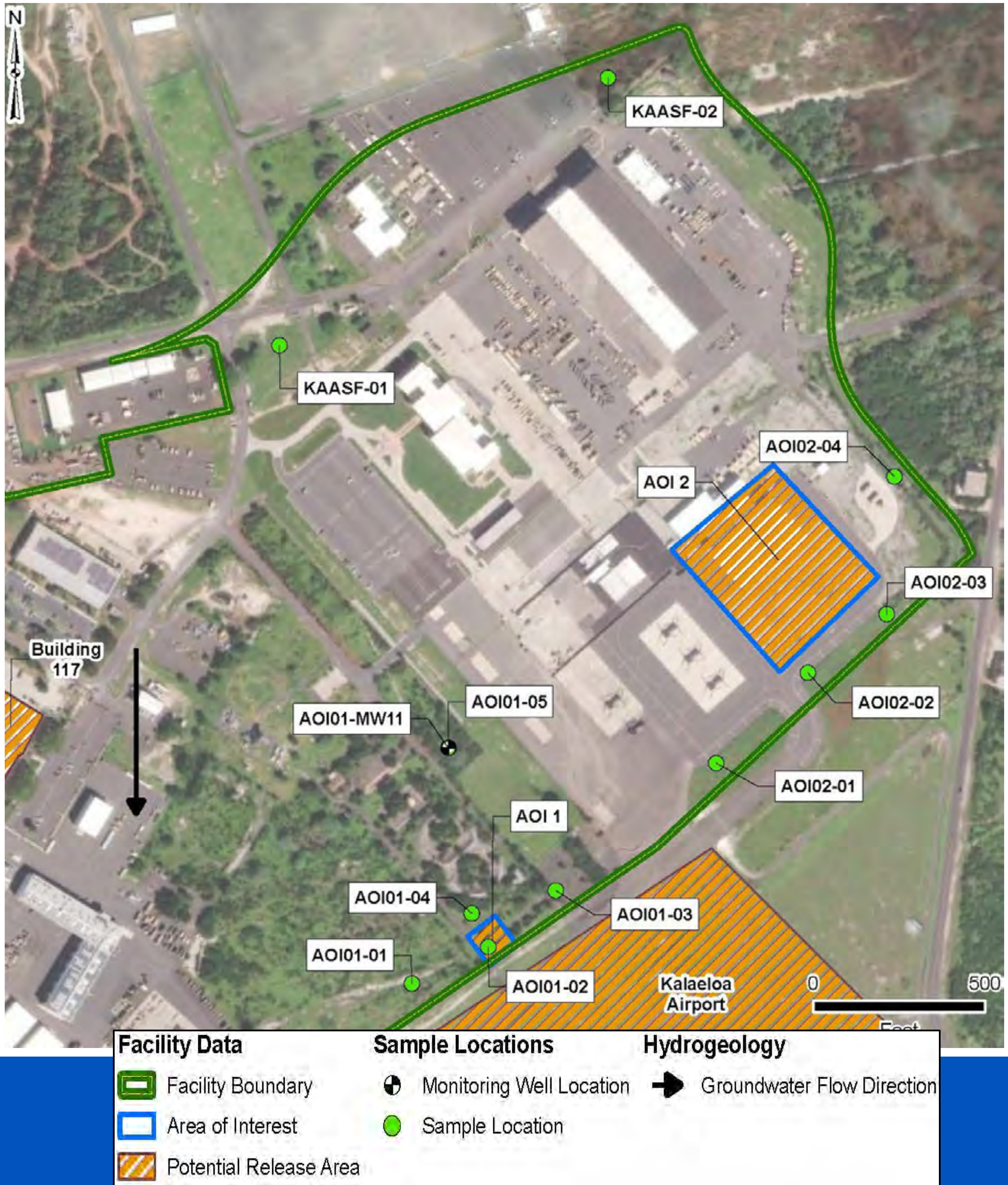
µg/kg = Microgram(s) per kilogram

ng/L = Nanogram(s) per liter

Summary of SI Approach Kalaeloa AASF #1-JRF

- Approach
  - Total boring depths ranged from 41 to 57 feet (ft) bgs
  - Soil samples from each location: Shallow (0 to 2 ft bgs), intermediate (13-15 ft bgs), and deep (31-48 ft bgs).
  - Groundwater was encountered at depths ranging from 34 to 48 ft bgs
  - Permanent wells were installed using 10 ft screen intervals after target depth was achieved
- Total Samples
  - Thirty-one (31) soil samples from 11 locations (7 primary locations, 1 secondary location [hand auger only], and 3 boundary locations)
  - Approximately 2 kilograms of soil were collected per sample in order for the laboratory to perform a multi increment subsampling procedure.
  - Eleven (11) grab groundwater samples from well locations (including 1 from a pre-existing monitoring well)
  - Twenty-six (26) quality assurance/quality control samples.

SI Sampling Locations Kalaeloa AASF #1-JRF



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Summary of SI Findings Kalaeloa AASF #1–JRF

Soil Results

AOI 1:

- Surface Soil:
  - All five relevant compounds were detected in surface soil in three locations, PFOA, PFOS, and PFHxS were detected in the remaining two locations.
  - Three relevant compounds were detected above their respective SLs in three locations: PFOA [one location at 100 µg/kg and 110 µg/kg in the duplicate], PFOS [two locations, highest was 1,500 J+ µg/kg and 1,500 J- µg/kg in it's duplicate], and PFHxS [one location at 340 µg/kg and 360 µg/kg in the duplicate]).
  - PFBS and PFNA were detected below their respective SLs.
- Shallow Subsurface Soil:
  - No relevant compounds were detected above their respective SLs in shallow subsurface soil; PFOA, PFOS, PFHxS, and PFBS were detected below their respective SLs.
  - PFNA was not detected in shallow subsurface soil.
- Deep subsurface Soil:
  - No relevant compounds were detected above their respective SLs in deep subsurface soil; PFOA, PFOS, PFHxS, and PFBS were detected below their respective SLs.
  - PFNA was not detected in deep subsurface soil.

Summary of SI Findings Kalaeloa AASF #1–JRF

Soil Results cont'd

AOI 2:

- Surface Soil:
  - No exceedances of SLs for any relevant compounds.
  - All five relevant compounds (PFOA, PFOS, PFBS, PFHxS, and PFNA) were detected below their respective SLs in surface soil.
- Shallow Subsurface Soil:
  - No exceedances of SLs for any relevant compounds.
  - Four of the five relevant compounds (PFOA, PFOS, PFBS, and PFHxS) were detected in shallow subsurface soil below their respective SLs.
  - PFNA was not detected at any shallow subsurface location.
- Deep subsurface Soil:
  - No exceedances of SLs for any relevant compounds.
  - All five relevant compounds (PFOA, PFOS, PFBS, PFHxS, and PFNA) were detected below their respective SLs in deep subsurface soil.

Summary of SI Findings Kalaeloa AASF #1–JRF

Soil results cont'd

Facility Boundary:

- Surface Soil:
  - Four of the five relevant compounds (PFOA, PFOS, PFHxS, and PFNA) were detected below their respective SLs in surface soil.
  - No exceedances for any relevant compound was detected. PFBS was not detected in either Facility Boundary location.
- Shallow Subsurface Soil:
  - Two of the five relevant compounds (PFOA, and PFOS,) were detected in shallow subsurface soil below their respective SLs.
  - PFBS, PFHxS, and PFNA were not detected at any shallow subsurface location.
  - No exceedances for any relevant compound was detected.
- Deep Subsurface Soil:
  - One of five relevant compounds (PFOS) was detected below their respective SLs in deep subsurface soil.
  - PFOA, PFBS, PFHxS, PFNA were not detected at either location.
  - No exceedances for any relevant compound was detected.

Summary of SI Findings
Kalaeloa AASF #1–JRF

Groundwater Results

AOI 1:

- All five relevant compounds (PFOA, PFOS, PFHxS, PFBS, and PFNA) were detected in groundwater samples.
- PFOA, PFOS, PFHxS, and PFNA were detected above their respective SLs; PFBS was detected below the SL.

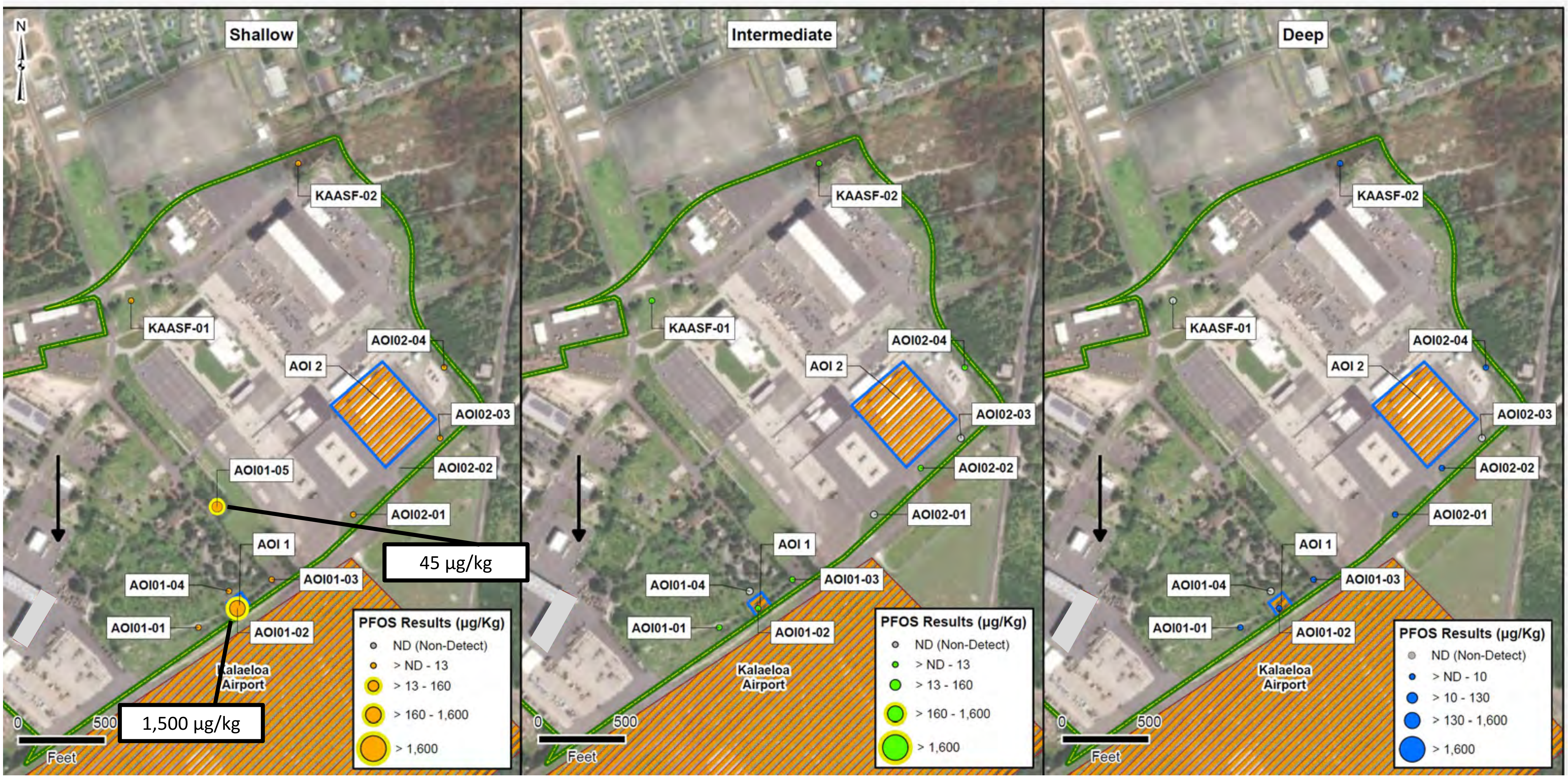
AOI 2:

- All five relevant compounds (PFOA, PFOS, PFHxS, PFBS, and PFNA) were detected in groundwater samples.
- PFOA, PFOS, PFHxS, and PFNA were detected above their respective SLs; PFBS was detected below the SL.

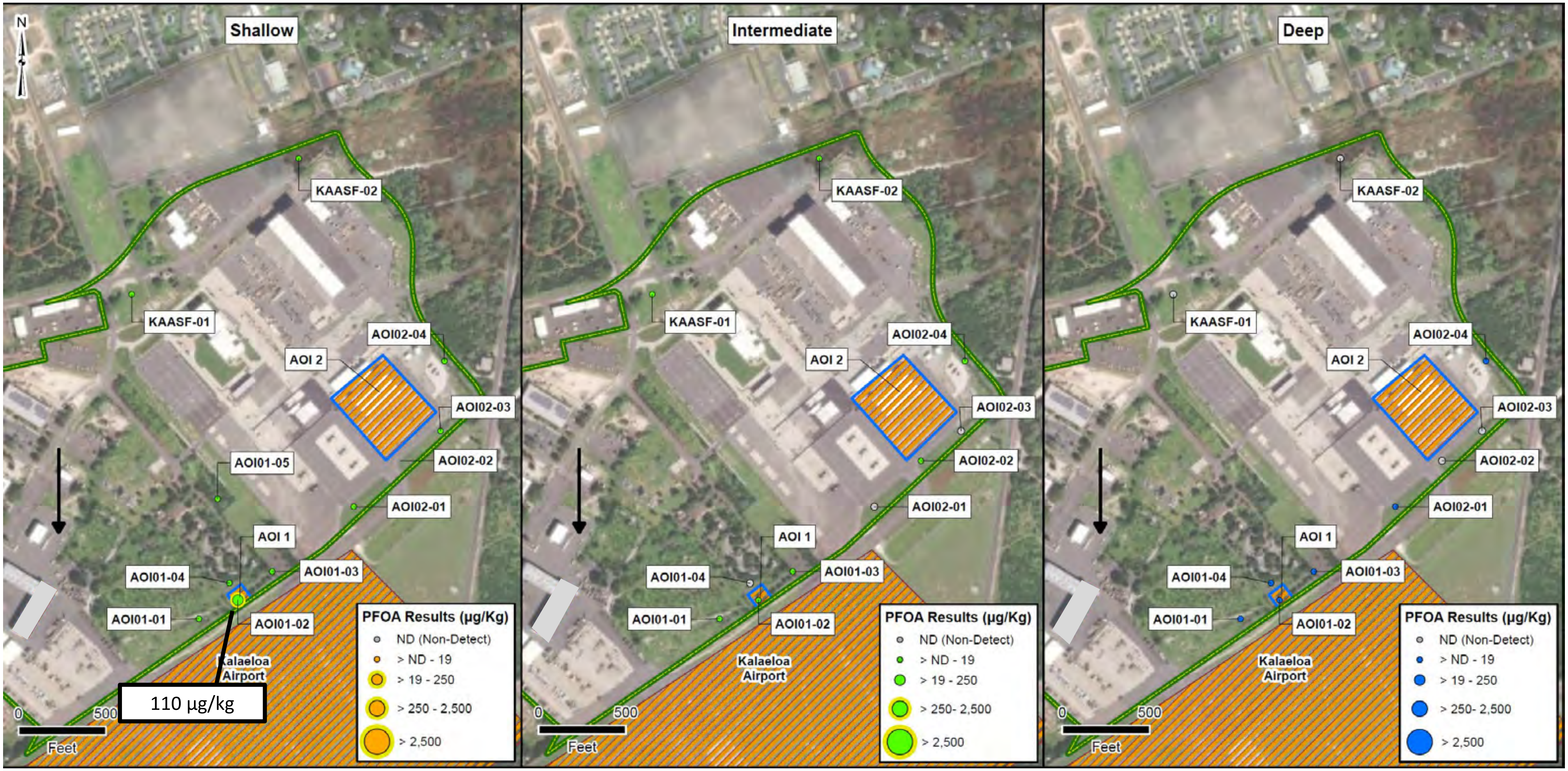
Facility Boundary:

- All five relevant compounds were detected in boundary locations.
- PFOA was detected above the SL in KAASF-01.
- PFOS was detected above the SL in both KAASF-01 and KAASF-02.
- PFNA, PFBS, and PFHxS were detected below their respective SLs.

