# FINAL
# Site Inspection Report
# Fresno Aviation Classification Repair Activity Depot (AVCRAD)
# Fresno, California

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

September 2023

Prepared for:

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

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# Acronyms and Abbreviations

| | |
|---|---|
| % | percent |
| °C | degrees Celsius |
| °F | degrees Fahrenheit |
| µg/kg | micrograms per kilogram |
| AECOM | AECOM Technical Services, Inc. |
| AFFF | aqueous film-forming foam |
| amsl | above mean sea level |
| AOI | Area of Interest |
| ARNG | Army National Guard |
| AVCRAD | Aviation Classification Repair Activity Depot |
| bgs | below ground surface |
| CAARNG | California Army National Guard |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CoC | chain of custody |
| CSM | conceptual site model |
| CSWRCB | California State Water Resources Control Board |
| DA | Department of the Army |
| DoD | Department of Defense |
| DO | dissolved oxygen |
| DQO | data quality objective |
| DUA | data usability assessment |
| ELAP | Environmental Laboratory Accreditation Program |
| EM | Engineer Manual |
| FedEx | Federal Express |
| FRB | Field Reagent Blank |
| FTA | Fire Training Area |
| GAMA | Groundwater Ambient Monitoring and Assessment Program |
| HA | Health Advisory |
| HAZMAT | hazardous materials |
| HDPE | high-density polyethylene |
| HFPO-DA | hexafluoropropylene oxide dimer acid |
| IDW | investigation-derived waste |
| ITRC | Interstate Technology Regulatory Council |
| LC/MS/MS | liquid chromatography with tandem mass spectrometry |
| MIL-SPEC | military specification |
| NELAP | National Environmental Laboratory Accreditation Program |
| ng/L | nanograms 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 |
| PID | photoionization detector |
| PQAPP | Programmatic UFP-QAPP |
| PVC | polyvinyl chloride |
| QA | quality assurance |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| QSM | Quality Systems Manual |
| SI | Site Inspection |
| SL | screening level |
| SOP | standard operating procedure |
| SWRCB | California State Water Board |
| TASMG | Theater Aviation Sustainment Maintenance Group |
| TOC | total organic carbon |
| TPP | Technical Project Planning |
| UCMR3 | Third Unregulated Contaminant Monitoring Rule |
| UFP | Uniform Federal Policy |
| US | United States |
| USACE | United States Army Corps of Engineers |
| USCS | Unified Soil Classification System |
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |

# Executive Summary

The Army National Guard (ARNG) G-9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances with a focus on the 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 include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS). These compounds are collectively referred to as "relevant compounds" throughout the document and the applicable screening levels (SLs) are provided in **Table ES-1**.

The PA identified three Areas of Interest (AOIs) where PFAS-containing materials may have been used, 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, or no further action is required based on SLs for relevant compounds. This SI was completed at the Fresno Aviation Classification Repair Activity Depot (AVCRAD) in Fresno, California and determined no further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted. The Fresno AVCRAD will also be referred to as the "facility" throughout this document.

The Fresno AVCRAD is located at 5168 East Dakota Avenue, Fresno, California and is occupied by the 1106th Theater Aviation Sustainment Maintenance Group. Fresno AVCRAD occupies approximately 48 acres of land and is situated in the center of San Joaquin Valley, in the southern portion of California's Central Valley. The mission of the AVCRAD is to provide support of ARNG aviation activities through depot-level and limited aviation intermediate unit maintenance. The facility serves as a maintenance shop for rotary wing aircraft. The AVCRAD includes four main buildings (hangar, armory, ground support equipment building, and corrosion control facility) and related infrastructure including roadways, parking lots, aircraft parking areas, and taxi lanes. The facility is categorized as a large-quantity hazardous waste generator because it houses several oil storage locations and manages a variety of hazardous materials (AECOM Technical Services, Inc. [AECOM], 2020).

The PA identified three AOIs for investigation during the SI phase. SI sampling results from the three AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, no further evaluation under CERCLA is warranted for each of the three AOIs at this time.

[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.

## Table ES-1: Screening Levels (Soil and Groundwater)

| Analyte[b] | Residential (Soil) (µg/kg)[a] 0-2 feet bgs | Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a] 2-15 feet bgs | Tap Water (Groundwater) (ng/L)[a] |
|---|---|---|---|
| **PFOA** | 19 | 250 | 6 |
| **PFOS** | 13 | 160 | 4 |
| **PFBS** | 1,900 | 25,000 | 601 |
| **PFHxS** | 130 | 1,600 | 39 |
| **PFNA** | 19 | 250 | 6 |

**Notes:**
bgs = below ground surface; µg/kg = micrograms per kilogram; ng/L = nanograms per liter

a.) Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.

b.) 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 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 | Hangar Training Area | ◐ | ◐ | N/A | No further action at this time |
| 2 | Wash Rack and East Airfield Taxiway | ◐ | ◐ | N/A | No further action at this time |
| 3 | Corrosion Control Facility | ◐ | N/A | N/A | No further action at this time |

**Legend:**
N/A = not applicable
● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the 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) 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) 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 perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS) at ARNG facilities nationwide. The ARNG performed this SI at the Fresno Aviation Classification Repair Activity Depot (AVCRAD) in Fresno, California. Fresno AVCRAD is also referred to as the "facility" throughout this document.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; United States [US] 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 US Department of the Army (DA) requirements and guidance for field investigations.

## 1.2 SI Purpose

A PA was performed at Fresno AVCRAD (AECOM Technical Services, Inc. [AECOM], 2020) that identified three 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 based on screening levels (SLs) for the relevant compounds.

[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.

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# 2. Facility Background

## 2.1 Facility Location and Description

The Fresno AVCRAD is located at 5168 East Dakota Avenue, Fresno, California and is occupied by the 1106th Theater Aviation Sustainment Maintenance Group (TASMG). The mission of the AVCRAD is to provide support of ARNG aviation activities through depot-level and limited aviation intermediate unit maintenance. The AVCRAD provides support to 13 western states, 18 Army Aviation Support Facilities, and over 500 rotary wing aircrafts (Radian International, 1999). California ARNG (CAARNG) leased property from the city of Fresno Airport Authority starting in 1978, and the AVCRAD property was constructed in approximately 1985. The lease was recently amended to extend to 2058 (Radian International, 1999; CAARNG Real Estate Manager, 2019).

The facility borders the Fresno Yosemite International Airport to the northeast and is situated in the center of San Joaquin Valley, in the southern portion of California's Central Valley (**Figure 2-1**). The facility is about 115 miles east of the Pacific Ocean and 170 miles south of Sacramento. The latitude, longitude, and surface elevation at the main gate of the facility are 36°47'11.2" N; 119°43'11.6" W, and 350 feet above mean sea level (amsl), respectively. The facility consists largely of paved surfaces and buildings, with limited permeable, unpaved areas located in the southwestern portion.

## 2.2 Facility Environmental Setting

Fresno AVCRAD occupies approximately 48 acres of land that are primarily composed of impervious surfaces. In addition to the adjoining Fresno Yosemite International Airport, residential communities are to the north of the facility, and commercial areas are to the northeast and east. Fresno AVCRAD is in a relatively flat area with no significant natural topographic features. The surface elevation ranges from 326 to 344 feet amsl. The general topographic gradient is west/ southwest **(Figure 2-2)**.

### 2.2.1 Geology

Fresno AVCRAD is located along the eastern margin of California's San Joaquin Valley. In the San Joaquin Valley, the principal freshwater-bearing units are the unconsolidated deposits that extend to depths of 3,500 feet below ground surface (bgs). The unconsolidated valley floor alluvium deposits are characterized by fine-grained silt and sand. Localized clay beds are also common below 200 feet bgs. Finer-grained sediments, such as silts and clays, are associated with overbank and floodplain deposits, whereas coarser sediments, such as sands and gravels, are associated with levee, channel lag, and point bar deposits (BB&E, Inc. 2016).

The Sierra Nevada Mountains form the physiographic barrier on the eastern side of the San Joaquin Valley. Groundwater stored in the alluvial deposits is bounded on the eastern flanks and below by the consolidated Cretaceous and Tertiary sedimentary rocks and Sierra Nevada granitic rocks. Water-bearing zones contain a higher percentage of sand compared to the intervening aquitards, which are primarily silt with secondary sand and clay (Page and LeBlanc, 1969). **(Figure 2-3)**.