Summary of SI Findings
PFOS in Soil

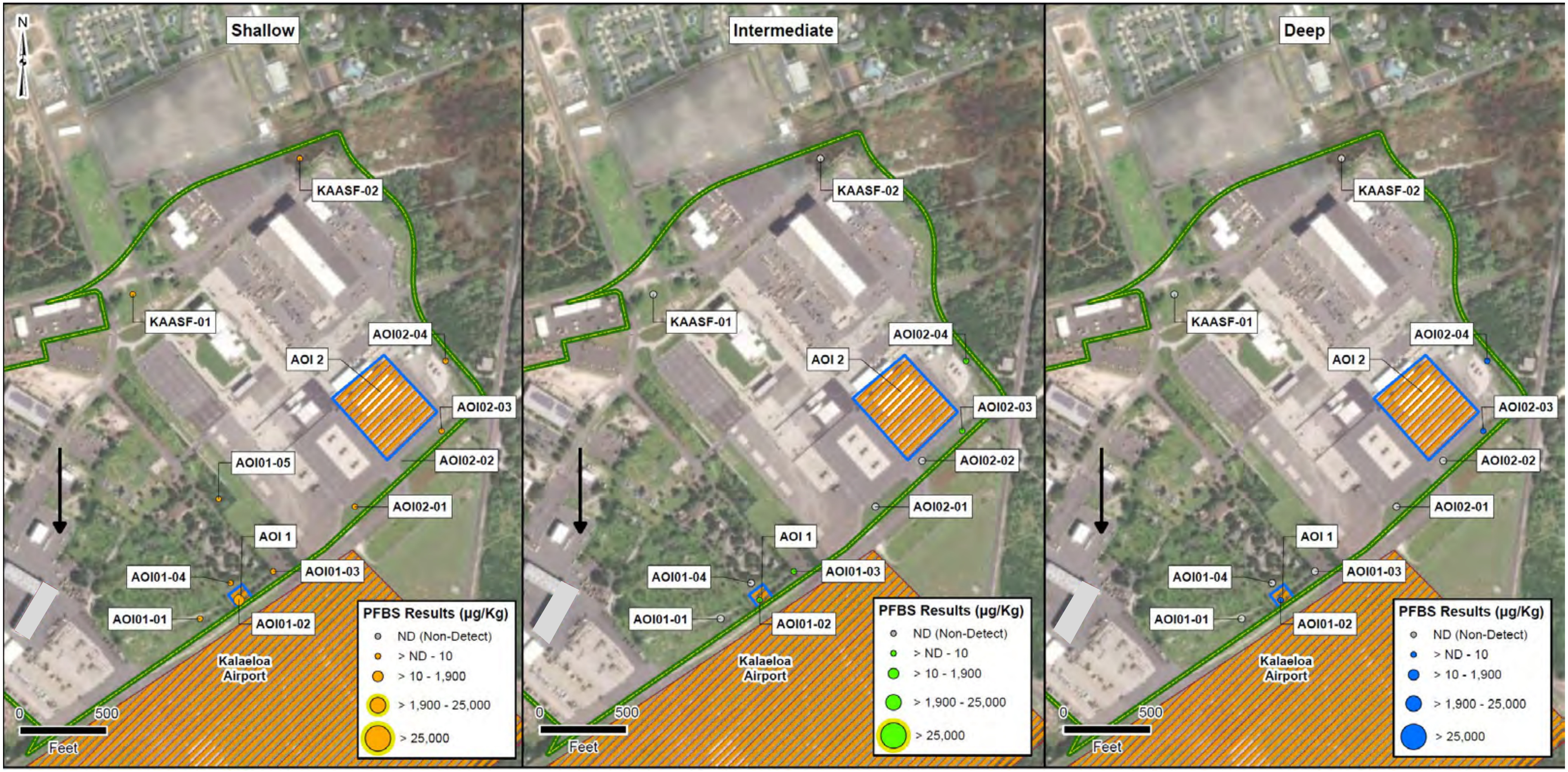


Summary of SI Findings
PFOA in Soil



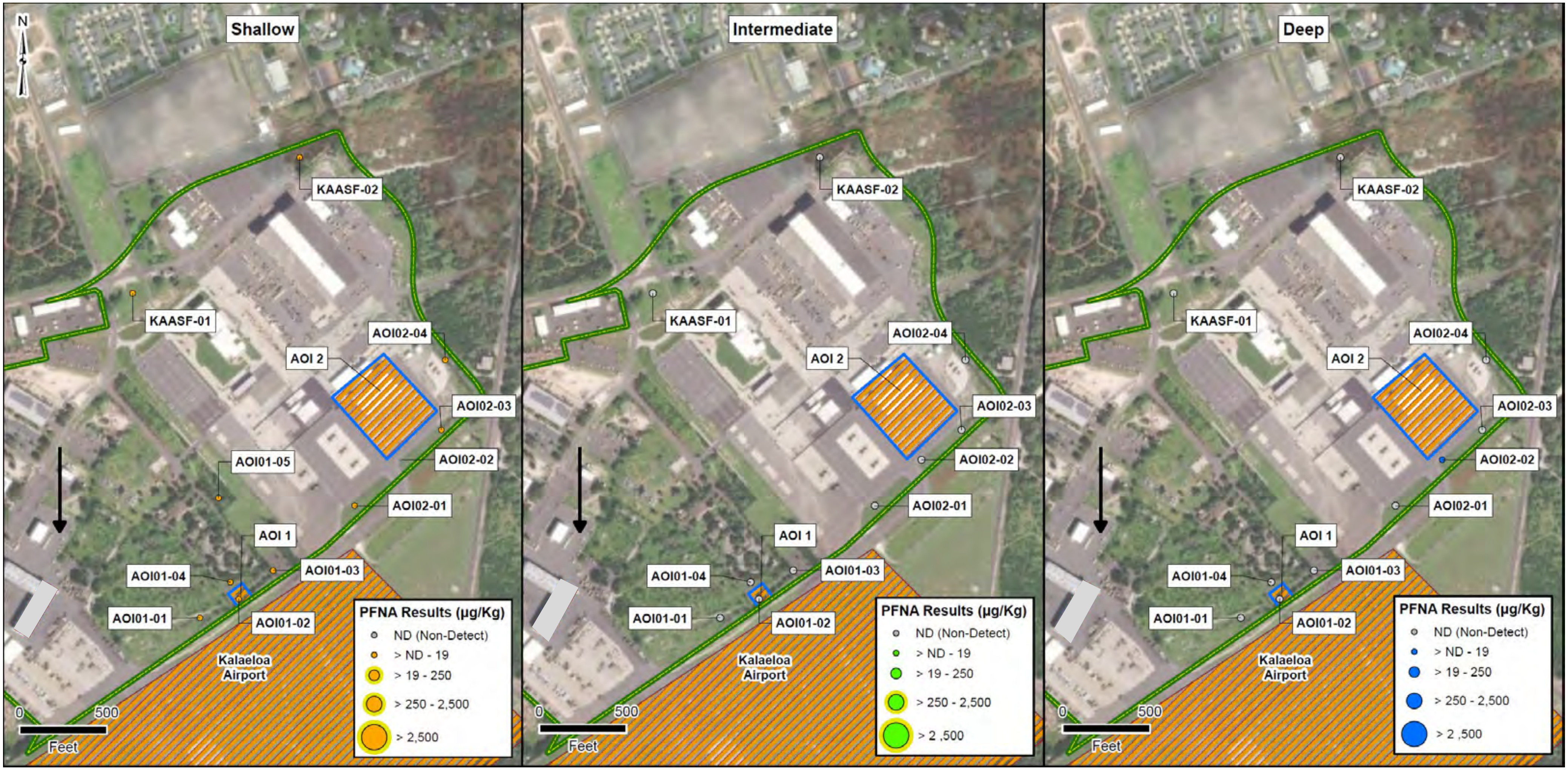
September 2023

Summary of SI Findings
PFBS in Soil

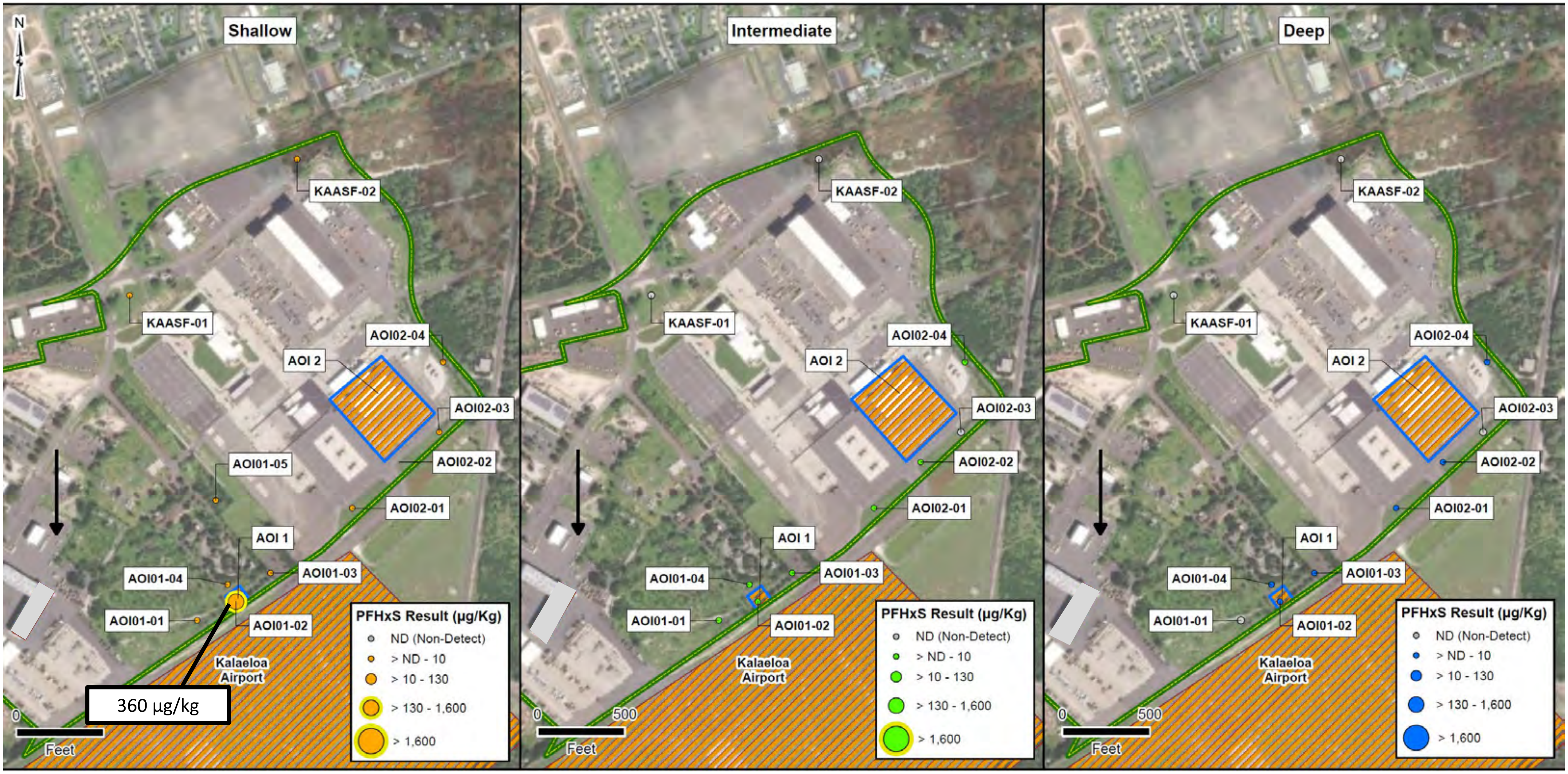


September 2023

Summary of SI Findings
PFNA in Soil

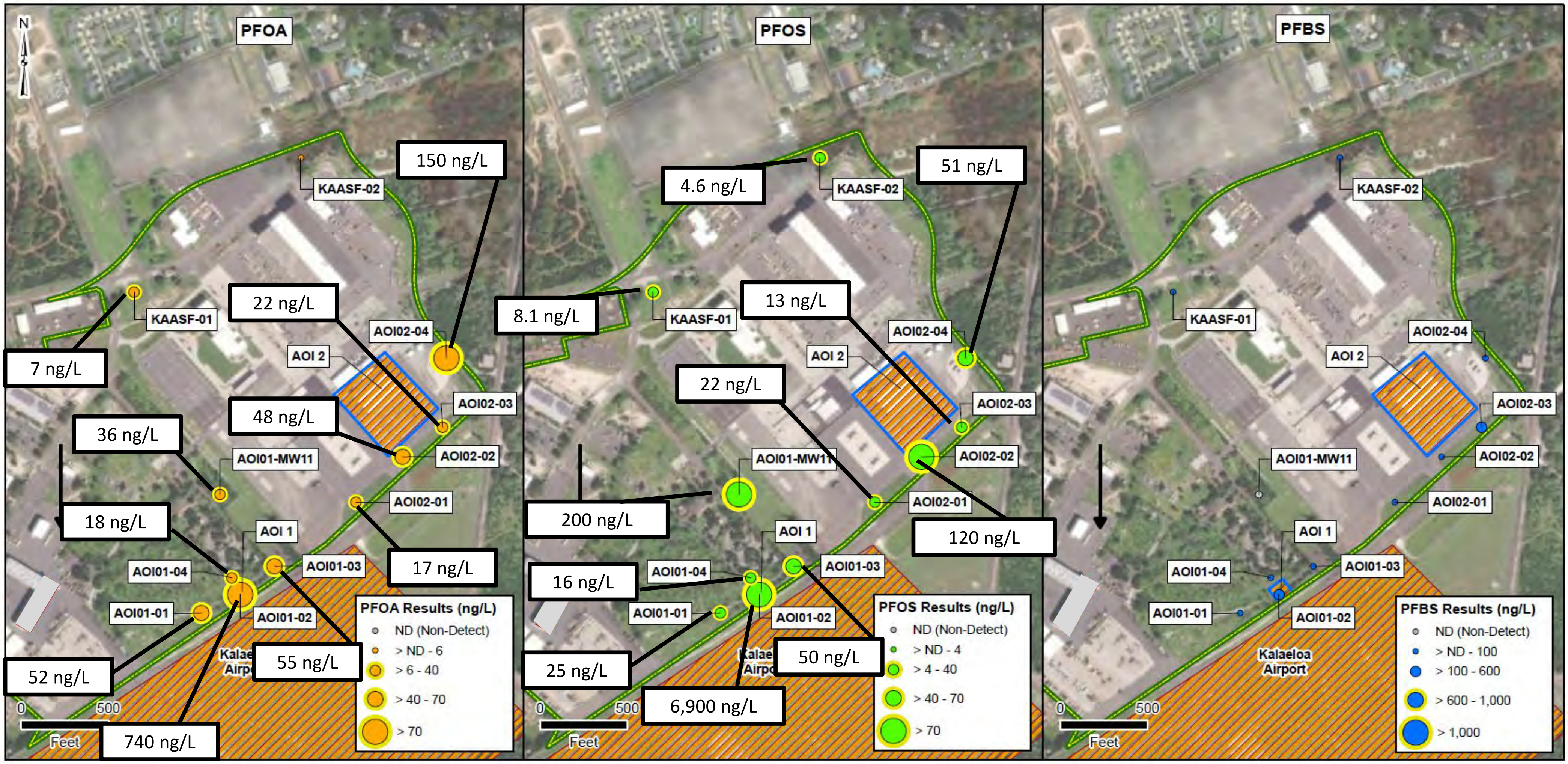


Summary of SI Findings
PFHxS in Soil



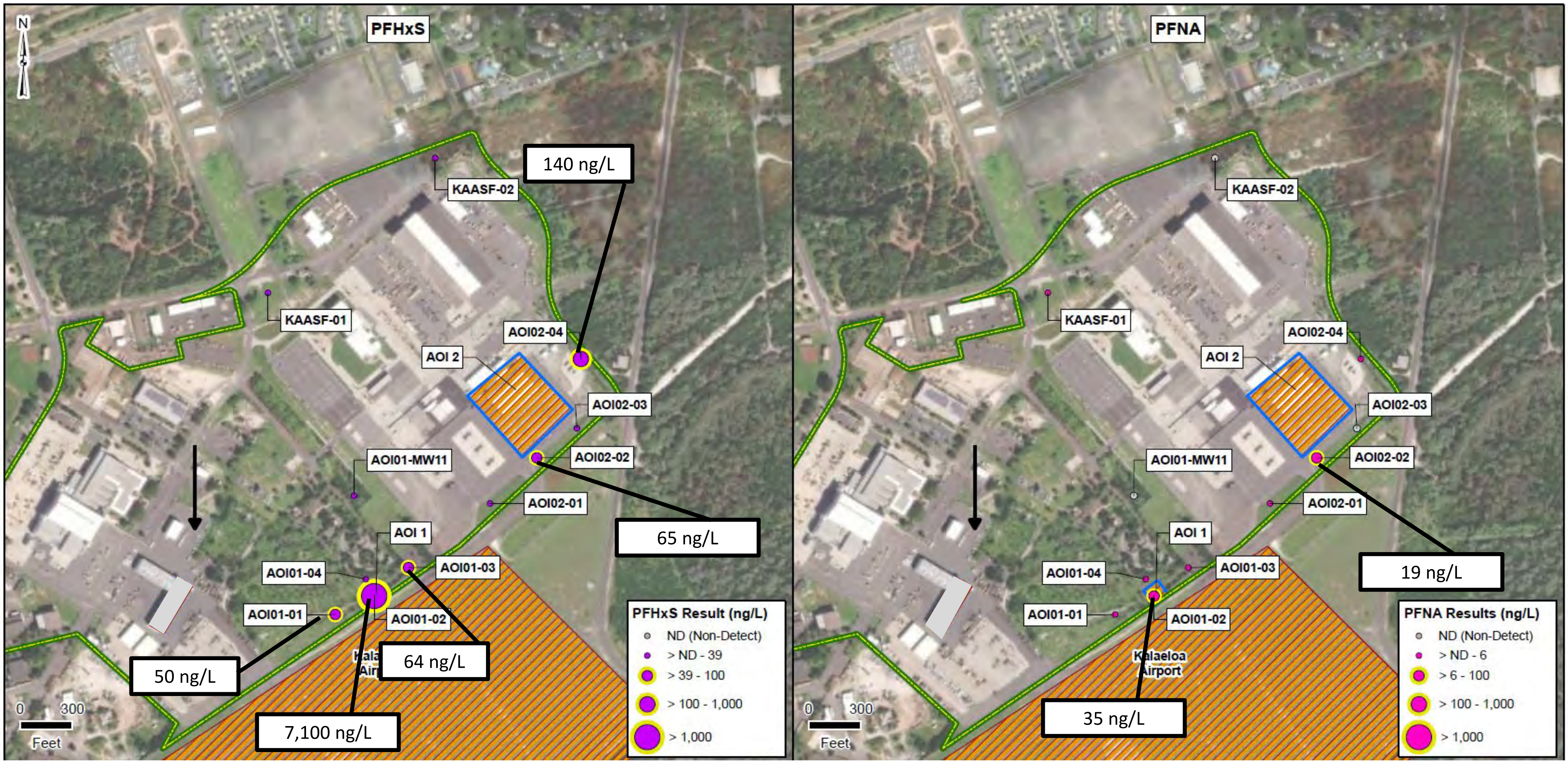
September 2023

Summary of SI Findings
PFOA, PFOS, PFBS in Groundwater



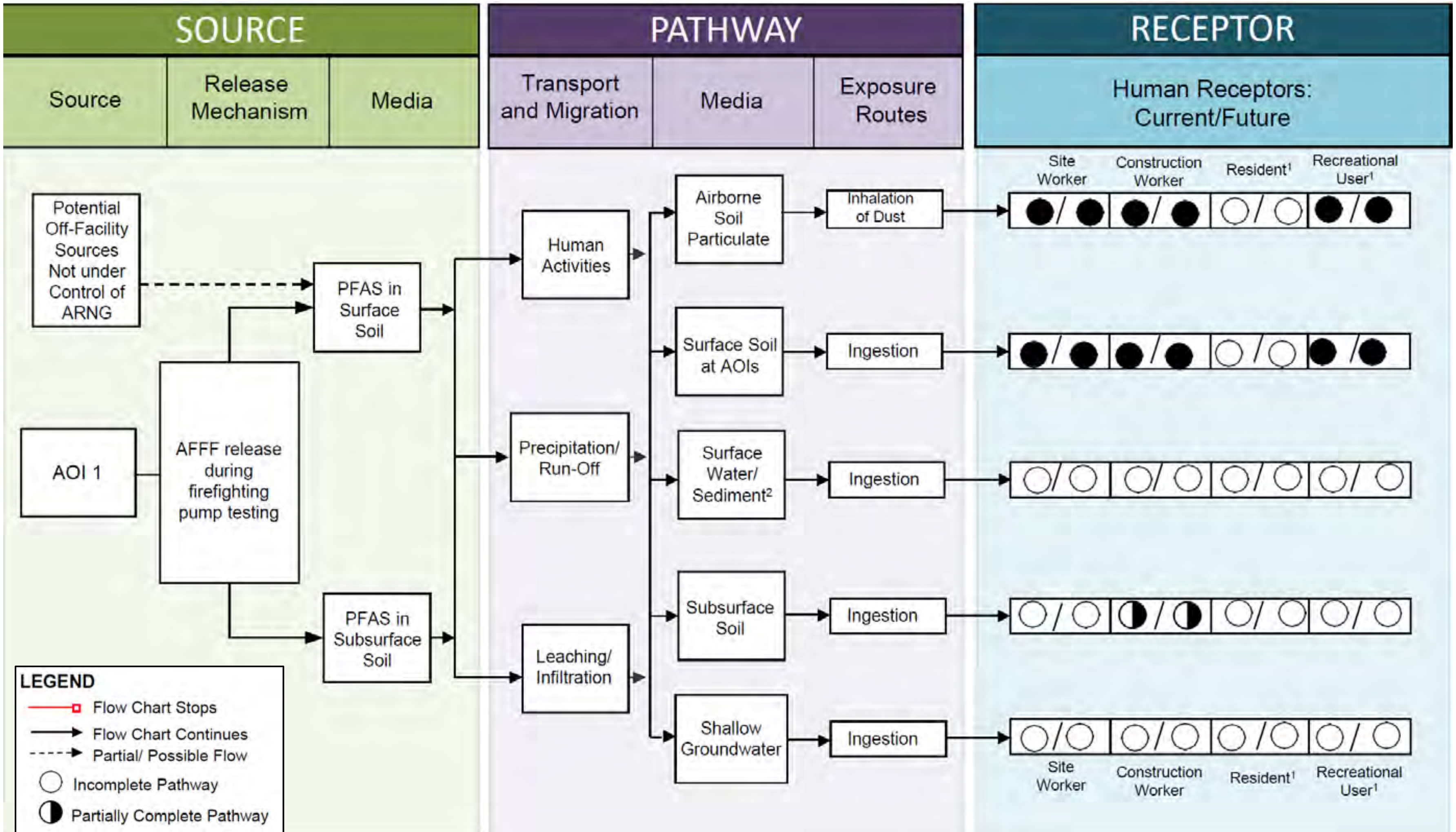
September 2023

Summary of SI Findings
PFHxS and PFNA in Groundwater



September 2023

Kalaeloa AASF #1 – JRF
SI CSM: AOI 1



LEGEND

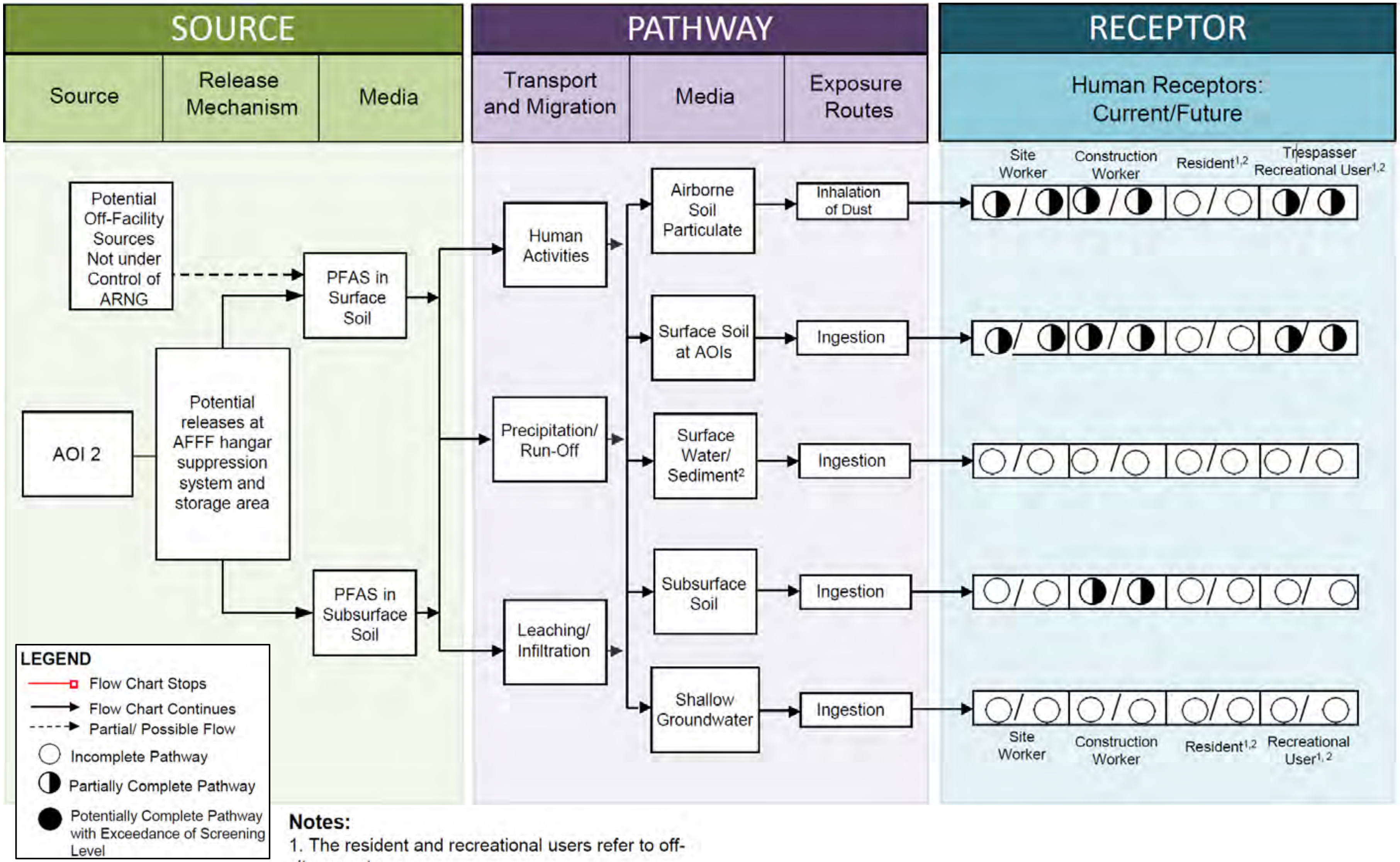
- Flow Chart Stops
- Flow Chart Continues
- Partial/ Possible Flow
- ○ Incomplete Pathway
- ◑ Partially Complete Pathway
- ● Potentially Complete Pathway with Exceedance of Screening Level

Notes:

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

September 2023

Kalaeloa AASF #1 – JRF
SI CSM: AOI 2



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

Summary of SI Findings
Kalaeloa AASF #1 – JRF

AOI	Potential Release Area	Soil Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	Former Fuel Farm Area	●	●	●	No further action under CERCLA
2	Hangar Suppression and Storage	◐	●	●	Proceed to RI

Legend:

● = Detected; exceedance of screening levels

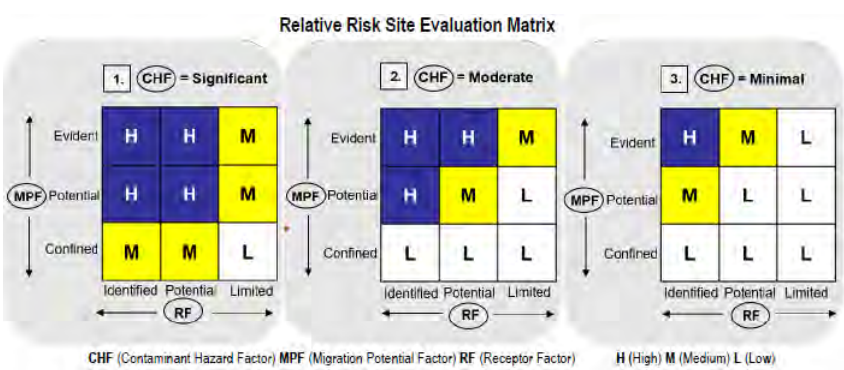
◐ = Detected; no exceedance of screening levels

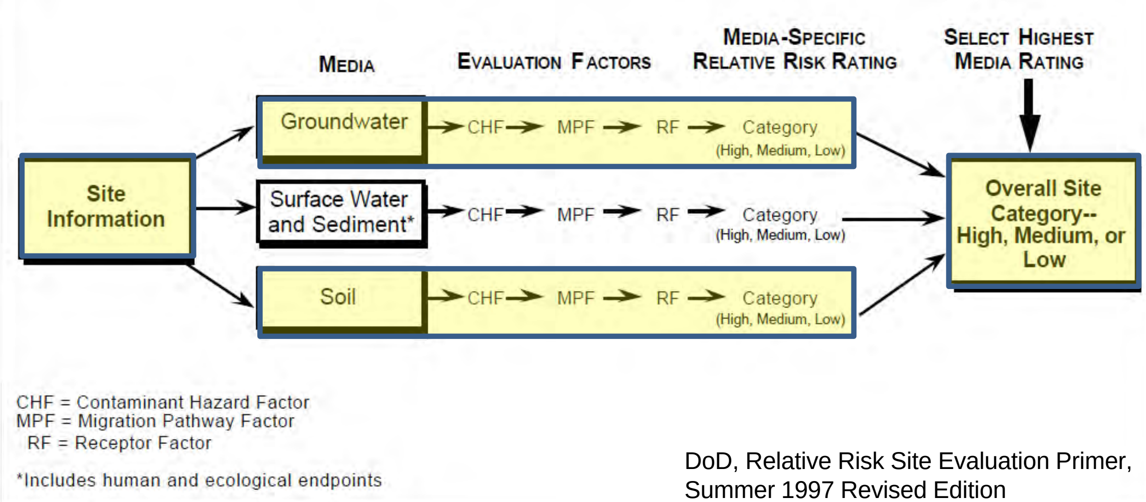
○ = Not detected

Note: AOI 1 is no further action (NFA) due to the determination that the AFFF release is from a non-Department of Defense (DOD) source.