Soil borings completed during the SI found silty sand and silt with sand as the dominant lithology of the unconsolidated sediments below Fresno AVCRAD. The borings were completed at depths between 137 and 140 feet bgs. Lesser amounts of poorly graded sand were observed in the borings, in layers ranging from 1 to 5 feet thick. Isolated clay layers were also observed and ranged from 2 to 7 feet thick. These observations are consistent with the understood lithology characterizing a fluvial-dominated alluvial fan depositional environment.

### 2.2.2 Hydrogeology

Fresno AVCRAD lies within the Kings Sub-basin of the San Joaquin Valley Groundwater Basin. Groundwater is found in the unconfined or semi-confined conditions within alluvial fan deposits in the eastern portion of the Central Valley, where Fresno AVCRAD is located. Seven water-bearing zones have been identified in the vicinity of the AVCRAD.

As indicated in the PA report, 21 wells are located within a one-mile radius of the Fresno AVCRAD (AECOM, 2020). Eleven (11) of the 21 wells are listed as federal US Geological Survey (USGS) wells. The remaining 10 wells are listed as water wells on the California Wells database. Potable water is supplied by City of Fresno public water supply wells, and base personnel have indicated that there is a city pump station located adjacent to the eastern facility property line, approximately 50 feet away. According to data on the publicly available Geotracker Groundwater Ambient Monitoring and Assessment (GAMA) online tools maintained by the California State Water Resources Control Board (SWRCB), PFAS sampling was conducted between June 2019 to February 2021 from one of two drinking water wells at the adjacent city pump station. As of February 2021, PFOS was detected at 4.4 nanograms per liter (ng/L), and PFOA, PFBS, PFHxS, and PFNA were not detected above the reporting limit of 2 ng/L (SWRCB, 2021). Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, PFOA, PFOS, PFBS, PFHxS, and PFNA were not reported in a public water system above the detection limits within 20 miles of the facility (USEPA, 2017a). PFAS analyses performed in 2016 had method detection limits that were higher than currently available. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

According to well database entries provided in the PA report, groundwater depth readings taken in 1963 ranged from 54.56 to 73.85 feet bgs in six USGS wells. However, groundwater levels have since declined due to extensive regional pumping and are estimated at a depth greater than 80 feet bgs (ERM-West, Inc., 1998). Based on historical information, the regional groundwater flow direction is inferred to be primarily east. Groundwater features are presented on **Figure 2-3**.

Groundwater was measured in a 2018 SI at the adjacent Fresno Air National Guard Base, located approximately 1.3 miles southeast of Fresno AVCRAD. Depth to groundwater ranged from 111 to 130 feet bgs, and the groundwater flow direction was northwest (AECOM, 2019a).

Depth to water was measured at two newly installed monitoring wells, AVCRAD-MW001 and AVCRAD-MW002R, in June and September 2021, respectively. Both wells were gauged synoptically in February 2022. During the February 2022 well gauging event, depth to water was measured at 125.73 feet bgs at AVCRAD-MW001 and 124.94 feet bgs at AVCRAD-MW002R. Groundwater elevations from the SI are presented on **Figure 2-4** and the inferred localized groundwater flow direction is to the northwest. Groundwater contours could not be drawn, as data at the site are limited to two points. The well AVCRAD-MW002 is shown on this map and in **Table 5-3**, however, it was abandoned after installation due to an obstruction in the well screen; thus, the groundwater elevation shown is for informational purposes only and may not be accurately representative of site conditions.

### 2.2.3 Hydrology

Surface water at AVCRAD runs southwest and joins the Fresno Yosemite International Airport drainage system **(Figure 2-5).** This drainage system then flows south into Mills Creek (canal along McKinley Avenue) and feeds into Herndon Canal. The Herndon Canal is a tributary to the San Joaquin River, which eventually discharges into the San Francisco Bay (HazCon, 2017).

Storm water is drained radially outwards in the facility airfield and is captured in the storm drains located around the airfield boundary. The storm drainage system on the western side of the AVCRAD facility has a gate valve that can be manually shut to control the release of storm water.

The facility has no water treatment system, and the two oil-water separators associated with the Wash Rack and Corrosion Control Facility are connected to the Fresno sanitary sewer system. Surface water features are presented on **Figure 2-5**.

### 2.2.4 Climate

Fresno AVCRAD is in a semi-arid, Mediterranean climate zone characterized by warm, dry weather from June through September, and mild, rainy weather from November through March. The average annual rainfall is approximately 11.5 inches, with the majority of the rainfall occurring between late fall and early spring. Summer temperatures peak in July and August, with an average temperature of 82.3 degrees Fahrenheit (°F), and winter temperatures are lowest in December to January, with an average temperature of 46.7 °F. Snowfall is rare, but frost occurs occasionally (National Oceanic and Atmospheric Administration, 2019).

### 2.2.5 Current and Future Land Use

Fresno AVCRAD serves as a maintenance shop for rotary wing aircraft. The AVCRAD includes four main buildings (hangar, armory, ground support equipment building, and corrosion control facility) and related infrastructure, including roadways, parking lots, aircraft parking areas, and taxi lanes. The facility is categorized as a large-quantity hazardous waste generator because it houses several oil storage locations and manages a variety of hazardous materials (HAZMAT). The current lease with the city of Fresno Airport Authority is set to expire in 2058 (CAARNG Real Estate Manager, 2019). Reasonably anticipated future land use is not expected to change from the current land use described above.

### 2.2.6 Sensitive Habitat and Threatened/ Endangered Species

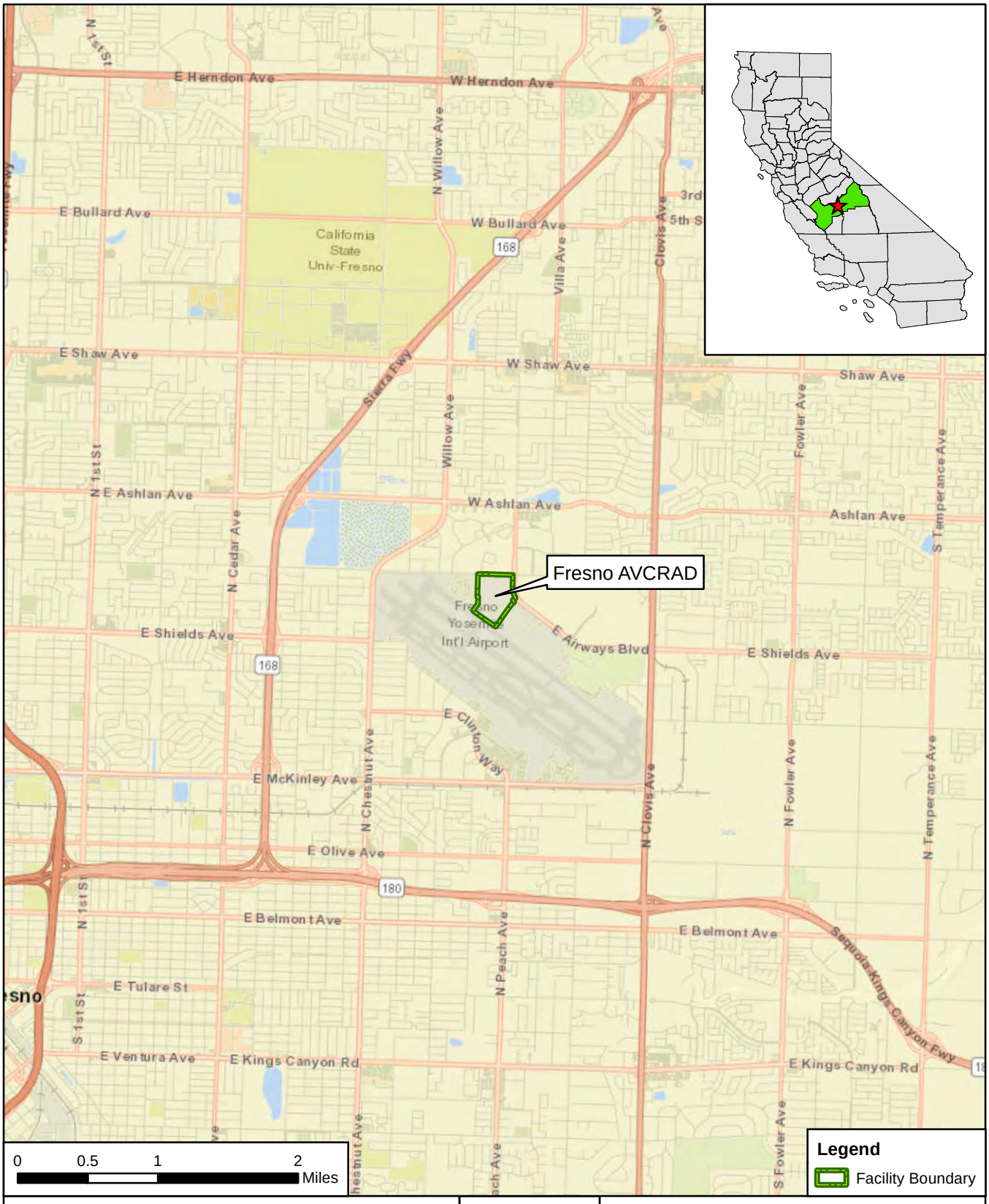
The following birds, plants, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Fresno County, California (US Fish and Wildlife Service [USFWS], 2021).

- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate); Valley elderberry longhorn beetle, *Desmocerus californicus dimorphus* (threatened)
- **Amphibians:** California tiger Salamander, *Ambystoma californiense* (endangered); Mountain yellow-legged frog, *Rana muscosa* (endangered); Sierra Nevada Yellow-legged Frog, *Rana sierrae* (endangered), California red-legged frog, *Rana draytonii* (threatened); Yosemite Toad, *Anaxyrus canorus* (threatened)
- **Birds:** California Condor**,** *Gymnogyps californias* (endangered); Yellow-billed Cuckoo, *Coccyzus americanus* (threatened)
- **Mammals**: Northern long-eared bat, *Myotis septentrionalis* (threatened);
- **Flowering plants:** Greene's tuctoria, *Tuctoria greenei* (endangered), California jewelflower, *Caulanthus californicus* (endangered); Hairy Orcutt grass, *Orcuttia pilosa* (endangered); Hartwig's golden sunburst, *Pseudopahia bahiifolia* (endangered); San Joaquin wooly-threads, *Monolopia Lembertia congdonii* (endangered)

## 2.3 History of PFAS Use

Five potential release areas were identified at the Fresno ACVRAD during the PA where AFFF may have been used or released historically (AECOM, 2020). These areas include the Hangar Training Area, the Wash Rack & East Airfield Taxiway (including the HAZMAT locker), and the Corrosion Control Facility (AECOM, 2020). PFAS-containing AFFF was released during fire

training activities at the Hangar Training Area and may have been incidentally spilled to the ground surface in controlled releases at the Wash Rack & East Airfield Taxiway. Additionally, a leak in the AFFF fire suppression system in the Corrosion Control Facility may have caused a release to floor drains in the building. The potential release areas were grouped into three AOIs, AOI 1, AOI 2, and AOI 3, based on proximity to one another and presumed groundwater flow. Descriptions of the AOIs are presented in **Section 3**.

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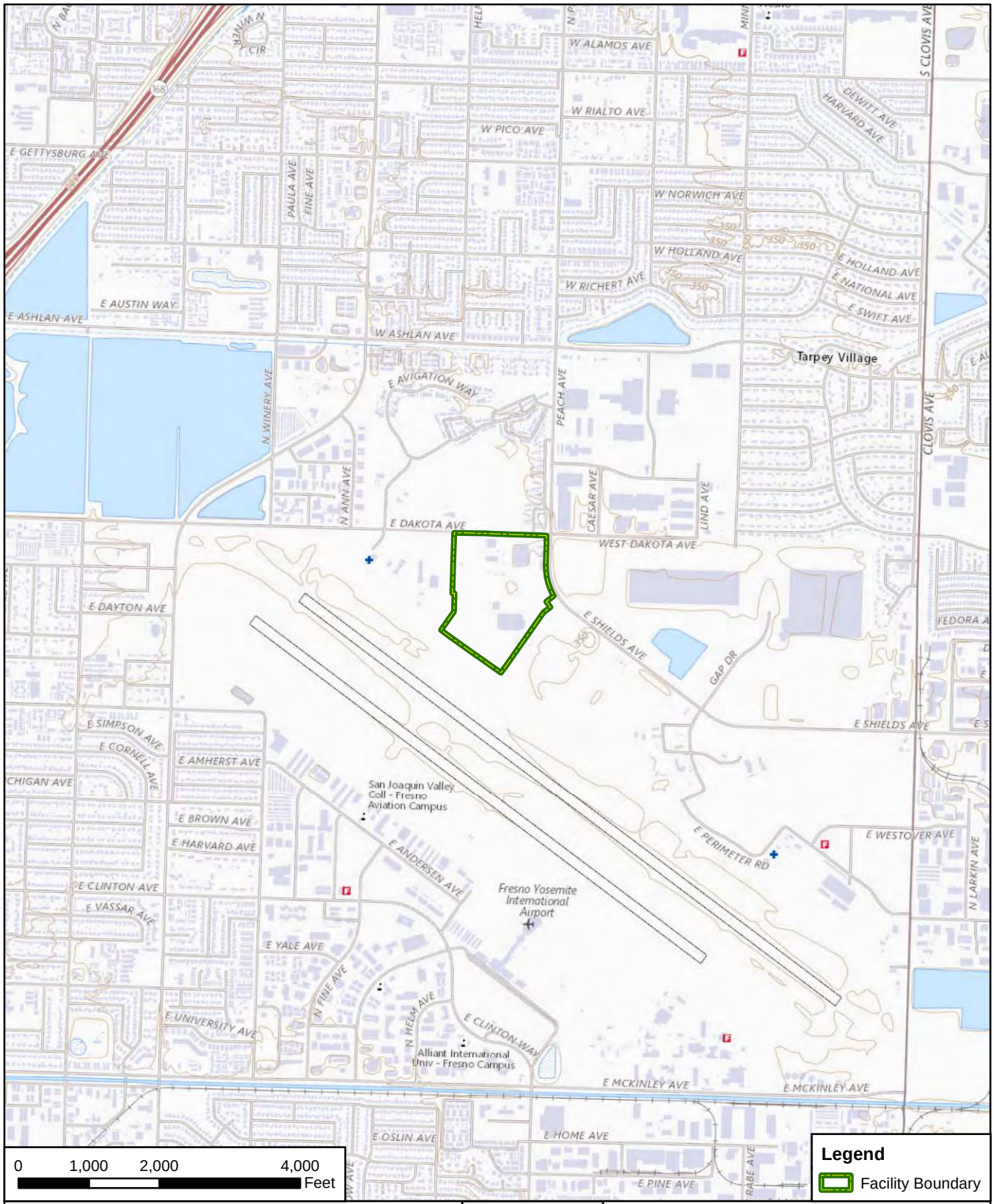
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/2/2022 | GIS BY | MS | 8/2/2022 |
| SCALE | 1:63,360 | CHK BY | EB | 8/2/2022 |
| Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, | | PM | CM | 8/2/2022 |

**Facility Location**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-1**

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|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/2/2022 | GIS BY | MS | 8/2/2022 |
| SCALE | 1:24,000 | CHK BY | EB | 8/2/2022 |
| Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, | | PM | CM | 8/2/2022 |