Relative Risk Site Evaluation (RRSE)

- Used by the DoD as methodology to sequence environmental restoration work – Goal to address “worst first” – Used for RI funding order
- Based on information fundamental to risk assessment: sources, pathways, and receptors
- **<u>NOT a risk assessment</u>**
- Media: groundwater, surface soil
- SI data put into a screening tool to determine relative risk (ratio to SLs)
- Sum of ratios (highest groundwater/soil) compared to a specific comparison value
- Stakeholder feedback requested





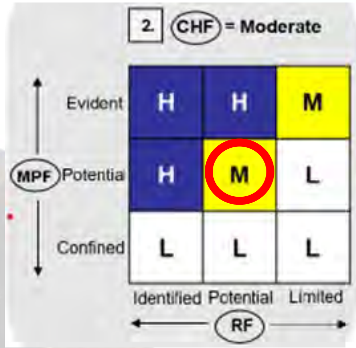
DoD, Relative Risk Site Evaluation Primer, Summer 1997 Revised Edition

☐

Groundwater: AOI 2 – Hangar Suppression System and Storage

Contaminant	Maximum Conc. (µg/L)	Comparison Value (µg/L; DoD 2022 for PFOA, PFOS, PFBS, PFNA, PFHxS, & HFPO-	Ratio Maximum Conc./ Comparison Value	Sum of All Ratios Check One Below	
PFOS	0.12	0.004	30.00	Significant (>100)	☐
PFOA	0.15	0.006	25.00	Moderate (2–100)	☑
PFBS	0.2	0.6	0.33	Minimal (<2)	☐
PFNA	0.019	0.006	3.17		
PFHxS	0.14	0.039	3.59		
HFPO-DA	NA	0.006	--		
		Sum of all ratios ->	62		

← Contaminant Hazard Factor (CHF)



Migration Pathway Factor (MPF) →

☐	***Evident***	
	☐	*Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure, such as a drinking water source.*
☑	***Potential***	
	☑	*Contamination in the groundwater has moved beyond the source,* ***OR***
	☐	*There is insufficient information available to make a determination of Evident or Confined.*
☐	***Confined***	
	☐	*Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited, possibly due to geological structures or physical controls;* ***OR***
	☐	*Is non-detect.*

☐	***Identified***	
	☐	*Impacted drinking water well with detected contaminants,* ***OR***
	☐	*Existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIa groundwater).*
☑	***Potential***	
	☐	*Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s)* ***OR***
	☐	*No known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or IIa groundwater)* ***OR***
	☑	*Is a source of water for other beneficial use (e.g., agricultural).*
☐	***Limited***	
	☐	*No known water supply wells downgradient* ***OR***
	☐	*Groundwater is not considered a potential drinking water source and is of limited beneficial use (EPA Class III).*

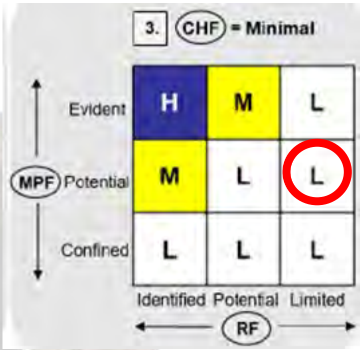
← Receptor Factor (RF)

EA Engineering, Science, and Technology, Inc., PBC

Surface Soil: AOI 2 – Hangar Suppression System and Storage

Contaminant	Maximum Conc. (mg/kg)	Comparison Value (mg/kg; DoD 2022 for PFOA, PFOS, PFBS, PFNA, PFHxS, & HFPO-	Ratio Maximum Conc./ Comparison Value	Sum of All Ratios Check One Below	
PFOS	0.0035	0.013	0.27	Significant (>100)	☐
PFOA	0.0024	0.019	0.13	Moderate (2–100)	☐
PFBS	0.000043	1.9	0.00	Minimal (<2)	☑
PFNA	0.00031	0.019	0.02		
PFHxS	0.00066	0.13	0.01		
HFPO-DA	NA	0.023	--		
		Sum of all ratios ->	0.42		

← Contaminant Hazard Factor (CHF)



Migration Pathway Factor (MPF) →

☐	***Evident***	
	☐	*Analytical data or observable evidence that contamination above the comparison value is present at a point of exposure.*
☑	***Potential***	
	☑	*Contamination is above the detection limit but below the comparison value and has either moved beyond the source or could move but is not moving appreciably,* ***OR***
	☐	*Information is not sufficient to make a determination of Evident or Confined.*
☐	***Confined***	
	☐	*Low possibility for contamination to be present at or migrate to a point of exposure due to barriers such as buildings, maintained berms, pavement, or caps;* ***OR***
	☐	*Is non-detect.*

☐	***Identified***	
	☐	*Receptors with unrestricted access to contaminated soil.*
☐	***Potential***	
	☐	*Receptors with controlled or restricted frequency of access to contaminated soil, such as commercial/industrial areas;* ***OR***
	☐	*Insufficient data exists to make a determination of Identified or Limited.*
☑	***Limited***	
	☑	*Receptors with limited access to contaminated soil, such as restricted access areas, fenced areas, or other controlled access areas; or migration pathway is Confined;* ***OR***
	☐	*Surface soil samples are non-detect.*

← Receptor Factor (RF)

Draft RRSE for Kalaeloa AASF #1 - JRF

<u>Evaluation Factors:</u>
CHF: Contaminant Hazard Factor
- Ratio of maximum concentration/screening level

MPF: Migration Pathway Factor
- Likelihood of contamination migrating to a point of exposure

RF: Receptor Factor
- Potential receptor exposure (within 4-miles)

<u>Scores:</u>
H: High
M: Medium
L: Low

<table>
<tr><th>Media</th><th>Evaluation Factor</th><th>Score</th><th>Relative Risk Evaluation</th><th>Overall AOI Rating</th></tr>
<tr><td colspan="5">AOI 1 - Former Fuel Farm Area (Non-DoD)</td></tr>
<tr><td colspan="5">AOI 2 - Hangar Suppression System and Storage</td></tr>
<tr><td rowspan="3">Groundwater</td><td>CHF</td><td>M</td><td rowspan="3">M</td><td rowspan="6">M</td></tr>
<tr><td>MPF</td><td>M</td></tr>
<tr><td>RF</td><td>M</td></tr>
<tr><td rowspan="3">Soil</td><td>CHF</td><td>L</td><td rowspan="3">L</td></tr>
<tr><td>MPF</td><td>M</td></tr>
<tr><td>RF</td><td>L</td></tr>
</table>

Feedback?

Next Steps

- Finalize SI Reports
  - Address comments from HDOH
  - Schedule
- Initiate next step in CERCLA process: Remedial Investigation

Open Discussion

September 2023

Acronyms

- µg/kg – microgram(s) per kilogram
- AFFF – aqueous film forming foam
- AOI – area of interest
- ARFF - aircraft rescue and fire training
- ARNG – Army National Guard
- bgs – below ground surface
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
- CSM – conceptual site model
- DQO – data quality objective
- ft – feet
- IDW – investigation-derived waste
- HDOH – Hawaiʻi State Department of Health
- HDOT – Hawaiʻi Department of Transportation
- HIARNG – Hawaiʻi Army National Guard
- MILSPEC – Military Specification
- NFA – No Further Action
- ng/L nanogram(s) per liter
- OSD – Office of the 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
- RI – Remedial Investigation
- SI – Site Inspection
- SL – screening level
- TPP – Technical Project Planning
- TS – Training Site
- USACE – U.S. Army Corp of Engineers

Appendix E

Boring Logs and Well Construction Diagrams

EA Engineering, Science, and Technology, Inc., PBC

Job. No.	Client:
634250383	ARNG

Drilling Method: Hollow Stem Auger (HSA)

Boring No. AOI01-01

Sampling Method: HSA/Continuous Core

Sheet 1 of 1

LOG OF SOIL/ROCK BORING

Coordinates (NAD 1983 PA11): 54396.47319 N, -1619548.14767 E

Surface Elevation: 36.28 ft

Casing Elevation (TOC): 35.97 ft

GW level at time of drilling: 34 ft bgs

GW level at time of sampling: 38.38 ft below TOC

		Drilling Start	Drilling Finish
Date	21-Apr-2022	0900	1200

Surface Conditions: Loose, dry, sandy gravel

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
AOI01-01-SB-0-2	0908	0.0	0.25 2	SM	White (7.5YR 8/1) silty sand with some gravels, dry, uniform
N/A	N/A	N/A	10	SM	White (7.5YR 8/1), fine and medium sand with some (20%) small gravel and coarse sand, well graded and poorly sorted, dry
AOI01-01-SB-13-15	0941	0.0	13 15	SM	
AOI01-01-SB-32-34	1041	0.0	30 34	GM	White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted; groundwater encountered at 34 ft bgs
N/A	N/A	N/A		GW	White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, wet
	1200	0.0	42		

Logged by: Teresa Quiniola

Date: 21-Apr-2022

Drilling Contractor: GeoTek Hawaii

Drillers: Gabe Gutierrez, Zack Tullis

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI01-02
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Date	20-Apr-2022
Drilling Start	1345
Drilling Finish	1550

Coordinates (NAD 1983 PA11): 54507.40167, -1619817.61573
Surface Elevation: 35.92 ft
Casing Elevation (TOC): 35.62 ft
GW level at time of drilling: 34 ft bgs
GW level at time of sampling: 34.03 ft below TOC

Surface Conditions: Asphalt

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
			0.1667	--	Asphalt
AOI01-02-SB-0-2	1351	0.0	2	SW	White (7.5YR 8/1), fine and medium sand with some (20%) small gravel and coarse sand, well graded and poorly sorted, dry
N/A	N/A		10	SM	White (7.5YR 8/1), sand (fines to medium-coarse grains) with 45% small gravel, poorly sorted, dry
AOI01-02-SB-13-15	1419	0.0	13 15		
N/A	N/A	N/A	N/A	GM	White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, dry
AOI01-02-SB-32-34	1511	0.1	32 34		White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted; groundwater encountered at 34 ft bgs
N/A	1526	0.0	45	GM	White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, wet

Logged by: Catharine Creadick
Date: 21-Apr-2022

Drilling Contractor: GeoTek Hawaii
Drillers: John Shjegstad, Kendall Bane

EA Engineering, Science, and Technology, Inc., PBC

Job. No.	Client:
634250383	ARNG

Drilling Method: Hollow Stem Auger (HSA)

Boring No. AOI01-03

Sampling Method: HSA/Continuous Core

Sheet 1 of 1

Date: 20-Apr-2022

Drilling Start	Drilling Finish
0900	1430

LOG OF SOIL/ROCK BORING

Coordinates (NAD 1983 PA11): 54631.97632, -1619976.4856

Surface Elevation: 36.53 ft

Casing Elevation (TOC): 36.23 ft

GW level at time of drilling: 36 ft bgs

GW level at time of sampling: 34.61 ft below TOC

Surface Conditions: Asphalt

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
N/A	0900	0.0	0.1667	--	Asphalt
AOI01-03-SB-0-2	0940	0.0	2	SM	White (7.5YR 8/1), fine and medium sand with some (20%) small gravel and coarse sand, well graded and poorly sorted, dry
N/A	N/A	0.0	10		
			13		White (7.5YR 8/1), sand (fines to medium-coarse grains) with 45% small gravel, poorly sorted, dry
AOI01-03-SB-13-15	1036	0.0	15		
N/A	N/A	N/A		GM	White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, dry
			34		White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, moist; groundwater encountered at 36 ft bgs.
AOI01-03-SB-34-36	1332	0.0	36		
N/A	1430	0.0	44		White (7.5YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, dry

Logged by: Catharine Creadick

Date: 04/20/2022

Drilling Contractor: GeoTek Hawaii

Drillers: Gabe Gutierrez, Zack Tullis

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI01-04
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Date	21-Apr-2022
Drilling Start	1020
Drilling Finish	1245

Coordinates (NAD 1983 PA11): 54568.69696, -1619768.13343
Surface Elevation: 36.65 ft
Casing Elevation (TOC): 36.46 ft
GW level at time of drilling: 33 ft bgs
GW level at time of sampling: 34.82 ft below TOC

Surface Conditions: Loose, dry, sandy gravel

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
	1020		0.1667	GP	Dark gray to olive gray (5Y 4/2) large gravel and cobbles, poorly sorted fill
			0.5	SM	Light brownish gray (10YR 6/2), poorly graded, dry, sandy silt with gravel
	N/A		1	SM	Light yellowish brown (10YR 6/4) silty soil with large gravels
AOI01-04-SB-0-2	1035	0.0	2	SM	White (10YR 8/1) silty sand with some gravels, dry, uniform
N/A	N/A		12	SM	
AOI01-04-SB-13-15	1047	0.0	13 15	SM	
N/A	N/A		30	GP	White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, dry
AOI01-04-SB-31-33	1155	0.0	31 33	GP	White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, moist; groundwater encountered at 33 ft bgs
N/A	1245	0.0	41	GP	White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, wet

Logged by: Catharine Creadick
Date: 04/21/2022
Drilling Contractor: GeoTek Hawaii
Drillers: Kevin Rogers, John Shjegstad

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI01-05
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Date	21-Apr-2022
Drilling Start	1505
Drilling Finish	1515

Coordinates (NAD 1983 PA11): 54993.88327, -1619941.88278
Surface Elevation: 37.24 ft
Casing Elevation (TOC): N/A
GW level at time of drilling: N/A
GW level at time of sampling: N/A

Surface Conditions: Vegetative grass

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
AOI01-05-SB-0-2	1515	0.0	2	SM	Topsoil, light yellowish brown (2.5Y 6/3) to light gray (2.5Y 7/2), silty sand with gravel and some cobbles. Poorly sorted, dry and loose. Dry organic material on upper 0.2 ft.

Note: Collected groundwater sample from existing well in the vicinity. Therefore, only surface soil sample was collected at this location.