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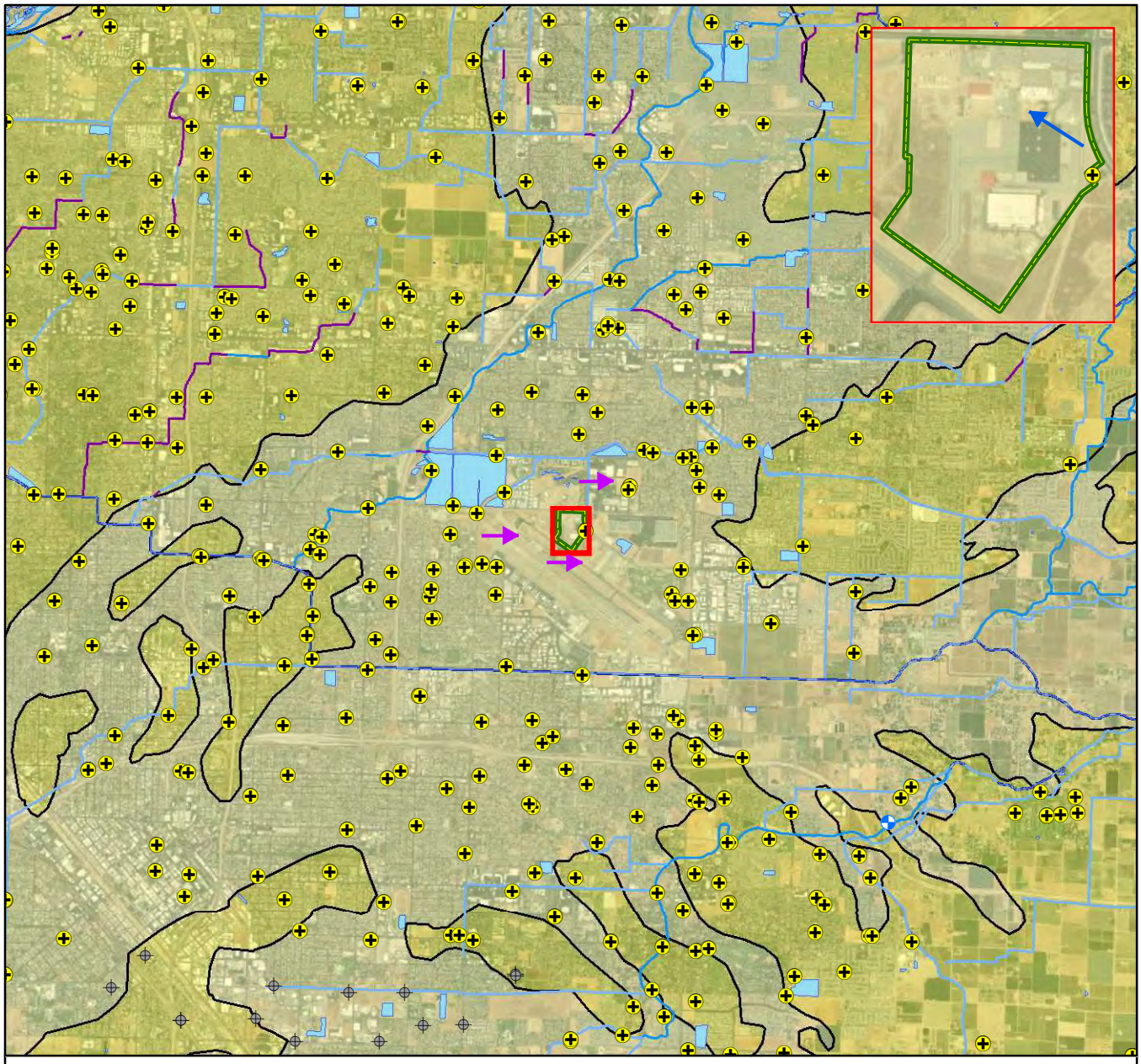
# Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-2**



Facility Boundary
Water Body
River/Stream
Canal/Ditch
Pipeline
Regional Inferred Groundwater Flow Direction
Localized Inferred Groundwater Flow Direction

0 0.75 1.5 3 Miles

**Geology**

Marine and nonmarine (continental) sedimentary rocks
Quaternary Deposits, Older Alluvium
Fault

**Wells**

Municipal Well
Private Well
Other/Unknown Well

| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/10/2022 | GIS BY | MS | 8/10/2022 |
| SCALE | 1:95,040 | CHK BY | EB | 8/10/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/10/2022 |

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# Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-3**


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 10/20/2022 | GIS BY | MS | 10/20/2022 |
| SCALE | 1:3,360 | CHK BY | MB | 10/20/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 10/20/2022 |

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**Groundwater Elevations, February 2022**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-4**


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/2/2022 | GIS BY | MS | 8/2/2022 |
| SCALE | 1:18,000 | CHK BY | EB | 8/2/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/2/2022 |

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**Surface Water Features**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-5**

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# 3. Summary of Areas of Interest

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, five potential release areas were identified at Fresno AVCRAD and grouped into three AOIs. Additionally, numerous adjacent potential release areas were identified during the PA, including the Fresno Air National Guard Base, Signature Fixed Based Operation Hangar, Fresno Aircraft Rescue and Firefighting, Former Fire Training Areas, and Former Marine Corps Facility (AECOM, 2020). The potential release areas are shown on **Figure 3-1**.

## 3.1 AOI 1 Hangar Training Area

AOI 1 is the Hangar Training Area, which borders the AVCRAD Hangar to the west. Controlled AFFF releases through fire training activities occurred annually during the approximate years 2008 to 2011 and 2014.

AOI 1 lies within the San Joaquin Valley Groundwater Basin, and all surface water is eventually drained by tributaries to the San Joaquin River. PFAS are water soluble and can migrate readily from soil to groundwater or surface water via leaching and run-off. If PFAS releases to surface and subsurface soil occurred, it is possible that PFAS migrated from surface soil at AOI 1 to groundwater and waters in the San Joaquin River. Drinking water is supplied by city of Fresno water supply wells. The closest city pump station was indicated to lie adjacent to the eastern facility property line, approximately 50 feet away from the AOI. In addition, precipitation infiltrating into the grassy surrounding areas of the AOI may cause the migration of PFAS from surface and subsurface soil to groundwater and surface water.

## 3.2 AOI 2 Wash Rack and East Airfield Taxiway

AOI 2 is the Wash Rack and East Airfield Taxiway. The area includes the HAZMAT locker with AFFF storage, located at the southeast corner of the Wash Rack. Controlled AFFF releases to the Wash Rack have occurred periodically from 2007 to 2010, and AFFF releases in the two identified areas from the servicing of Tri-Max™ fire extinguishers in the East Airfield Taxiway have occurred in 2015.

The Wash Rack contains an oil-water separator that drains to the Fresno sanitary sewer. However, base personnel have indicated that the wash rack drains were typically plugged during training events. Therefore, during events when the wash rack drains were plugged, potentially contaminated surface water at AOI 2 may have been captured in surrounding storm drains, which carry water towards Mills Creek and eventually to San Joaquin River. If PFAS were released to surface soil at AOI 2, they would have potential to migrate from surface soil to surface water via run-off and to groundwater via leaching. The nearest water supply well to AOI 2 is east of the AOI, approximately 50 feet away. The pathways and receptors for AOI 2 are the same as AOI 1 described in above section.

## 3.3 AOI 3 Corrosion Control Facility

AOI 3 is the corrosion control facility, which is located south of the airfield. The facility contains an AFFF fire suppression system with a 1,100-gallon capacity AFFF tank containing 3 percent (%) AFFF. A small drip leak at fire suppression system was reported approximately six to eight months after the system installation in June 2011. Leak repair and cleaning occurred approximately one week after the incident was reported. A large floor drain is located in the facility, but it is unknown whether the drain leads to the sanitary sewer or storm drain system. If PFAS-contaminated water were captured in the storm water drainage system, it would eventually discharge to San Joaquin

River. If PFAS were released to surface soil at AOI 3, it may have migrated from the surface soil to surface water through runoff or to groundwater through infiltration at grassy areas. The pathways and receptors for AOI 3 are the same as AOI 1 described in above section.

## 3.4 Adjacent Sources

Numerous potential off-facility sources of PFAS adjacent to the TASMG, not under the control of the CAARNG, were identified during the PA. The adjacent potential sources are shown on Figure 3-1 and described in the following sections for informational purposes only and were not investigated as part of this SI. These facilities are all located nominally cross-gradient to the Fresno AVCRAD facility.

### 3.4.1 Fresno Air National Guard Base

Fresno ANGB is located on a 111-acre leased property on the southeast corner of the Fresno Yosemite International Airport. Fresno ANGB is home to the 144$^{th}$ Fighter Wing, and operations related to the use and/or storage of AFFF have historically occurred at various locations at Fresno ANGB. A 2016 PA report on PFAS identified nine potential release locations (PRLs) (BB&E, Inc. 2016). A 2018 SI report for the Fresno ANGB confirmed that PFOS concentrations in soil at one PRL exceeded the USEPA residential soil regional screening level (RSL), and PFOA concentrations in groundwater at three PRLs exceeded the Health Advisories (AECOM, 2019).

### 3.4.2 Fresno ARFF

The Fresno ARFF has a fire station on Fresno Yosemite International Airport property and provides emergency response to aircraft emergencies. The fire station stores 3% AFFF and contains a firetruck with a 500-gallon AFFF and 3000-gallon water capacity with proportioning valves to mix the concentrate with water. Nozzle testing with water regularly occurs in all areas of the airport property. In addition, the ARFF conducts bi-annual foam testing for Federal Aviation Administration (FAA) certification. Approximately 30-50 gallons of 3% AFFF in the concentrated form are released from the firetruck during each testing event. Three testing areas were identified during interviews with ARFF personnel. One testing area was outside the ARFF fire station, and the other two areas were located southeast of the Fresno AVCRAD.

### 3.4.3 Former Fire Training Area #1

A former FTA is located on Fresno Yosemite International Airport. According to interviews with Fresno ARFF personnel, the FTA was utilized by both the ANGB and ARFF in combined annual training events during the estimated years of 1989 to 2000. The FTA contained a mock-up aircraft in a lined fire pit with a fuel pumping system. Training reportedly consisted of igniting fuel within the fire pit or in the mock-up aircraft and then extinguishing the resulting fire with AFFF. The frequency, volume, and concentration of AFFF used in this FTA are unknown.

### 3.4.4 Former Fire Training Area #2

A former FTA is located on Fresno Yosemite International Airport. According to interviews with Fresno ARFF personnel, the FTA was utilized by both the ANGB and ARFF in combined annual training events during the estimated years of 2005 to 2008. The FTA contained an old city of Fresno bus that would be ignited with fuel and then extinguished with AFFF. The frequency, volume, and concentration of AFFF used in this FTA are unknown.

### 3.4.5 Private Aviation Companies at Fresno Yosemite International Airport

Signature Flight Support Corporation maintains two hangars with AFFF deluge systems on a parcel of land adjacent to R-11 Runway. On 16 October 2015, it was reported by ARFF personnel that the AFFF deluge system at the Signature Fixed Base Operator hangar had an accidental trip, which resulted in a release of AFFF.

### 3.4.6 Former Marine Corps Facility

According to interviews with Fresno ARFF personnel, there was a former Marine Corp facility located approximately 0.5 miles southeast of the TASMG. The facility housed a Light Anti-Aircraft Missile Battalion, a United States Marine Corps air defense unit, and had a deployable fire unit with a P-19 firetruck. The current Fresno ARFF fire captain and former guardsman recounted that combined fire training was conducted with the Air National Guard in the area during the estimated years of 1990-1992. The Marine Corps leased the property from the Fresno Yosemite International Airport until approximately five years ago. A search on the Naval Facilities Engineering Command administrative record was made, but no information was readily available. Based on the timeline and operational use, it is possible AFFF could have been released or used during fire training exercises.

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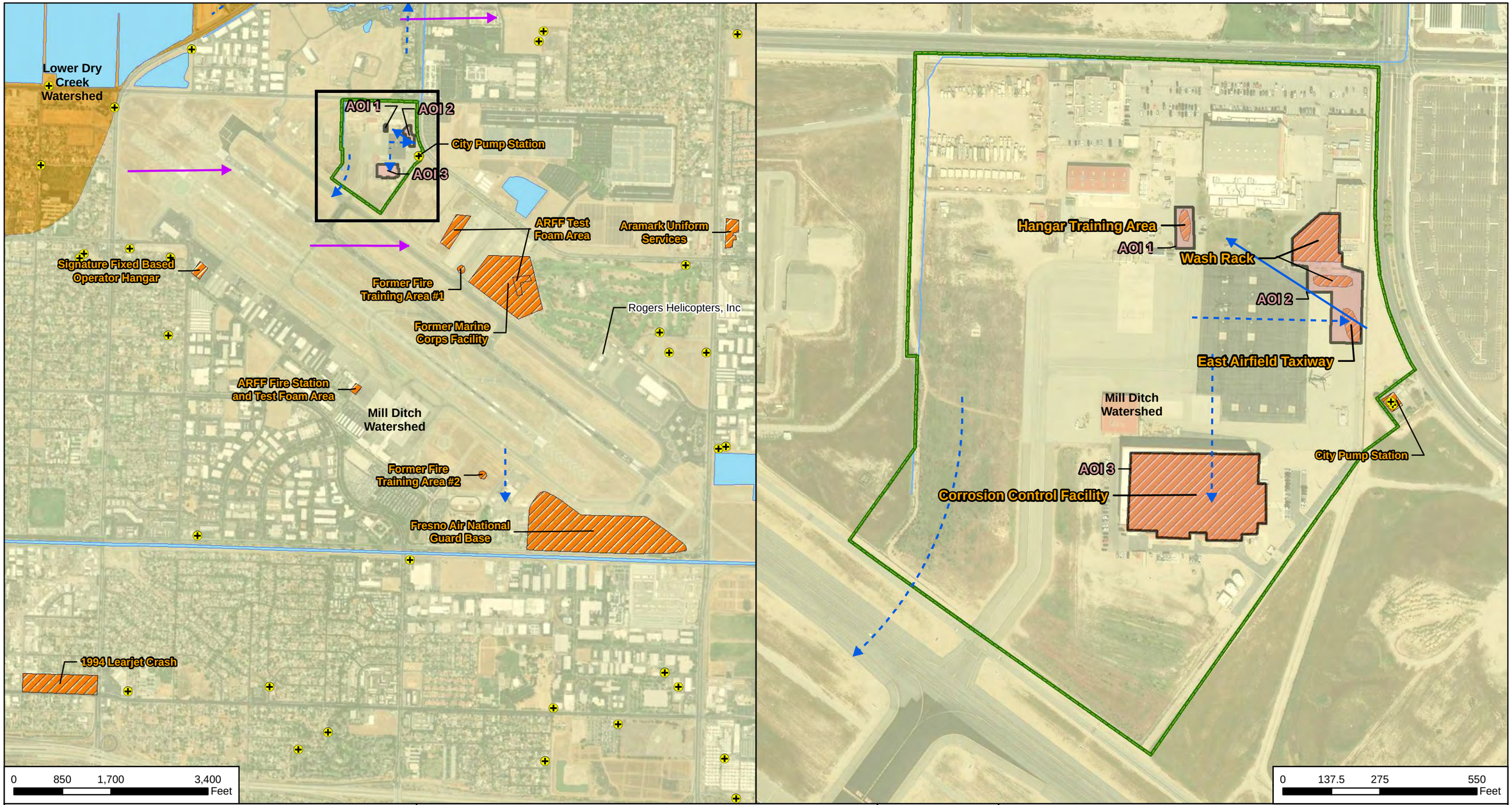


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno, AVCRAD, CA | | | |
| REVISED | 8/31/2022 | GIS BY | MS | 8/31/2022 |
| SCALE | 1:20,400 | CHK BY | MB | 8/31/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/31/2022 |

- Area of Interest
- Potential Release Area
- Facility Boundary
- Water Body
- Canal/Ditch
- Inferred Groundwater Flow Direction
- Regional Inferred Groundwater Flow Direction
- Surface Water Flow Direction
- Municipal Well

N

## Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 3-1**

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# 4. Project Data Quality Objectives

As identified during the Data Quality Objective (DQO) process and outlined in the SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2021a), 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 an AOI for Remedial Investigation (RI) if related soil and groundwater samples have concentrations of the relevant compounds above the OSD risk-based SLs. The SLs are presented in **Section 6.1** of this report.

## 4.2 Information Inputs

Primary information inputs included:

- The PA for Fresno AVCRAD (AECOM, 2020);
- Analytical data maintained by the SWRCB (SWRCB, 2021);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific UFP-QAPP (AECOM, 2021a); and
- 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 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).

## 4.4 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs within this document and decision rules as defined in the SI QAPP Addendum (AECOM, 2021a).

## 4.5 Data Usability Assessment

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

whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2019a; DoD, 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 SI QAPP Addendum (AECOM, 2021a).

# 5. Site Inspection Activities

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

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, Fresno TASMG, Fresno, California* dated February 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Fresno AVCRAD, Fresno, California* dated May 2021 (AECOM, 2021a);
- *Final Site Safety and Health Plan, Fresno AVCRAD, Fresno, California* dated May 2021 (AECOM, 2021b).

The SI field activities were conducted from 15 June to 14 September 2021 and February 2022 and consisted of utility clearance, sonic boring, soil sample collection, permanent monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as noted in **Section 5.8**.

The following samples were collected during the SI and analyzed for a subset of 18 compounds by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.3 Table B-15 to fulfill the project DQOs:

- Twelve (12) soil samples from two (2) boring locations and six surface soil locations;
- Two (2) grab groundwater samples from two (2) newly installed permanent well locations;
- Eleven (11) 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 media. 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**. Sampling forms are provided in **Appendix B2**, a Field Change Request Form is provided in **Appendix B3**, Nonconformance and Corrective Action Reports are provided in **Appendix B4**, and land survey data are provided in **Appendix B5**. 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 for each of these activities are presented below.

### 5.1.1 Technical Project Planning

The US Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (USACE, 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 20 January 2021, prior to SI field activities. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include the ARNG, CAARNG, USACE, the Regional Water Quality Control Board, and 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 SI QAPP Addendum (AECOM, 2021a).