Logged by: Catharine Creadick
Date: 21-Apr-2022
Drilling Contractor: GeoTek Hawaii
Drillers: John Shjegstad, Kendall Bane

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI02-01
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1

Coordinates (NAD 1983 PA11):	54998.67233, -1620468.41235
Surface Elevation:	36.76 ft
Casing Elevation (TOC):	36.50 ft
GW level at time of drilling:	36 ft bgs
GW level at time of sampling:	34.92 ft below TOC

		Drilling Start	Drilling Finish
Time			
Date	18-Apr-2022	1331	
	19-Apr-2022		1140

Surface Conditions: Vegetative grass, some gravel

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
AOI02-01-SB-0-2	1331	0.0	0.5	ML	Dark grayish brown (10YR 4/2) soil with organics, cobbles and very large gravel, poorly sorted, dry
			1	SM	Grayish brown (10YR 5/2) soil with small gravel and medium sand, poorly sorted, dry
	1354		2		
N/A	N/A	N/A	10	SM	White (10YR 8/1) and very pale brown (10YR 8/2), coralline and silty sand, very fine with small gravels, poorly sorted, dry
AOI02-01-SB-13-15	1442	0.0	13		
			15		
N/A	N/A	0.0	33	GM	White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, dry
AOI02-01-SB-34-36	19-Apr-22 1121	0.0	34		White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, moist; groundwater encountered at 36 ft bgs
			36		
N/A	1140	0.0	43		White (10 YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, wet

Logged by:	Teresa Quiniola	Date:	19-Apr-2022
Drilling Contractor:	GeoTek Hawaii	Drillers:	Gabe Gutierrez John Shjegstad

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI02-02
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Date	18-Apr-2022
Drilling Start	0930
Drilling Finish	1130

Coordinates (NAD 1983 PA11): 55284.4664, -1620784.54175
Surface Elevation: 39.12 ft
Casing Elevation (TOC): 38.76 ft
GW level at time of drilling: 38 ft bgs
GW level at time of sampling: 37.15 ft below TOC

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Vegetative grass, some gravel
AOI02-02-SB-0-2	932	0.0	0.5	ML	Dark grayish brown (10YR 4/2) soil with organics, cobbles and very large gravel, poorly sorted, dry
			1	SM	Grayish brown (10YR 5/2) soil with small gravel and medium sand, loose, poorly sorted, dry
	941		2		White (10YR 8/1) and very pale brown (10YR 8/2), coralline and silty sand, very fine with small gravels, poorly sorted, dry
N/A	N/A		12		White (10YR 8/1) silty sand with some gravels, uniformly graded, dry
AOI02-02-SB-13-15	1021	0.0	13		
			15		
N/A	N/A	N/A	35		White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, dry
AOI02-02-SB-36-38	1113	0.0	36		White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, moist; groundwater encountered at 38 ft bgs
			38	GP	
N/A	1130	0.0	45	GM	White (10 YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, wet.

Logged by: Catharine Creadick
Date: 04/18/2022
Drilling Contractor: GeoTek Hawaii
Drillers: Gabe Gutierrez, John Shjegstad

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI02-03
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Date	15-Apr-2022
Drilling Start	1000
Drilling Finish	1220

Coordinates (NAD 1983 PA11):	55379.56526, -1620891.73984
Surface Elevation:	39.99 ft
Casing Elevation (TOC):	39.55 ft
GW level at time of drilling:	38 ft bgs
GW level at time of sampling:	37.91 ft below TOC

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Vegetative Grass
AOI02-03-SB-0-2	1015	0.0	0.5	ML	Dark grayish brown (10YR 4/2) soil with organics, cobbles and very large gravel, poorly sorted, dry
			1	SM	Grayish brown (10YR 5/2) soil with small gravel and medium sand, loose, poorly sorted, dry
	1035		2	GM	White (10YR 8/1) and very pale brown (10YR 8/2), coralline and silty sand, very fine with small gravels, poorly sorted, dry
N/A	N/A	N/A	10		
AOI02-03-SB-13-15	1125	0.0	13	SW	White (10YR 8/1) silty sand with some gravels, uniformly graded, dry
			15		
N/A	N/A	N/A	35		
AOI02-03-SB-36-38	1155	0.0	36	GP	White (10YR 8/1) medium to coarse sand and gravels, poorly sorted and moderately uniform, moist; groundwater encountered at 38 ft bgs
			38		
N/A	1220	0.0	45	GM	White (10 YR 8/1) Coarse gravel-sand-silt mixture, well graded and poorly sorted, wet.

Logged by: Catharine Creadick

Date: 04/15/2022

Drilling Contractor: GeoTek Hawaii

Drillers: Gabe Gutierrez, John Shjegstad

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	AOI02-04
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Coordinates (NAD 1983 PA11):	55806.99013, -1620992.4682
Surface Elevation:	40.78 ft
Casing Elevation (TOC):	40.46 ft
GW level at time of drilling:	38 ft bgs
GW level at time of sampling:	38.82 ft below TOC
Date	19-Apr-2022
Drilling Start (Time)	0850
Drilling Finish (Time)	1615

Surface Conditions: Concrete cobbles

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
AOI02-04-SB-0-2; KAASF-DUP-SB-01		0.0	1	-	Concrete, light gray (2.5Y 7/2), very coarse grained, angular, moderately hard, non-plastic, dry
	912	0.0	2	SM	White (10YR 8/1) and very pale brown (10YR 8/2), coralline and silty sand, very fine with small gravels, poorly sorted, low plasticity, dry
N/A	N/A	N/A	10		
AOI02-04-SB-13-15	1527	0.0	11 15	CL	Gray (10YR 6/1) clay, fat with high plasticity, moist
N/A	N/A	N/A	35		
AOI02-04-SB-36-38	1611		36 38		Gray (10YR 6/2) clay, fat with high plasticity, moist; groundwater encountered at 38 ft bgs
N/A	N/A	N/A	48		Gray (10YR 6/2) clay, fat with high plasticity, wet

Logged by: Teresa Quiniola

Date: 04/20/2022

Drilling Contractor: GeoTek Hawaii

Drillers: John Shjegstad, Kendall Bane

EA Engineering, Science, and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Job. No.	634250383
Client:	ARNG
Drilling Method:	Hollow Stem Auger (HSA)
Boring No.	KAASF-01
Sampling Method:	HSA/Continuous Core
Sheet	1 of 1
Date	11-Apr-2022
Drilling Start	0900
Drilling Finish	1405

Coordinates (NAD 1983 PA11): 56239.95349, -1619194.28043

Surface Elevation: 46.45 ft

Casing Elevation (TOC): 46.17 ft

GW level at time of drilling: 42 ft bgs

GW level at time of sampling: 44.54 ft below TOC

Surface Conditions: Coarse sand and coarse gravels; some grass

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Description
KAASF-01-SB-0-2	0905		0.5	ML	Dark reddish brown (2.5YR 2.5/4), silty soil with small gravel, poorly sorted, dry, trace organic material
			1	SM	White (10YR 8/1) and very pale brown (10YR 8/2), coralline and silty sand, very fine with small gravels, poorly sorted, dry
	0915	0.0	2		
N/A	N/A	0.0	8		
N/A	N/A	N/A	9 13	--	Void from 9 to 13 ft bgs
KAASF-01-SB-13-15	0945	0.0	15	GW	White (10YR 8/1) coralline, slightly moist (dry to moist), poorly sorted small gravel/sand mixture
N/A	N/A	0.0	30		
N/A	1025		35	SM - GM	White (10YR 8/1), coralline sandy silt with gravels, dry, poorly sorted and well graded
N/A	1054	0.0	39		
KAASF-01-SB-40-42	1150	0.0	40 42	GW - GM	White (10YR 8/1), coralline, poorly sorted and well graded sand/silt/gravel mixture, moist; groundwater encountered at 42 ft bgs
N/A	1405	0.0	47		White (10YR 8/1), coralline, poorly sorted and well graded sand/silt/gravel mixture, wet

Logged by: Catharine Creadick

Date: 04/11/2022

Drilling Contractor: GeoTek Hawaii

Drillers: John Shjegstad, Gabe Gutierrez

EA Engineering, Science, and Technology, Inc., PBC

Job. No.	Client:
634250383	ARNG

Drilling Method:	Boring No.
Hollow Stem Auger (HSA)	KAASF-02
Sampling Method:	
HSA/Continuous Core	Sheet 1 of 1

	Drilling Start	Drilling Finish
Date 12-Apr-2022	0930	1700

LOG OF SOIL/ROCK BORING

Coordinates (NAD 1983 PA11): 56940.10374, -1620245.23409
Surface Elevation: 50.11 ft
Casing Elevation (TOC): 49.62 ft
GW level at time of drilling: 48 ft bgs
GW level at time of sampling: 47.94 ft below TOC

Soil Sample ID	Time	PID ppm	Depth in Feet	USCS Log	Surface conditions: Sand and small gravels
KAASF-02-SB-0-2	0930	0.0	0.5	SM	Very pale brown (10YR 8/3) sand with small gravel, poorly sorted, dry, little (~10%) organic material
	0958		2		Very pale brown (10YR 8/2), silty sand with some (20%) small gravel, poorly sorted, dry
N/A	N/A	N/A			
KAASF-02-SB-13-15	1035		13 15		
N/A	N/A	N/A	45	GM	Very pale brown (10YR 8/2), silt/sand/gravel mixture (~50% large gravel), well graded, poorly sorted, dry. Some moisture at 44-45 ft bgs
KAASF-02-SB-46-48	1415	0.0	46 48	GP	Very pale brown (10YR 8/2) to white (18YR 8/1) poorly graded gravels with sand, moist; groundwater encountered at 48 ft bgs
N/A	1530	0.0	57		Very pale brown (10YR 8/2) to white (18YR 8/1) poorly graded gravels with sand, wet

Logged by: Catharine Creadick
Date: 04/12/2022
Drilling Contractor: GeoTek Hawaii
Drillers: John Shjegstad, Gabe Gutierrez

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Appendix F

Analytical Results

PFAS Results in Surface Soil, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI01-01				AOI01-02				AOI01-02				AOI01-03				AOI01-04			
		Sample Name	AOI01-01-SB-0-2				AOI01-02-SB-0-2				KAASF-DUP-SB-03				AOI01-03-SB-0-2				AOI01-04-SB-0-2			
		Parent Sample ID									AOI01-02-SB-0-2											
		Sample Date	4/21/2022				4/20/2022				4/20/2022				4/20/2022				4/21/2022			
		Depth (ft bgs)	0-2				0-2				0-2				0-2				0-2			
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																						
4:2 Fluorotelomer sulfonate	--	µg/kg	<	0.18	0.23	UJ	7.6	1.7	2.1		11	1.7	2.1	J+	<	0.17	0.21	UJ	<	0.16	0.21	U
6:2 Fluorotelomer sulfonate	--	µg/kg	1.3	0.18	0.23	J+	550	17	21	J-	430	17	21	J-	0.17	0.17	0.21	J+	<	0.16	0.21	U
8:2 Fluorotelomer sulfonate	--	µg/kg	0.42	0.18	0.34	J+	130	1.7	3.2		120	1.7	3.1		<	0.17	0.32	UJ	<	0.16	0.31	U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.046	0.23	UJ	<	0.42	2.1	UJ	<	0.42	2.1	UJ	<	0.042	0.21	UJ	<	0.041	0.21	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.046	0.23	UJ	<	0.42	2.1	UJ	<	0.42	2.1	UJ	<	0.042	0.21	UJ	<	0.041	0.21	UJ
Perfluorobutanesulfonic acid (PFBS)	1900	µg/kg	0.084	0.18	0.23	J	19	1.7	2.1		25	1.7	2.1		<	0.17	0.21	U	<	0.16	0.21	U
Perfluorobutanoic acid	--	µg/kg	0.51	0.18	0.23		19	1.7	2.1		23	1.7	2.1		0.17	0.17	0.21	J+	0.25	0.16	0.21	
Perfluorodecanesulfonic acid	--	µg/kg	<	0.046	0.069	U	0.45	0.42	0.63	J	0.45	0.42	0.62	J-	<	0.042	0.063	U	<	0.041	0.062	U
Perfluorodecanoic acid	--	µg/kg	0.033	0.046	0.069	J	11	0.42	0.63		11	0.42	0.62		<	0.042	0.063	UJ	<	0.041	0.062	U
Perfluorododecanoic acid	--	µg/kg	<	0.046	0.069	U	2.1	0.42	0.63		2.2	0.42	0.62		<	0.042	0.063	UJ	<	0.041	0.062	U
Perfluoroheptanesulfonic acid	--	µg/kg	0.061	0.046	0.069	J	56	0.42	0.63		55	0.42	0.62		<	0.042	0.063	U	<	0.041	0.062	U
Perfluoroheptanoic acid	--	µg/kg	0.25	0.046	0.069		19	0.42	0.63		22	0.42	0.62		0.096	0.042	0.063	J+	0.1	0.041	0.062	
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	2.1	0.046	0.069		340	4.2	6.3		360	4.2	6.2		0.54	0.042	0.063		0.65	0.041	0.062	
Perfluorohexanoic acid	--	µg/kg	1.1	0.046	0.069	J+	190	0.42	0.63		270	4.2	6.2		0.18	0.042	0.063	J+	0.36	0.041	0.062	J+
Perfluorononanesulfonic acid	--	µg/kg	<	0.046	0.069	U	0.82	0.42	0.63		0.84	0.42	0.62		<	0.042	0.063	U	<	0.041	0.062	U
Perfluorononanoic acid (PFNA)	19	µg/kg	0.042	0.046	0.069	J	12	0.42	0.63		12	0.42	0.62		<	0.042	0.063	UJ	<	0.041	0.062	U
Perfluorooctanesulfonamide	--	µg/kg	<	0.046	0.069	U	12	0.42	0.63	J+	13	0.42	0.62		<	0.042	0.063	U	<	0.041	0.062	U
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	4.7	0.046	0.069	J+	1500	4.2	6.3		1500	4.2	6.2	J-	0.72	0.042	0.063		0.5	0.041	0.062	J+
Perfluorooctanoic acid (PFOA)	19	µg/kg	1.9	0.046	0.069		100	0.42	0.63		110	0.42	0.62		0.33	0.042	0.063	J+	0.26	0.041	0.062	
Perfluoropentanesulfonic acid	--	µg/kg	0.039	0.046	0.34	J	17	0.42	3.2		22	0.42	3.1		<	0.042	0.32	U	0.024	0.041	0.31	J
Perfluoropentanoic acid	--	µg/kg	0.57	0.046	0.069	J+	81	0.42	0.63		99	0.42	0.62		0.14	0.042	0.063	J+	0.33	0.041	0.062	J+
Perfluorotetradecanoic acid	--	µg/kg	<	0.046	0.069	U	0.78	0.42	0.63		0.82	0.42	0.62		<	0.042	0.063	UJ	<	0.041	0.062	U
Perfluorotridecanoic acid	--	µg/kg	<	0.046	0.069	U	0.78	0.42	0.63		0.78	0.42	0.62		<	0.042	0.063	UJ	<	0.041	0.062	U
Perfluoroundecanoic acid	--	µg/kg	<	0.046	0.069	U	3.5	0.42	0.63		3.1	0.42	0.62		<	0.042	0.063	UJ	<	0.041	0.062	U

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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.
< = Analyte not detected above the LOD.
-- = No screening level available.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.