A TPP Meeting 3 was held on 16 June 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

AECOM's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with the "Dig Alert" Southern California utility clearance provider to notify them of intrusive work on 04 June 2021 and 12 August 2021. However, because Fresno AVCRAD is a private facility, the participating "Dig Alert" locators did not clear utilities at the entire facility. Therefore, AECOM contracted Ground Penetrating Radar Systems, LLC., a private utility location service, to perform utility clearance. Underground Surveying, LLC. performed utility clearance of the proposed boring locations on 17 March 2021 and 17 August 2021 with input from the AECOM field team and Fresno AVCRAD facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

### 5.1.3 Source Water and Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be acceptable for use in a PFAS investigation prior to the start of field activities. A sample from a potable water source at Fresno AVCRAD was collected on 17 March 2021, prior to mobilization, and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample are provided in **Appendix F**. A discussion of the results is presented in the DUA (**Appendix A**).

Materials that were used within the sampling zone were confirmed as acceptable for use in the sampling environment. The checklist of acceptable materials for use in the sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the SI QAPP Addendum (AECOM, 2021a). Prior to the start of field work each day, a Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

## 5.2 Soil Borings and Soil Sampling

Soil samples were collected via sonic drilling technology, in accordance with the SI QAPP Addendum (AECOM, 2021a). A track-mounted Prosonic 600T and truck-mounted Boart Longyear™ LS™ 600 were used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top five feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1**, and depths are provided **Table 5-2**.

Three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample approximately 2 feet above the groundwater table, and one subsurface soil sample from 13 to 15 feet bgs. Due to the presence of groundwater at a depth greater than 15 feet bgs, mid-point samples were taken from the 13 to 15 feet bgs interval, in accordance with the QAPP Addendum (AECOM, 2021a).

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

Soil borings completed during the SI found silty sand and silt with sand as the dominant lithology of the unconsolidated sediments below Fresno AVCRAD. The borings were completed at depths between 137 and 140 feet bgs. Lesser amounts of poorly graded sand were observed in the borings, in layers ranging from 1 to 5 feet thick. Isolated clay layers were also observed and ranged from 2 to 7 feet thick. These Site observations are consistent with the understood lithology characterizing a fluvial-dominated alluvial fan depositional environment.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles 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 5.3 Table B-15), total organic compounds ([TOC]; USEPA Method 9060A) and pH (USEPA Method 9045D) in accordance with the SI QAPP Addendum (AECOM, 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/MS 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, equipment rinsate blanks were collected at a rate of 5% 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.

Sonic borings were converted to permanent monitoring wells. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

## 5.3 Permanent Well Installation and Groundwater Sampling

During the initial mobilization for SI field activities in June 2021, two permanent monitoring wells were installed within or downgradient of potential source areas. Due to an obstruction of the well screen at AVCRAD-MW002, it was determined that the well could not be developed or subsequently sampled. Field staff remobilized in August 2021 to install a replacement well near the original location (AVCRAD-MW002R) and abandoned the original well. The original well location was overdrilled to remove the well materials and backfilled with grout. Due to the proximity of the replacement well, additional soil samples were not collected at this location. The location of AVCRAD-MW001, the original well location for AVCRAD-MW002, and the location of replacement well AVCRAD-MW002R are shown on **Figure 5-1**.

A track-mounted Prosonic 600T and truck-mounted Boart Longyear™ LS™600 drill rig were used to install two 2-inch diameter monitoring wells. The monitoring wells were constructed with Schedule 40 polyvinyl chloride (PVC), flush threaded 10-foot sections of riser, 0.010-inch slotted well screen, and a threaded bottom cap. A filter pack of 20/40 silica sand was installed in the

annulus around the well screen to a minimum of 2 feet above the well screen. A 3-foot-thick bentonite seal was placed above the filter sand and hydrated with distilled water. Bentonite grout was placed in the well annulus from the top of the bentonite seal to ground surface. The bentonite grout was allowed to set for 24 hours prior to well completion in accordance with the SI QAPP Addendum (AECOM, 2021a). All monitoring wells were completed with flush mount well vaults. The screen interval of each of the groundwater monitoring wells is provided in **Table 5-3**.

Development and sampling of wells was completed in accordance with the SI QAPP Addendum (AECOM, 2021a). The newly installed monitoring wells were developed no sooner than 24 hours following installation by pumping and surging using a variable speed submersible pump. Water levels were measured to the nearest 0.01 inch and recorded. Samples were collected no sooner than 24 hours following development using HDPE Hydrasleeves™, in accordance with the SI QAPP Addendum (AECOM, 2021b). Since the Hydrasleeve™ is a PFAS-free and disposable passive sampler, this sampling method minimized the potential for cross contamination, negated the need for decontamination, and minimized the amount of purge water generated. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, and oxidation reduction potential) were measured during well development using a water quality meter and recorded on the well development sampling form (**Appendix B2**). Additionally, a subsample of each groundwater sample was collected in a separate container and a shaker test was completed to identify if there was any foaming. No foaming was noted in any of the groundwater samples.

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles 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 by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2021a).

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. One field reagent blank (FRB) was collected in accordance with the PQAPP (AECOM, 2018a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment.

## 5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 3 February 2022. Depth to groundwater measurements were collected from the two new permanent monitoring wells and used to calculate groundwater elevations. Water level measurements were taken from the northern side of the well casing. A groundwater elevation map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

## 5.5 Surveying

The northern side of each well casing was surveyed by California-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed wells on the facility were collected on 23 June 2021 and 2 August 2021 in the applicable Universal Transverse Mercator zone projection with World Geodetic System 84 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B5**.

## 5.6 Investigation-Derived Waste

As of the date of this report, the disposal of 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 (AECOM, 2021a) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Soil IDW (i.e., soil cuttings) generated during the SI activities were containerized in properly-labeled 55-gallon drums and stored in a location identified by CAARNG. The soil IDW was not sampled and assumes the PFAS characteristics of the associated soil samples collected from that source location. ARNG has coordinated waste profiling, transportation, and disposal of the solid IDW under a separate contract.

Liquid IDW generated during SI activities (i.e. purge water, development water, and decontamination fluids) was containerized in properly-labeled 55-gallon drums and stored in a location identified by CAARNG. The liquid IDW was not sampled and assumes the PFAS characteristics of the associated groundwater samples collected from that source location. Based on laboratory results, containerized liquid IDW will be managed and disposed by ARNG (either by offsite disposal or onsite disposal with treatment, as appropriate) under a separate contract in accordance with SOP No. 042A (EA Engineering, Science, and Technology, Inc., 2021).

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

## 5.7 Laboratory Analytical Methods

Samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15 at Pace Analytical Gulf Coast in Baton Rouge, Louisiana, 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 SI QAPP Addendum

Four deviations from the SI QAPP Addendum were identified during review of the field documentation. The deviations are noted below and documented in a Field Change Request Form (**Appendix B3**) and Nonconformance and Corrective Action Reports (**Appendix B4**):

- After the installation of two permanent monitoring wells in June 2021, the screen in one well (AVCRAD-MW002) appeared obstructed during development. As a result, it was determined that this well was damaged, and a new well would have to be installed before the two wells could be sampled. A replacement well (AVCRAD-MW002R) was installed and subsequently developed in August 2021, allowing both newly installed permanent wells to be sampled for groundwater. This action was documented in a field change request form provided in **Appendix B3**.
- Upon review of field documentation, it was discovered that an FRB was not collected during the field effort. Additionally, a Field Duplicate and MS/MSD were not collected for groundwater samples. This action was documented in a nonconformance and corrective action report provided in **Appendix B4**.

Prior to groundwater sampling, water quality parameters were not recorded to the extent stated in the SI QAPP Addendum. Stabilized water quality parameters collected during monitoring well development may be used in lieu of measurements not collected during groundwater sampling. This action was documented in a nonconformance and corrective action report provided in **Appendix B4**.

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**Table 5-1**
**Site Inspection Samples by Medium**
**Site Inspection Report, Fresno AVCRAD, California**

| Sample Identification | Sample Collection Date/Time | Sample Depth (feet bgs) | LC/MS/MS compliant with QSM 5.3 Table B-15 | TOC (USEPA Method 9060A) | pH (USEPA Method 9045D) | Grain Size (ASTM D-422) | Comments |
|---|---|---|---|---|---|---|---|
| **Soil Samples** | | | | | | | |
| AVCRAD-MW001-SB-00-02 | 6/17/2021 13:25 | 0 - 2 | x | | | | |
| AVCRAD-MW001-SB-00-02-D | 6/17/2021 13:25 | 0 - 2 | x | | | | FD |
| AVCRAD-MW001-SB-13-15 | 6/17/2021 16:00 | 13 - 15 | x | | | | |
| AVCRAD-MW001-SB-124-125 | 6/21/2021 14:15 | 124 - 125 | x | | | | |
| AOI01-01-SB-00-02 | 6/18/2021 8:30 | 0 - 2 | x | | | | |
| AOI01-01-SB-00-02-MS | 6/18/2021 8:30 | 0 - 2 | x | | | | MS |
| AOI01-01-SB-00-02-MSD | 6/18/2021 8:30 | 0 - 2 | x | | | | MSD |
| AOI01-02-SB-00-02 | 6/17/2021 14:00 | 0 - 2 | x | x | x | | |
| AOI01-02-SB-00-02-D | 6/17/2021 14:00 | 0 - 2 | x | | | | FD (pH, TOC) |
| AVCRAD-MW002-SB-00-02 | 6/15/2021 14:30 | 0 - 2 | x | | | | |
| AVCRAD-MW002-SB-13-15 | 6/15/2021 15:30 | 13 - 15 | x | | | | |
| AVCRAD-MW002-SB-124-125 | 6/16/2021 13:45 | 124 - 125 | x | | | | |
| AOI02-01-SB-00-02 | 6/18/2021 12:00 | 0 - 2 | x | | | | |
| AOI02-02-SB-00-02 | 6/17/2021 TIME? | 0 - 2 | x | | | | |
| AOI02-02-SB-00-02-MS | 6/17/2021 TIME? | 0 - 2 | | x | x | | MS (pH, TOC) |
| AOI02-02-SB-00-02-MSD | 6/17/2021 TIME? | 0 - 2 | | x | x | | MSD (pH, TOC) |
| AOI02-03-SB-00-02 | 6/18/2021 9:50 | 0 - 2 | x | | | | |
| AOI03-01-SB-00-02 | 6/18/2021 12:20 | 0 - 2 | x | x | x | | |
| AOI03-01-SB-00-02-D | 6/18/2021 12:20 | 0 - 2 | | x | x | | FD |
| **Groundwater Samples** | | | | | | | |
| AVCRAD-MW001-GW | 9/14/2021 9:10 | NA | x | | | | |
| AVCRAD-MW002R-GW | 9/14/2021 9:55 | NA | x | | | | Collected from MW002R |
| **Quality Control Samples** | | | | | | | |
| CN-PW-01 | 3/17/2021 13:50 | NA | x | | | | Decon Source |
| CN-ERB-01 | 6/18/2021 12:25 | NA | x | | | | Hand Auger |
| CN-ERB-02 | 6/18/2021 13:30 | NA | x | | | | Stainless-steel Bowl |
| CN-ERB-03 | 6/22/2021 14:35 | NA | x | | | | Hand Auger |

**Notes:**
ASTM = American Society for Testing and Materials
bgs = below ground surface
Decon Source = Source of water used for decontamination of equipment
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

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**Table 5-2**
**Soil Boring Depths**
**Site Inspection Report, Fresno AVCRAD, California**

| Area of Interest | Boring Location | Soil Boring Depth (feet bgs) |
|---|---|---|
| 1 | AVCRAD-MW001 | 137 |
| 2 | AVCRAD-MW002 | 137 |
| | AVCRAD-MW002R | 140 |

**Notes:**

[1] Permanent well screen set above total depth to capture groundwater interface

AVCRAD = Aviation Classification Repair Activity Depot
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988

**Table 5-3**
**Permanent Well Screen Intervals and Groundwater Elevations**
**Site Inspection Report, Fresno AVCRAD, California**

| Area of Interest | Boring Location | Permanent Well Screen Interval (feet bgs) | Top of Casing Elevation (feet NAVD88) | Ground Surface Elevation (feet NAVD88) | Depth to Water (feet btoc) | Depth to Water (feet bgs) | Groundwater Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|
| 1 | AVCRAD-MW001 | 126 - 136 | 337.43 | 338.20 | 124.96 | 125.73 | 212.47 |
| 2 | AVCRAD-MW002 | 125 - 135 | 337.91 | 338.14 | 122.00 | 122.23 | 215.91 |
| | AVCRAD-MW002R | 125 - 135 | 337.57 | 338.05 | 124.46 | 124.94 | 213.11 |

**Notes:**

[1] Permanent well screen set above total depth to capture groundwater interface

AVCRAD = Aviation Classification Repair Activity Depot
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/2/2022 | GIS BY | MS | 8/2/2022 |
| SCALE | 1:3,360 | CHK BY | MB | 8/2/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/2/2022 |

**Site Inspection Sample Locations**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 5-1**

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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 each AOI is provided in **Section 6.3** through **Section 6.5**. **Table 6-2** through **Table 6-4** present results in 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** below.

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

| Analyte[b] | Residential (Soil) (µg/kg)[a] 0-2 feet bgs | Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a] 2-15 feet bgs | Tap Water (Groundwater) (ng/L)[a] |
|---|---|---|---|
| **PFOA** | 19 | 250 | 6 |
| **PFOS** | 13 | 160 | 4 |
| **PFBS** | 1,900 | 25,000 | 601 |
| **PFHxS** | 130 | 1,600 | 39 |
| **PFNA** | 19 | 250 | 6 |

**Notes:**
bgs = below ground surface; µg/kg = micrograms per kilogram; ng/L = nanograms per liter

a.) Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.

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

The 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 feet bgs) and the industrial/commercial worker scenario is applied to shallow subsurface soil results (2 to 15 feet bgs). The SLs are not applied to deep subsurface soil results (>15 feet bgs) because 15 feet 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 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).

## 6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1: Hangar Training Area. The soil and groundwater results are summarized on **Table 6-2** through **Table 6-4**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

### 6.3.1 AOI 1 Soil Analytical Results

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

At AOI 1, soil was sampled from surface soil (0 to 2 feet bgs), shallow subsurface soil (13 to 15 feet bgs), and deep subsurface soil (124 to 125 feet bgs) from boring location AVCRAD-MW001. Soil was also sampled from the surface soil (0 to 2 feet bgs) at locations AOI01-01 and AOI01-02. PFBS was not detected at any soil sampling locations in AOI 1. In the deep subsurface soil, PFOA, PFOS, PFBS, PFHxS, and PFNA were not detected.

In the surface soil, PFOA was detected at two of four locations at concentrations ranging between 0.269 J micrograms per kilogram (µg/kg) to 1.16 µg/kg, with the highest concentration reported at AOI01-01. PFOS was detected at all four surface soil locations, at concentrations ranging between 0.085 J µg/kg to 0.357 J µg/kg, with the highest concentration reported at AOI01-01. PFHxS was detected at one surface soil location (AOI01-01), at a concentration of 0.357 J µg/kg. PFNA was detected at all four surface soil locations, at concentrations ranging between 0.026 J µg/kg to 0.289 µg/kg, with the highest concentration reported at AOI01-01. No detected compound exceeded their respective SLs.

In the shallow subsurface soil, PFOA, PFBS, and PFNA were not detected. PFOS was detected at one of two locations (AVCRAD-MW001), at a concentration of 0.075 J µg/kg. PFHxS was detected at one of two locations (AVCRAD-MW001), at a concentration of 0.032 J µg/kg.

### 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.

Within AOI 1, groundwater was sampled from one newly installed permanent monitoring well, AVCRAD-MW001, which was installed in June 2021. Groundwater was sampled in September 2021. PFOA and PFNA were not detected at AVCRAD-MW001. PFOS was detected below the SL of 4 ng/L, at a concentration of 1.14 J ng/L. PFBS was detected below the SL of 601 ng/L at a concentration of 1.39 J ng/L. PFHxS was detected below the SL of 39 ng/L, at a concentration of 1.96 ng/L.

### 6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, and PFNA were detected in soil below their respective SLs. PFBS was not detected in soil. PFOS, PFBS, and PFHxS were detected in groundwater at concentrations below their respective SLs. PFOA and PFNA were not detected in groundwater. Therefore, no further evaluation at AOI 1 is warranted at this time.

## 6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2, which includes two potential release areas: Wash Rack and East Airfield Taxiway. The results in soil and groundwater are summarized on **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

### 6.4.1 AOI 2 Soil Analytical Results

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

At AOI 2, soil was sampled from surface soil (0 to 2 feet bgs), shallow subsurface soil (13 to 15 feet bgs), and deep subsurface soil (124 to 125 feet bgs) from boring location AVCRAD-MW002. Soil was also sampled from the surface (0 to 2 feet bgs) at locations AOI02-01, AOI02-02, and AOI02-03. In the shallow and deep subsurface soil, PFOA, PFOS, PFBS, PFHxS, and PFNA were not detected.