PFAS Results in Surface Soil, Site Inspection Report, Kalaeloa AASF #1-JRF

Location ID			AOI01-05				AOI01-05				AOI02-01				AOI02-02				AOI02-03				AOI02-04			
Sample Name			AOI01-05-SB-0-2				KAASF-DUP-SB-04				AOI02-01-SB-0-2				AOI02-02-SB-0-2				AOI02-03-SB-0-2				AOI02-04-SB-0-2			
Parent Sample ID							AOI01-05-SB-0-2																			
Sample Date			4/21/2022				4/21/2022				4/18/2022				4/18/2022				4/15/2022				4/19/2022			
Depth (ft bgs)			0-2				0-2				0-2				0-2				0-2				0-2			
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																										
4:2 Fluorotelomer sulfonate	--	µg/kg	<	0.17	0.21	UJ	<	0.17	0.21	UJ	<	0.17	0.21	UJ	<	0.17	0.21	UJ	<	0.17	0.21	UJ	<	0.16	0.21	U
6:2 Fluorotelomer sulfonate	--	µg/kg	0.082	0.17	0.21	J+	0.27	0.17	0.21	J+	<	0.17	0.21	UJ	<	0.17	0.21	UJ	0.09	0.17	0.21	J	0.097	0.16	0.21	J
8:2 Fluorotelomer sulfonate	--	µg/kg	<	0.17	0.32	UJ	<	0.17	0.31	UJ	<	0.17	0.32	UJ	<	0.17	0.31	UJ	0.23	0.17	0.31	J	<	0.16	0.31	U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.043	0.21	UJ	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.041	0.21	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.043	0.21	UJ	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.041	0.21	UJ
Perfluorobutanesulfonic acid (PFBS)	1900	µg/kg	0.11	0.17	0.21	J	0.15	0.17	0.21	J	0.043	0.17	0.21	J	0.043	0.17	0.21	J	<	0.17	0.21	U	<	0.16	0.21	U
Perfluorobutanoic acid	--	µg/kg	0.53	0.17	0.21	J+	0.48	0.17	0.21	J+	0.11	0.17	0.21	J+	0.19	0.17	0.21	J+	0.6	0.17	0.21		0.16	0.16	0.21	J
Perfluorodecanesulfonic acid	--	µg/kg	<	0.042	0.063	U	<	0.042	0.062	U	<	0.043	0.064	U	<	0.042	0.063	U	0.021	0.042	0.063	J	<	0.041	0.062	U
Perfluorodecanoic acid	--	µg/kg	0.15	0.042	0.063		0.12	0.042	0.062		0.15	0.043	0.064	J+	0.045	0.042	0.063	J+	0.22	0.042	0.063		0.041	0.041	0.062	J
Perfluorododecanoic acid	--	µg/kg	<	0.042	0.063	U	<	0.042	0.062	U	0.049	0.043	0.064	J+	<	0.042	0.063	UJ	0.059	0.042	0.063	J	<	0.041	0.062	U
Perfluoroheptanesulfonic acid	--	µg/kg	0.21	0.042	0.063		0.21	0.042	0.062		<	0.043	0.064	U	<	0.042	0.063	U	0.022	0.042	0.063	J	0.022	0.041	0.062	J
Perfluoroheptanoic acid	--	µg/kg	0.61	0.042	0.063		0.66	0.042	0.062		0.042	0.043	0.064	J+	0.1	0.042	0.063	J+	1.4	0.042	0.063		0.066	0.041	0.062	
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	2.2	0.042	0.063		2.6	0.042	0.062		0.13	0.043	0.064		0.045	0.042	0.063	J	0.66	0.042	0.063		0.35	0.041	0.062	
Perfluorohexanoic acid	--	µg/kg	0.65	0.042	0.063	J+	0.79	0.042	0.062	J+	0.075	0.043	0.064	J+	0.18	0.042	0.063	J+	0.65	0.042	0.063	J+	0.27	0.041	0.062	J+
Perfluorononanesulfonic acid	--	µg/kg	0.028	0.042	0.063	J	0.024	0.042	0.062	J	<	0.043	0.064	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.041	0.062	U
Perfluorononanoic acid (PFNA)	19	µg/kg	3	0.042	0.063		2.7	0.042	0.062		0.1	0.043	0.064	J+	0.067	0.042	0.063	J+	0.31	0.042	0.063		0.043	0.041	0.062	J
Perfluorooctanesulfonamide	--	µg/kg	<	0.042	0.063	U	<	0.042	0.062	U	<	0.043	0.064	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.041	0.062	U
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	45	0.42	0.63		39	0.42	0.62		2.3	0.043	0.064	J+	1	0.042	0.063	J+	3.5	0.042	0.063		2.7	0.041	0.062	J+
Perfluorooctanoic acid (PFOA)	19	µg/kg	2.1	0.042	0.063		2.5	0.042	0.062		0.26	0.043	0.064	J+	0.21	0.042	0.063	J+	2.4	0.042	0.063		0.87	0.041	0.062	J+
Perfluoropentanesulfonic acid	--	µg/kg	0.086	0.042	0.32	J	0.11	0.042	0.31	J	<	0.043	0.32	U	<	0.042	0.31	U	0.026	0.042	0.31	J	<	0.041	0.31	U
Perfluoropentanoic acid	--	µg/kg	0.93	0.042	0.063	J+	0.97	0.042	0.062	J+	0.04	0.043	0.064	J+	0.18	0.042	0.063	J+	1	0.042	0.063		0.065	0.041	0.062	
Perfluorotetradecanoic acid	--	µg/kg	<	0.042	0.063	U	<	0.042	0.062	U	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.041	0.062	U
Perfluorotridecanoic acid	--	µg/kg	<	0.042	0.063	U	<	0.042	0.062	U	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.041	0.062	U
Perfluoroundecanoic acid	--	µg/kg	0.091	0.042	0.063		0.06	0.042	0.062	J	0.052	0.043	0.064	J+	<	0.042	0.063	UJ	0.11	0.042	0.063		<	0.041	0.062	U

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.

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.
< = Analyte not detected above the LOD.
-- = No screening level available.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.

PFAS Results in Surface Soil, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI02-04				KAASF-01				KAASF-01				KAASF-01				KAASF-02			
		Sample Name	KAASF-DUP-SB-01				KAASF-01-SB-0TO2				KAASF-01-SB-0TO2 Duplicate				KAASF-01-SB-0TO2 Triplicate				KAASF-02-SB-01-02			
		Parent Sample ID	AOI02-04-SB-0-2								KAASF-01-SB-0TO2				KAASF-01-SB-0TO2							
		Sample Date	4/19/2022				4/11/2022				4/11/2022				4/11/2022				4/12/2022			
		Depth (ft bgs)	0-2				0-2				0-2				0-2				1-2			
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																						
4:2 Fluorotelomer sulfonate	--	µg/kg	<	0.17	0.21	U	<	0.17	0.21	UJ	<	0.17	0.21	U	<	0.17	0.21	U	<	0.17	0.22	UJ
6:2 Fluorotelomer sulfonate	--	µg/kg	0.088	0.17	0.21	J	<	0.17	0.21	UJ	<	0.17	0.21	U	<	0.17	0.21	U	0.079	0.17	0.22	J
8:2 Fluorotelomer sulfonate	--	µg/kg	<	0.17	0.31	U	<	0.17	0.32	UJ	<	0.17	0.31	U	<	0.17	0.32	U	<	0.17	0.33	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.042	0.21	UJ	<	0.043	0.21	UJ	<	0.042	0.21	U	<	0.042	0.21	U	<	0.044	0.22	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.042	0.21	UJ	<	0.043	0.21	UJ	<	0.042	0.21	U	<	0.042	0.21	U	<	0.044	0.22	UJ
Perfluorobutanesulfonic acid (PFBS)	1900	µg/kg	<	0.17	0.21	U	<	0.17	0.21	UJ	<	0.17	0.21	U	<	0.17	0.21	U	<	0.17	0.22	UJ
Perfluorobutanoic acid	--	µg/kg	0.2	0.17	0.21	J	0.17	0.17	0.21	J	0.15	0.17	0.21	J	0.15	0.17	0.21	J	0.1	0.17	0.22	J
Perfluorodecanesulfonic acid	--	µg/kg	<	0.042	0.063	U	<	0.043	0.064	UJ	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.065	UJ
Perfluorodecanoic acid	--	µg/kg	0.045	0.042	0.063	J	0.066	0.043	0.064	J	0.079	0.042	0.063		0.077	0.042	0.063		0.022	0.044	0.065	J
Perfluorododecanoic acid	--	µg/kg	<	0.042	0.063	U	0.03	0.043	0.064	J	0.021	0.042	0.063	J	0.028	0.042	0.063	J	<	0.044	0.065	UJ
Perfluoroheptanesulfonic acid	--	µg/kg	<	0.042	0.063	U	<	0.043	0.064	UJ	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.065	UJ
Perfluoroheptanoic acid	--	µg/kg	0.08	0.042	0.063		0.054	0.043	0.064	J	0.05	0.042	0.063	J	0.048	0.042	0.063	J	0.6	0.044	0.065	J
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	0.35	0.042	0.063		0.09	0.043	0.064	J	0.087	0.042	0.063		0.081	0.042	0.063		0.2	0.044	0.065	J
Perfluorohexanoic acid	--	µg/kg	0.41	0.042	0.063	J+	0.072	0.043	0.064	J	0.064	0.042	0.063		0.07	0.042	0.063		0.061	0.044	0.065	J
Perfluorononanesulfonic acid	--	µg/kg	<	0.042	0.063	U	<	0.043	0.064	UJ	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.065	UJ
Perfluorononanoic acid (PFNA)	19	µg/kg	0.041	0.042	0.063	J	0.092	0.043	0.064	J	0.094	0.042	0.063		0.092	0.042	0.063		<	0.044	0.065	UJ
Perfluorooctanesulfonamide	--	µg/kg	<	0.042	0.063	U	<	0.043	0.064	UJ	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.065	UJ
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	2.8	0.042	0.063	J+	1.1	0.043	0.064	J	1.1	0.042	0.063		1	0.042	0.063		2.2	0.044	0.065	J
Perfluorooctanoic acid (PFOA)	19	µg/kg	0.88	0.042	0.063	J+	0.28	0.043	0.064	J	0.26	0.042	0.063		0.28	0.042	0.063		1.2	0.044	0.065	J
Perfluoropentanesulfonic acid	--	µg/kg	<	0.042	0.31	U	<	0.043	0.32	UJ	<	0.042	0.31	U	<	0.042	0.32	U	<	0.044	0.33	UJ
Perfluoropentanoic acid	--	µg/kg	0.078	0.042	0.063		0.036	0.043	0.064	J	0.032	0.042	0.063	J	0.034	0.042	0.063	J	0.045	0.044	0.065	J
Perfluorotetradecanoic acid	--	µg/kg	<	0.042	0.063	U	<	0.043	0.064	UJ	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.065	UJ
Perfluorotridecanoic acid	--	µg/kg	<	0.042	0.063	U	<	0.043	0.064	UJ	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.065	UJ
Perfluoroundecanoic acid	--	µg/kg	<	0.042	0.063	U	0.023	0.043	0.064	J	0.026	0.042	0.063	J	0.023	0.042	0.063	J	<	0.044	0.065	UJ

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.

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.
< = Analyte not detected above the LOD.
-- = No screening level available.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.

PFAS Results in Shallow Subsurface Soil, Site Inspeciton Report, Kalaeloa AASF #1-JRF

		Location ID	AOI01-01				AOI01-02				AOI01-03				AOI01-03				AOI01-04				AOI02-01			
		Sample Name	AOI01-01-SB-13-15				AOI01-02-SB-13-15				AOI01-03-SB-13-15				KAASF-DUP-SB-02				AOI01-04-SB-13-15				AOI02-01-SB-13-15			
		Parent Sample ID													AOI01-03-SB-13-15											
		Sample Date	4/21/2022				4/20/2022				4/20/2022				4/20/2022				4/21/2022				4/18/2022			
		Depth (ft bgs)	13-15				13-15				13-15				13-15				13-15				13-15			
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																										
4:2 Fluorotelomer sulfonate	--	µg/kg	<	0.17	0.21	UJ	2.7	0.17	0.21	J+	<	0.17	0.21	UJ	<	0.17	0.21	UJ	<	0.17	0.21	UJ	<	0.17	0.22	UJ
6:2 Fluorotelomer sulfonate	--	µg/kg	3.1	0.17	0.21	J+	2.9	0.17	0.21	J+	0.27	0.17	0.21	J+	0.38	0.17	0.21	J+	0.17	0.17	0.21	J+	2.2	0.17	0.22	J+
8:2 Fluorotelomer sulfonate	--	µg/kg	0.19	0.17	0.31	J+	<	0.17	0.32	UJ	<	0.17	0.31	UJ	<	0.17	0.31	UJ	<	0.17	0.31	UJ	<	0.17	0.33	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.042	0.21	UJ	<	0.043	0.21	UJ	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.044	0.22	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.042	0.21	UJ	<	0.043	0.21	UJ	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.042	0.21	UJ	<	0.044	0.22	UJ
Perfluorobutanesulfonic acid (PFBS)	25000	µg/kg	<	0.17	0.21	U	6.5	0.17	0.21		0.047	0.17	0.21	J	0.049	0.17	0.21	J	<	0.17	0.21	U	<	0.17	0.22	U
Perfluorobutanoic acid	--	µg/kg	0.14	0.17	0.21	J+	5.3	0.17	0.21	J+	0.11	0.17	0.21	J+	0.13	0.17	0.21	J+	<	0.17	0.21	U	0.11	0.17	0.22	J+
Perfluorodecanesulfonic acid	--	µg/kg	<	0.042	0.062	U	<	0.043	0.064	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.066	U
Perfluorodecanoic acid	--	µg/kg	<	0.042	0.062	UJ	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluorododecanoic acid	--	µg/kg	<	0.042	0.062	UJ	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluoroheptanesulfonic acid	--	µg/kg	<	0.042	0.062	U	<	0.043	0.064	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.066	U
Perfluoroheptanoic acid	--	µg/kg	<	0.042	0.062	UJ	0.94	0.043	0.064	J+	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluorohexanesulfonic acid (PFHxS)	1600	µg/kg	0.045	0.042	0.062	J	3.4	0.043	0.064		0.13	0.042	0.063		0.13	0.042	0.063		0.022	0.042	0.063	J	0.039	0.044	0.066	J
Perfluorohexanoic acid	--	µg/kg	0.14	0.042	0.062	J+	66	0.43	0.64	J+	0.089	0.042	0.063	J+	0.096	0.042	0.063	J+	<	0.042	0.063	U	0.11	0.044	0.066	J+
Perfluorononanesulfonic acid	--	µg/kg	<	0.042	0.062	U	<	0.043	0.064	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.066	U
Perfluorononanoic acid (PFNA)	250	µg/kg	<	0.042	0.062	UJ	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluorooctanesulfonamide	--	µg/kg	<	0.042	0.062	U	<	0.043	0.064	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.042	0.063	U	<	0.044	0.066	U
Perfluorooctanesulfonic acid (PFOS)	160	µg/kg	0.15	0.042	0.062	J+	0.54	0.043	0.064		0.07	0.042	0.063		0.059	0.042	0.063	J	<	0.042	0.063	U	<	0.044	0.066	U
Perfluorooctanoic acid (PFOA)	250	µg/kg	0.071	0.042	0.062	J+	0.2	0.043	0.064	J+	0.054	0.042	0.063	J+	0.061	0.042	0.063	J+	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluoropentanesulfonic acid	--	µg/kg	<	0.042	0.31	U	4.8	0.043	0.32		<	0.042	0.31	U	<	0.042	0.31	U	<	0.042	0.31	U	<	0.044	0.33	U
Perfluoropentanoic acid	--	µg/kg	<	0.042	0.062	UJ	18	0.043	0.064	J+	0.11	0.042	0.063	J+	0.13	0.042	0.063	J+	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluorotetradecanoic acid	--	µg/kg	<	0.042	0.062	UJ	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluorotridecanoic acid	--	µg/kg	<	0.042	0.062	UJ	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ
Perfluoroundecanoic acid	--	µg/kg	<	0.042	0.062	UJ	<	0.043	0.064	UJ	<	0.042	0.063	UJ	<	0.042	0.063	UJ	<	0.042	0.063	U	<	0.044	0.066	UJ

Notes:
J = Estimated concentration.
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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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
2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil.
ft bgs = Feet below ground surface.
< = Analyte not detected above the LOD.
-- = No screening level available.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.

PFAS Results in Shallow Subsurface Soil, Site Inspeciton Report, KAASF

		Location ID	AOI02-02				AOI02-03				AOI02-04				KAASF-01				KAASF-02			
		Sample Name	AOI02-02-SB-13-15				AOI02-03-SB-13-15				AOI02-04-SB-13-15				KAASF-01-SB-13-15				KAASF-02-SB-13-15			
		Parent Sample ID																				
		Sample Date	4/18/2022				4/15/2022				4/19/2022				4/11/2022				4/12/2022			
		Depth (ft bgs)	13-15				13-15				13-15				13-15				13-15			
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																						
4:2 Fluorotelomer sulfonate	--	µg/kg	<	0.18	0.22	UJ	<	0.17	0.21	UJ	<	0.2	0.26	U	<	0.18	0.23	UJ	<	0.18	0.22	UJ
6:2 Fluorotelomer sulfonate	--	µg/kg	0.33	0.18	0.22	J+	<	0.17	0.21	UJ	<	0.2	0.26	UJ	<	0.18	0.23	UJ	0.067	0.18	0.22	J
8:2 Fluorotelomer sulfonate	--	µg/kg	0.69	0.18	0.34	J+	<	0.17	0.31	UJ	<	0.2	0.38	UJ	<	0.18	0.34	UJ	<	0.18	0.33	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.045	0.22	UJ	<	0.042	0.21	UJ	<	0.051	0.26	UJ	<	0.045	0.23	UJ	<	0.044	0.22	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	µg/kg	<	0.045	0.22	UJ	<	0.042	0.21	UJ	<	0.051	0.26	UJ	<	0.045	0.23	UJ	<	0.044	0.22	UJ
Perfluorobutanesulfonic acid (PFBS)	25000	µg/kg	<	0.18	0.22	U	0.18	0.17	0.21	J	0.056	0.2	0.26	J	<	0.18	0.23	UJ	<	0.18	0.22	UJ
Perfluorobutanoic acid	--	µg/kg	0.2	0.18	0.22	J+	0.57	0.17	0.21		0.21	0.2	0.26	J+	<	0.18	0.23	UJ	<	0.18	0.22	UJ
Perfluorodecanesulfonic acid	--	µg/kg	<	0.045	0.067	U	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorodecanoic acid	--	µg/kg	<	0.045	0.067	UJ	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorododecanoic acid	--	µg/kg	<	0.045	0.067	UJ	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluoroheptanesulfonic acid	--	µg/kg	<	0.045	0.067	U	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluoroheptanoic acid	--	µg/kg	0.053	0.045	0.067	J+	<	0.042	0.063	U	0.035	0.051	0.077	J+	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorohexanesulfonic acid (PFHxS)	1600	µg/kg	0.025	0.045	0.067	J	<	0.042	0.063	U	0.32	0.051	0.077		<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorohexanoic acid	--	µg/kg	0.096	0.045	0.067	J+	0.77	0.042	0.063	J+	0.32	0.051	0.077	J+	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorononanesulfonic acid	--	µg/kg	<	0.045	0.067	U	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorononanoic acid (PFNA)	250	µg/kg	<	0.045	0.067	UJ	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorooctanesulfonamide	--	µg/kg	<	0.045	0.067	U	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorooctanesulfonic acid (PFOS)	160	µg/kg	0.13	0.045	0.067	J+	<	0.042	0.063	U	0.39	0.051	0.077	J+	0.071	0.045	0.068	J	0.068	0.044	0.066	J
Perfluorooctanoic acid (PFOA)	250	µg/kg	0.11	0.045	0.067	J+	<	0.042	0.063	U	0.16	0.051	0.077	J+	0.037	0.045	0.068	J	0.024	0.044	0.066	J
Perfluoropentanesulfonic acid	--	µg/kg	<	0.045	0.34	U	<	0.042	0.31	U	0.042	0.051	0.38	J	<	0.045	0.34	UJ	<	0.044	0.33	UJ
Perfluoropentanoic acid	--	µg/kg	0.1	0.045	0.067	J+	1.6	0.042	0.063		<	0.051	0.077	UJ	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorotetradecanoic acid	--	µg/kg	<	0.045	0.067	UJ	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluorotridecanoic acid	--	µg/kg	<	0.045	0.067	UJ	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ
Perfluoroundecanoic acid	--	µg/kg	<	0.045	0.067	UJ	<	0.042	0.063	U	<	0.051	0.077	U	<	0.045	0.068	UJ	<	0.044	0.066	UJ

Notes:
J = Estimated concentration.
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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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
2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil.
ft bgs = Feet below ground surface.
< = Analyte not detected above the LOD.
-- = No screening level available.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.

PFAS Results in Deep Subsurface Soil, Site Inspection Report, Kalaeloa AASF #1-JRF

	Location ID	AOI01-01				AOI01-01				AOI01-01				AOI01-02				AOI01-03				AOI01-04			
	Sample Name	AOI01-01-SB-32-34				AOI01-01-SB-32-34 Duplicate				AOI01-01-SB-32-34 Triplicate				AOI01-02-SB-32-34				AOI01-03-SB-34-36				AOI01-04-SB-31-33			
	Parent Sample ID					AOI01-01-SB-32-34				AOI01-01-SB-32-34															
	Sample Date	4/21/2022				4/21/2022				4/21/2022				4/20/2022				4/20/2022				4/21/2022			
	Depth (ft bgs)	32-34				32-34				32-34				32-34				34-36				31-33			
Analyte	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																									
4:2 Fluorotelomer sulfonate	µg/kg	<	0.18	0.23	UJ	<	0.19	0.23	U	<	0.18	0.23	U	<	0.19	0.24	UJ	<	0.17	0.21	UJ	<	0.17	0.21	UJ
6:2 Fluorotelomer sulfonate	µg/kg	1.3	0.18	0.23	J+	0.78	0.19	0.23		0.9	0.18	0.23		0.75	0.19	0.24	J+	0.62	0.17	0.21	J+	0.2	0.17	0.21	J+
8:2 Fluorotelomer sulfonate	µg/kg	0.14	0.18	0.35	J+	0.16	0.19	0.35	J	<	0.18	0.34	U	0.16	0.19	0.37	J+	<	0.17	0.32	UJ	<	0.17	0.32	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	µg/kg	<	0.046	0.23	UJ	<	0.047	0.23	U	<	0.046	0.23	U	<	0.049	0.24	UJ	<	0.042	0.21	UJ	<	0.043	0.21	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	µg/kg	<	0.046	0.23	UJ	<	0.047	0.23	U	<	0.046	0.23	U	<	0.049	0.24	UJ	<	0.042	0.21	UJ	<	0.043	0.21	UJ
Perfluorobutanesulfonic acid (PFBS)	µg/kg	<	0.18	0.23	U	<	0.19	0.23	U	<	0.18	0.23	U	0.075	0.19	0.24	J	<	0.17	0.21	U	<	0.17	0.21	U
Perfluorobutanoic acid	µg/kg	0.089	0.18	0.23	J+	0.092	0.19	0.23	J	0.084	0.18	0.23	J	0.35	0.19	0.24		0.11	0.17	0.21	J+	<	0.17	0.21	UJ
Perfluorodecanesulfonic acid	µg/kg	<	0.046	0.069	U	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	U	<	0.043	0.064	U
Perfluorodecanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	UJ	<	0.043	0.064	UJ
Perfluorododecanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	UJ	<	0.043	0.064	UJ
Perfluoroheptanesulfonic acid	µg/kg	<	0.046	0.069	U	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	U	<	0.043	0.064	U
Perfluoroheptanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	0.051	0.049	0.073	J	0.032	0.042	0.064	J+	<	0.043	0.064	UJ
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	<	0.046	0.069	U	0.029	0.047	0.07	J	0.039	0.046	0.069	J	0.11	0.049	0.073		0.12	0.042	0.064		0.041	0.043	0.064	J
Perfluorohexanoic acid	µg/kg	0.13	0.046	0.069	J+	0.13	0.047	0.07		0.16	0.046	0.069		0.62	0.049	0.073		0.09	0.042	0.064	J+	<	0.043	0.064	UJ
Perfluorononanesulfonic acid	µg/kg	<	0.046	0.069	U	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	U	<	0.043	0.064	U
Perfluorononanoic acid (PFNA)	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	UJ	<	0.043	0.064	U
Perfluorooctanesulfonamide	µg/kg	<	0.046	0.069	U	0.033	0.047	0.07	J	0.028	0.046	0.069	J	<	0.049	0.073	U	<	0.042	0.064	U	<	0.043	0.064	U
Perfluorooctanesulfonic acid (PFOS)	µg/kg	0.16	0.046	0.069	J+	0.21	0.047	0.07		0.28	0.046	0.069		0.33	0.049	0.073		0.11	0.042	0.064		<	0.043	0.064	U
Perfluorooctanoic acid (PFOA)	µg/kg	0.032	0.046	0.069	J+	0.049	0.047	0.07	J	0.037	0.046	0.069	J	0.1	0.049	0.073		0.055	0.042	0.064	J+	0.024	0.043	0.064	J
Perfluoropentanesulfonic acid	µg/kg	<	0.046	0.35	U	<	0.047	0.35	U	<	0.046	0.34	U	<	0.049	0.37	U	<	0.042	0.32	U	<	0.043	0.32	U
Perfluoropentanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	0.028	0.046	0.069	J	0.38	0.049	0.073		0.079	0.042	0.064	J+	<	0.043	0.064	U
Perfluorotetradecanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	UJ	<	0.042	0.064	UJ	<	0.043	0.064	UJ
Perfluorotridecanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	UJ	<	0.043	0.064	UJ
Perfluoroundecanoic acid	µg/kg	<	0.046	0.069	UJ	<	0.047	0.07	U	<	0.046	0.069	U	<	0.049	0.073	U	<	0.042	0.064	UJ	<	0.043	0.064	UJ

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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feer below ground surface.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.
< = Analyte not detected above the LOD.

PFAS Results in Deep Subsurface Soil, Site Inspection Report, KAASF

	Location ID	AOI02-01				AOI02-02				AOI02-03				AOI02-04				KAASF-01				KAASF-02			
	Sample Name	AOI02-01-SB-34-36				AOI02-02-SB-36-38				AOI02-03-SB-36-38				AOI02-04-SB-36-38				KAASF-01-SB-40-42				KAASF-02-SB-46-48			
	Parent Sample ID																								
	Sample Date	4/19/2022				4/18/2022				4/15/2022				4/19/2022				4/11/2022				4/12/2022			
	Depth (ft bgs)	34-36				36-38				36-38				36-38				40-42				46-48			
Analyte	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																									
4:2 Fluorotelomer sulfonate	µg/kg	<	0.19	0.24	UJ	<	0.19	0.24	UJ	0.089	0.17	0.22	J+	<	0.21	0.27	UJ	<	0.18	0.23	UJ	<	0.18	0.23	UJ
6:2 Fluorotelomer sulfonate	µg/kg	16	0.19	0.24	J+	0.18	0.19	0.24	J+	<	0.17	0.22	UJ	0.53	0.21	0.27	J+	<	0.18	0.23	UJ	<	0.18	0.23	UJ
8:2 Fluorotelomer sulfonate	µg/kg	1.4	0.19	0.35	J+	<	0.19	0.35	UJ	<	0.17	0.33	UJ	<	0.21	0.4	UJ	<	0.18	0.34	UJ	<	0.18	0.34	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	µg/kg	<	0.047	0.24	UJ	<	0.047	0.24	UJ	<	0.044	0.22	UJ	<	0.053	0.27	UJ	<	0.046	0.23	UJ	<	0.045	0.23	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	µg/kg	<	0.047	0.24	UJ	<	0.047	0.24	UJ	<	0.044	0.22	UJ	<	0.053	0.27	UJ	<	0.046	0.23	UJ	<	0.045	0.23	UJ
Perfluorobutanesulfonic acid (PFBS)	µg/kg	<	0.19	0.24	U	<	0.19	0.24	U	0.37	0.17	0.22		0.078	0.21	0.27	J	<	0.18	0.23	UJ	<	0.18	0.23	UJ
Perfluorobutanoic acid	µg/kg	0.25	0.19	0.24	J+	0.18	0.19	0.24	J	1.3	0.17	0.22		1.2	0.21	0.27		<	0.18	0.23	UJ	<	0.18	0.23	UJ
Perfluorodecanesulfonic acid	µg/kg	<	0.047	0.071	U	<	0.047	0.071	U	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorodecanoic acid	µg/kg	<	0.047	0.071	UJ	<	0.047	0.071	U	<	0.044	0.066	U	0.082	0.053	0.08		<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorododecanoic acid	µg/kg	<	0.047	0.071	UJ	<	0.047	0.071	UJ	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluoroheptanesulfonic acid	µg/kg	<	0.047	0.071	U	<	0.047	0.071	U	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluoroheptanoic acid	µg/kg	0.036	0.047	0.071	J+	0.04	0.047	0.071	J	<	0.044	0.066	U	0.17	0.053	0.08		<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	0.092	0.047	0.071		0.029	0.047	0.071	J	<	0.044	0.066	U	0.55	0.053	0.08		<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorohexanoic acid	µg/kg	0.29	0.047	0.071	J+	0.12	0.047	0.071	J+	2	0.044	0.066	J+	2.5	0.053	0.08	J+	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorononanesulfonic acid	µg/kg	<	0.047	0.071	U	<	0.047	0.071	U	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorononanoic acid (PFNA)	µg/kg	<	0.047	0.071	UJ	0.047	0.047	0.071	J	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorooctanesulfonamide	µg/kg	<	0.047	0.071	U	<	0.047	0.071	U	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorooctanesulfonic acid (PFOS)	µg/kg	0.5	0.047	0.071	J+	0.74	0.047	0.071	J+	<	0.044	0.066	U	0.89	0.053	0.08	J+	<	0.046	0.069	UJ	0.38	0.045	0.068	J
Perfluorooctanoic acid (PFOA)	µg/kg	0.12	0.047	0.071	J+	<	0.047	0.071	U	<	0.044	0.066	U	0.64	0.053	0.08	J+	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluoropentanesulfonic acid	µg/kg	<	0.047	0.35	U	<	0.047	0.35	U	0.12	0.044	0.33	J	0.048	0.053	0.4	J	<	0.046	0.34	UJ	<	0.045	0.34	UJ
Perfluoropentanoic acid	µg/kg	0.065	0.047	0.071	J+	0.058	0.047	0.071	J	6.6	0.044	0.066	J-	0.17	0.053	0.08		<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorotetradecanoic acid	µg/kg	<	0.047	0.071	UJ	<	0.047	0.071	UJ	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluorotridecanoic acid	µg/kg	<	0.047	0.071	UJ	<	0.047	0.071	UJ	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ
Perfluoroundecanoic acid	µg/kg	<	0.047	0.071	UJ	<	0.047	0.071	U	<	0.044	0.066	U	<	0.053	0.08	U	<	0.046	0.069	UJ	<	0.045	0.068	UJ

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).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feer below ground surface.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.
< = Analyte not detected above the LOD.

PFAS Results in Groundwater, Site Inspection Report, Kalaeloa AASF #1-JRF

		Location ID	AOI01-01				AOI01-02				AOI01-02				AOI01-03				AOI01-04			
		Sample Name	AOI01-01-GW				AOI01-02-GW				KAASF-DUP-GW-01				AOI01-03-GW				AOI01-04-GW			
		Parent Sample ID									AOI01-02-GW											
		Sample Date	5/5/2022				5/4/2022				5/4/2022				5/4/2022				5/5/2022			
Analyte	**Screening Level[1]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)																						
4:2 Fluorotelomer sulfonate	--	ng/L	<	0.87	1.7	UJ	230	0.89	1.8	J	210	0.88	1.8	J	<	0.86	1.7	UJ	<	0.87	1.7	UJ
6:2 Fluorotelomer sulfonate	--	ng/L	9.8	0.87	4.4	J	8700	89	450	J-	8100	88	440	J-	<	0.86	4.3	UJ	8.4	0.87	4.4	J
8:2 Fluorotelomer sulfonate	--	ng/L	1.3	1.3	1.7	J	340	130	180	J	330	130	180	J	<	1.3	1.7	UJ	<	1.3	1.7	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	--	ng/L	<	0.87	4.4	UJ	<	0.89	4.5	UJ	<	0.88	4.4	UJ	<	0.86	4.3	UJ	<	0.87	4.4	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	ng/L	<	0.87	4.4	UJ	<	0.89	4.5	UJ	<	0.88	4.4	UJ	<	0.86	4.3	UJ	<	0.87	4.4	UJ
Perfluorobutanesulfonic acid (PFBS)	601	ng/L	6.6	0.87	1.7	J	480	89	180	J	530	88	180	J	8	0.86	1.7	J	4.8	0.87	1.7	J
Perfluorobutanoic acid	--	ng/L	20	0.44	1.7	J	640	45	180	J	600	44	180	J	33	0.43	1.7	J	7.6	0.44	1.7	J
Perfluorodecanesulfonic acid	--	ng/L	<	1.3	1.7	UJ	<	1.3	1.8	UJ	0.62	1.3	1.8	J	<	1.3	1.7	UJ	<	1.3	1.7	UJ
Perfluorodecanoic acid	--	ng/L	<	0.87	1.7	UJ	19	0.89	1.8	J-	19	0.88	1.8	J-	1.2	0.86	1.7	J	<	0.87	1.7	UJ
Perfluorododecanoic acid	--	ng/L	<	0.87	1.7	UJ	1.1	0.89	1.8	J-	0.87	0.88	1.8	J-	<	0.86	1.7	UJ	<	0.87	1.7	UJ
Perfluoroheptanesulfonic acid	--	ng/L	0.63	1.3	1.7	J	140	1.3	1.8	J	150	1.3	1.8	J	0.9	1.3	1.7	J	<	1.3	1.7	UJ
Perfluoroheptanoic acid	--	ng/L	11	0.87	1.7	J	820	89	180	J	860	88	180	J	19	0.86	1.7	J	4.8	0.87	1.7	J
Perfluorohexanesulfonic acid (PFHxS)	39	ng/L	50	0.87	1.7	J	7100	89	180	J	6700	88	180	J	64	0.86	1.7	J	14	0.87	1.7	J
Perfluorohexanoic acid	--	ng/L	38	1.3	1.7	J	4200	130	180	J	6000	130	180	J	43	1.3	1.7	J	13	1.3	1.7	J
Perfluorononanesulfonic acid	--	ng/L	<	1.3	1.7	UJ	1.3	1.3	1.8	J	2.1	1.3	1.8	J	<	1.3	1.7	UJ	<	1.3	1.7	UJ
Perfluorononanoic acid (PFNA)	6	ng/L	0.99	1.3	1.7	J	35	1.3	1.8	J	34	1.3	1.8	J	2.3	1.3	1.7	J	0.9	1.3	1.7	J
Perfluorooctanesulfonamide	--	ng/L	<	1.3	1.7	UJ	32	1.3	1.8	J-	34	1.3	1.8	J-	<	1.3	1.7	UJ	<	1.3	1.7	UJ
Perfluorooctanesulfonic acid (PFOS)	4	ng/L	25	1.3	1.7	J	5700	130	180	J	6900	130	180	J	50	1.3	1.7	J	16	1.3	1.7	J
Perfluorooctanoic acid (PFOA)	6	ng/L	52	1.3	1.7	J	740	130	180	J	710	130	180	J	55	1.3	1.7	J	18	1.3	1.7	J
Perfluoropentanesulfonic acid	--	ng/L	2.6	1.3	1.7	J	520	130	180	J	550	130	180	J	6.4	1.3	1.7	J	1.3	1.3	1.7	J
Perfluoropentanoic acid	--	ng/L	29	0.44	1.7	J	2500	45	180	J	2600	44	180	J	52	0.43	1.7	J	13	0.44	1.7	J
Perfluorotetradecanoic acid	--	ng/L	<	1.3	1.7	UJ	<	1.3	1.8	UJ	<	1.3	1.8	UJ	<	1.3	1.7	UJ	<	1.3	1.7	UJ
Perfluorotridecanoic acid	--	ng/L	<	1.3	1.7	UJ	<	1.3	1.8	UJ	<	1.3	1.8	UJ	<	1.3	1.7	UJ	<	1.3	1.7	UJ
Perfluoroundecanoic acid	--	ng/L	<	1.3	1.7	UJ	3.3	1.3	1.8	J-	3.3	1.3	1.8	J-	<	1.3	1.7	UJ	<	1.3	1.7	UJ

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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. LOD = Limit of Detection.
< = Analyte not detected above the LOD. LOQ = Limit of Quantitation.
-- = No screening level available. Qual = Qualifier.

PFAS Results in Groundwater, Site Inspection Report, KAASF

Location ID			AOI01-MW11				AOI02-01				AOI02-02				AOI02-03				AOI02-04				AOI02-04			
Sample Name			AOI01-MW11-GW				AOI02-01-GW				AOI02-02-GW				AOI02-03-GW				AOI02-04-GW				KAASF-DUP-GW-02			
Parent Sample ID																							AOI02-04-GW			
Sample Date			5/5/2022				5/2/2022				5/2/2022				5/3/2022				5/5/2022				5/5/2022			
Analyte	**Screening Level[1]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)																										
4:2 Fluorotelomer sulfonate	--	ng/L	<	50	100	UJ	<	0.93	1.9	U	<	0.94	1.9	U	76	9	18		<	0.92	1.8	UJ	<	0.87	1.7	UJ
6:2 Fluorotelomer sulfonate	--	ng/L	<	50	250	UJ	<	0.93	4.7	U	<	0.94	4.7	U	<	9	45	U	<	0.92	4.6	UJ	<	0.87	4.4	UJ
8:2 Fluorotelomer sulfonate	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ
N-ethyl perfluorooctanesulfonamidoacetic acid	--	ng/L	<	50	250	UJ	<	0.93	4.7	U	<	0.94	4.7	U	<	9	45	U	<	0.92	4.6	UJ	<	0.87	4.4	UJ
N-methyl perfluorooctanesulfonamidoacetic acid	--	ng/L	<	50	250	UJ	<	0.93	4.7	U	<	0.94	4.7	U	<	9	45	U	<	0.92	4.6	UJ	<	0.87	4.4	UJ
Perfluorobutanesulfonic acid (PFBS)	601	ng/L	<	50	100	UJ	3.4	0.93	1.9		11	0.94	1.9		200	9	18		13	0.92	1.8	J	12	0.87	1.7	J
Perfluorobutanoic acid	--	ng/L	54	25	100	J	9	0.47	1.9		83	0.47	1.9		400	4.5	18		10	0.46	1.8	J	10	0.44	1.7	J
Perfluorodecanesulfonic acid	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ
Perfluorodecanoic acid	--	ng/L	<	50	100	UJ	0.5	0.93	1.9	J	0.63	0.94	1.9	J	<	9	18	U	<	0.92	1.8	UJ	0.67	0.87	1.7	J
Perfluorododecanoic acid	--	ng/L	<	50	100	UJ	<	0.93	1.9	U	<	0.94	1.9	U	<	9	18	U	<	0.92	1.8	UJ	<	0.87	1.7	UJ
Perfluoroheptanesulfonic acid	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	2	1.4	1.9		<	14	18	U	2	1.4	1.8	J	2	1.3	1.7	J
Perfluoroheptanoic acid	--	ng/L	<	50	100	UJ	4.5	0.93	1.9		64	0.94	1.9		11	9	18	J	12	0.92	1.8	J	11	0.87	1.7	J
Perfluorohexanesulfonic acid (PFHxS)	39	ng/L	36	50	100	J	32	0.93	1.9		65	0.94	1.9		29	9	18		140	0.92	1.8	J	130	0.87	1.7	J
Perfluorohexanoic acid	--	ng/L	<	75	100	UJ	14	1.4	1.9		75	1.4	1.9		1000	14	18		47	1.4	1.8	J	44	1.3	1.7	J
Perfluorononanesulfonic acid	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ
Perfluorononanoic acid (PFNA)	6	ng/L	<	75	100	UJ	1.2	1.4	1.9	J	19	1.4	1.9		<	14	18	U	1.5	1.4	1.8	J	1.6	1.3	1.7	J
Perfluorooctanesulfonamide	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ
Perfluorooctanesulfonic acid (PFOS)	4	ng/L	200	75	100	J	22	1.4	1.9		120	1.4	1.9		13	14	18	J	51	1.4	1.8	J	51	1.3	1.7	J
Perfluorooctanoic acid (PFOA)	6	ng/L	36	75	100	J	17	1.4	1.9		48	1.4	1.9		22	14	18		140	1.4	1.8	J	150	1.3	1.7	J
Perfluoropentanesulfonic acid	--	ng/L	<	75	100	UJ	1.6	1.4	1.9	J	5.6	1.4	1.9		49	14	18		7.9	1.4	1.8	J	7.8	1.3	1.7	J
Perfluoropentanoic acid	--	ng/L	57	25	100	J	11	0.47	1.9		140	0.47	1.9		2100	4.5	18		21	0.46	1.8	J	20	0.44	1.7	J
Perfluorotetradecanoic acid	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ
Perfluorotridecanoic acid	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ
Perfluoroundecanoic acid	--	ng/L	<	75	100	UJ	<	1.4	1.9	U	<	1.4	1.9	U	<	14	18	U	<	1.4	1.8	UJ	<	1.3	1.7	UJ

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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.	LOD = Limit of Detection.
< = Analyte not detected above the LOD.	LOQ = Limit of Quantitation.
-- = No screening level available.	Qual = Qualifier.

PFAS Results in Groundwater, Site Inspection Report, KAASF

		Location ID	KAASF-01				KAASF-02				Source-1				Source-2			
		Sample Name	KAASF-01-GW				KAASF-02-GW				Source 1-18				Source 2-18			
		Parent Sample ID																
		Sample Date	4/29/2022				5/4/2022				11/18/2021				11/18/2021			
Analyte	**Screening Level[1]**	**Unit**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)																		
4:2 Fluorotelomer sulfonate	--	ng/L	<	0.86	1.7	U	<	0.87	1.7	UJ	<	0.98	2	U	<	0.94	1.9	U
6:2 Fluorotelomer sulfonate	--	ng/L	<	0.86	4.3	U	<	0.87	4.4	UJ	<	0.98	4.9	U	<	0.94	4.7	U
8:2 Fluorotelomer sulfonate	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	ng/L	<	0.86	4.3	U	<	0.87	4.4	UJ	<	0.98	4.9	U	<	0.94	4.7	U
N-methyl perfluorooctanesulfonamidoacetic acid	--	ng/L	<	0.86	4.3	U	<	0.87	4.4	UJ	<	0.98	4.9	U	<	0.94	4.7	U
Perfluorobutanesulfonic acid (PFBS)	601	ng/L	6.4	0.86	1.7		0.38	0.87	1.7	J	<	0.98	2	U	<	0.94	1.9	U
Perfluorobutanoic acid	--	ng/L	6	0.43	1.7		1.8	0.44	1.7	J+	<	0.49	2	U	<	0.47	1.9	U
Perfluorodecanesulfonic acid	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluorodecanoic acid	--	ng/L	<	0.86	1.7	U	0.64	0.87	1.7	J	<	0.98	2	U	<	0.94	1.9	U
Perfluorododecanoic acid	--	ng/L	<	0.86	1.7	U	<	0.87	1.7	UJ	<	0.98	2	U	<	0.94	1.9	U
Perfluoroheptanesulfonic acid	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluoroheptanoic acid	--	ng/L	4.6	0.86	1.7		0.52	0.87	1.7	J	<	0.98	2	U	<	0.94	1.9	U
Perfluorohexanesulfonic acid (PFHxS)	39	ng/L	8.8	0.86	1.7		0.61	0.87	1.7	J	<	0.98	2	U	<	0.94	1.9	U
Perfluorohexanoic acid	--	ng/L	9.4	1.3	1.7		1.2	1.3	1.7	J	<	1.5	2	U	<	1.4	1.9	U
Perfluorononanesulfonic acid	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluorononanoic acid (PFNA)	6	ng/L	0.75	1.3	1.7	J	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluorooctanesulfonamide	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluorooctanesulfonic acid (PFOS)	4	ng/L	8.1	1.3	1.7		4.6	1.3	1.7	J	<	1.5	2	U	<	1.4	1.9	U
Perfluorooctanoic acid (PFOA)	6	ng/L	7	1.3	1.7		1.8	1.3	1.7	J	<	1.5	2	U	<	1.4	1.9	U
Perfluoropentanesulfonic acid	--	ng/L	0.94	1.3	1.7	J	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluoropentanoic acid	--	ng/L	8.7	0.43	1.7		1.2	0.44	1.7	J	<	0.49	2	U	<	0.47	1.9	U
Perfluorotetradecanoic acid	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluorotridecanoic acid	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U
Perfluoroundecanoic acid	--	ng/L	<	1.3	1.7	U	<	1.3	1.7	UJ	<	1.5	2	U	<	1.4	1.9	U

Notes:
J = Estimated concentration.
J+ = Estimated concentration, biased high.
J- = Estimated concentration, biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate.
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Values exceeding the Screening Level are shaded gray. LOD = Limit of Detection.
< = Analyte not detected above the LOD. LOQ = Limit of Quantitation.
-- = No screening level available. Qual = Qualifier.

Grain Size Analysis, Site Inspection Report, Kalaeloa AASF #1-JRF

Location ID	AOI01-03			
Sample Name	AOI01-03-SB-13-15			
Parent Sample ID				
Sample Date	4/20/2022			
Depth (ft bgs)	13-15			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**
Grain Size (ASTM D422) (%)				
2 inch sieve (50.0 mm)	100	1	1	
1.5 Inch sieve (37.5 mm)	100	1	1	
1 Inch sieve (25.0 mm)	100	1	1	
0.75 Inch sieve (19.0 mm)	100	1	1	
0.375 Inch sieve (9.51 mm)	95.3	1	1	
No. 4 sieve (4.75 mm)	88.3	1	1	
No. 10 sieve (2.00 mm)	75.2	1	1	
No. 20 sieve (0.85 mm)	68.4	1	1	
No. 40 sieve (0.425 mm)	59.3	1	1	
No. 60 sieve (0.25 mm)	53.8	1	1	
No. 80 sieve (0.177 mm)	50.8	1	1	
No. 100 sieve (0.15 mm)	49.3	1	1	
No. 200 sieve (0.075 mm)	45.4	1	1	
36.1µm (Hydrometer)	16.7	1	1	
22.9µm (Hydrometer)	14.6	1	1	
13.4µm (Hydrometer)	13.5	1	1	
9.8µm (Hydrometer)	11.4	1	1	
6.7µm (Hydrometer)	9.2	1	1	
3.3µm (Hydrometer)	7.1	1	1	
1.4µm (Hydrometer)	2.8	1	1	

Notes:
mm = Millimeter(s).
µm = Micrometer(s).
ft bgs = Feet below ground surface.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.
% = Percent passing.

General Chemistry, Site Inspection Report,Kalaeloa AASF #1-JRF

Location ID	AOI01-03			
Sample Name	AOI01-03-SB-13-15			
Parent Sample ID				
Sample Date	4/20/2022			
Depth (ft bgs)	13-15			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**
pH (SW9045D) (SU)	7.2	0.01	0.01	
Temperature (SW9045D) (°C)	20.8	0.01	0.01	
Total Organic Carbon (SW9060) (mg/kg)	8200	210	320	

Notes:
SU= Standard unit.
°C = Degrees Celsius.
mg/kg= Milligram(s) per kilogram.
ft bgs = Feet below ground surface.
LOD = Limit of Detection.
LOQ = Limit of Quantitation.
Qual = Qualifier.

Appendix G

Laboratory Reports

Due to file size, laboratory reports are provided electronically (CD) or can be requested.

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