In the surface soil, PFOA was detected in all three locations, at concentrations ranging between 0.089 J µg/kg to 0.270 J µg/kg, with the highest concentration reported at AOI02-01. PFOS was detected at all three surface soil locations, at concentrations ranging between 0.238 J µg/kg to 0.424 J µg/kg, with the highest concentration reported at AOI02-02. PFBS was detected in two of the three surface soil locations at concentrations of 0.027 J µg/kg and 0.192 J µg/kg, with the highest concentration reported at AOI02-01. PFHxS was detected at one surface soil location (AOI02-01), at a concentration of 0.985 J µg/kg. PFNA was detected at all three surface soil locations, at concentrations ranging between 0.058 J µg/kg to 0.274 J µg/kg, with the highest concentration detected at AOI02-01. No detected compound exceeded their respective SLs.

### 6.4.2 AOI 2 Groundwater Analytical Results

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

Within AOI 2, groundwater was sampled from one newly installed permanent monitoring well, AVCRAD-MW002R, which was installed in August 2021. Groundwater was sampled in September 2021. PFBS, PFHxS, and PFNA were not detected at AVCRAD-MW002R. PFOA was detected below the SL of 6 ng/L, at a concentration of 0.843 J ng/L. PFOS was detected below the SL of 4 ng/L, at a concentration of 3.00 J ng/L.

### 6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil at concentrations below their respective SLs. PFOA and PFOS were detected in groundwater below the SLs. PFBS, PFHxS, and PFNA were not detected in groundwater. Therefore, further evaluation at AOI 2 is not warranted at this time.

## 6.5 AOI 3

This section presents the analytical results for soil in comparison to SLs for AOI 3, which includes one potential release area: the Corrosion Control Facility. No wells were installed at AOI 3; thus, groundwater was not sampled. The results in soil are presented in **Table 6-2**. Soil results are presented on **Figure 6-1** through **Figure 6-5**.

### 6.5.1 AOI 3 Soil Analytical Results

**Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** summarizes the soil results.

Soil was sampled from surface soil (0 to 2 feet bgs) from one hand auger boring location, AOI03-01. At this location, PFOA was detected at a concentration of 1.11 µg/kg; PFOS was detected at a concentration of 8.18 µg/kg; PFBS was detected at a concentration of 0.089 J µg/kg; PFHxS was detected at a concentration of 3.43 µg/kg; and PFNA was detected at a concentration of 0.479 µg/kg. No detected compound exceeded their respective SL.

### 6.5.2 AOI 3 Conclusions

Based on the results of the SI, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil at concentrations below their respective SLs. Groundwater was not sampled at AOI 3. Based on the results of the soil samples, further evaluation at AOI 3 is not warranted at this time.

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

| Area of Interest | | AOI01 | | | | | | | | | | AOI02 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | AOI01-01-SB-00-02 | | AOI01-02-SB-00-02 | | AOI01-02-SB-00-02D | | AVCRAD-MW001-SB-00-02 | | AVCRAD-MW001-SB-00-02D | | AOI02-01-SB-00-02 | | AOI02-02-SB-00-02 | | AOI02-03-SB-00-02 | |
| Sample Date | | 06/18/2021 | | 06/17/2021 | | 06/17/2021 | | 06/17/2021 | | 06/17/2021 | | 06/18/2021 | | 06/17/2021 | | 06/18/2021 | |
| Depth | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | |
| Analyte | OSD Screening Level [a] | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | | | | | |
| PFBS | 1900 | ND | U | ND | UJ | ND | UJ | ND | UJ | ND | UJ | 0.192 | J | 0.027 | J | ND | U |
| PFHxS | 130 | 0.084 | J | ND | UJ | ND | UJ | ND | UJ | ND | UJ | 0.985 | J | ND | UJ | ND | U |
| PFNA | 19 | 0.289 | J | 0.136 | J | 0.134 | J | 0.026 | J | 0.028 | J | 0.274 | J | 0.075 | J | 0.058 | J |
| PFOA | 19 | 1.16 | | 0.269 | J | 0.281 | J | ND | UJ | ND | UJ | 0.270 | J | 0.089 | J | 0.169 | J |
| PFOS | 13 | 0.357 | J | ND | UJ | 0.085 | J | 0.235 | J | 0.250 | J | 0.351 | J | 0.424 | J | 0.238 | J |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on residential scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted DL

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

| | |
|---|---|
| PFBS | perfluorobutanesulfonic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |

Acronyms and Abbreviations

| | |
|---|---|
| AOI | Area of Interest |
| AVCRAD | Aviation Classification Repair Activity Depot |
| D | duplicate |
| DL | detection limit |
| ft | feet |
| HQ | hazard quotient |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| OSD | Office of the Secretary of Defense |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| SB | soil boring |
| USEPA | United States Environmental Protection Agency |
| µg/kg | micrograms per kilogram |

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

| | Area of Interest | AOI02 | | AOI03 | |
|---|---|---|---|---|---|
| | Sample ID | AVCRAD-MW002-SB-00-02 | | AOI03-01-SB-00-02 | |
| | Sample Date | 06/15/2021 | | 06/18/2021 | |
| | Depth | 0-2 ft | | 0-2 ft | |
| Analyte | OSD Screening Level [a] | Result | Qual | Result | Qual |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | |
| PFBS | 1900 | ND | UJ | 0.089 | J |
| PFHxS | 130 | ND | UJ | 3.43 | |
| PFNA | 19 | 0.025 | J | 0.479 | J |
| PFOA | 19 | ND | UJ | 1.11 | |
| PFOS | 13 | 0.097 | J | 8.18 | |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on residential scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted DL

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

| | |
|---|---|
| PFBS | perfluorobutanesulfonic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |

Acronyms and Abbreviations

| | |
|---|---|
| AOI | Area of Interest |
| AVCRAD | Aviation Classification Repair Activity Depot |
| D | duplicate |
| DL | detection limit |
| ft | feet |
| HQ | hazard quotient |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| OSD | Office of the Secretary of Defense |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| SB | soil boring |
| USEPA | United States Environmental Protection Agency |
| µg/kg | micrograms per kilogram |

**Table 6-3**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil**
**Site Inspection Report, Fresno AVCRAD**

| | Area of Interest | AOI01 | | AOI02 | |
|---|---|---|---|---|---|
| | Sample ID | AVCRAD-MW001-SB-13-15 | | AVCRAD-MW002-SB-13-15 | |
| | Sample Date | 06/17/2021 | | 06/15/2021 | |
| | Depth | 13-15 ft | | 13-15 ft | |
| Analyte | OSD Screening Level [a] | Result | Qual | Result | Qual |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | |
| PFBS | 25000 | ND | U | ND | UJ |
| PFHxS | 1600 | 0.032 | J | ND | UJ |
| PFNA | 250 | ND | U | ND | UJ |
| PFOA | 250 | ND | U | ND | UJ |
| PFOS | 160 | 0.075 | J | ND | UJ |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted DL

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

| | |
|---|---|
| PFBS | perfluorobutanesulfonic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |

Acronyms and Abbreviations

| | |
|---|---|
| AOI | Area of Interest |
| AVCRAD | Aviation Classification Repair Activity Depot |
| DL | detection limit |
| ft | feet |
| HQ | hazard quotient |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| OSD | Office of the Secretary of Defense |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| SB | soil boring |
| USEPA | United States Environmental Protection Agency |
| µg/kg | micrograms per kilogram |

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

| Area of Interest | AOI01 | | AOI02 | |
|---|---|---|---|---|
| Sample ID | AVCRAD-MW001-SB-124-125 | | AVCRAD-MW002-SB-124-125 | |
| Sample Date | 06/21/2021 | | 06/16/2021 | |
| Depth | 124-125 ft | | 124-125 ft | |
| **Analyte** | **Result** | **Qual** | **Result** | **Qual** |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | |
| PFBS | ND | U | ND | UJ |
| PFHxS | ND | U | ND | UJ |
| PFNA | ND | U | ND | UJ |
| PFOA | ND | U | ND | UJ |
| PFOS | ND | U | ND | UJ |

Interpreted Qualifiers

U = The analyte was not detected at a level greater than or equal to the adjusted DL

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

| | |
|---|---|
| PFBS | perfluorobutanesulfonic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |

Acronyms and Abbreviations

| | |
|---|---|
| AOI | Area of Interest |
| AVCRAD | Aviation Classification Repair Activity Depot |
| DL | detection limit |
| ft | feet |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| SB | soil boring |
| µg/kg | micrograms per kilogram |

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

| Area of Interest | | AOI01 | | AOI02 | |
|---|---|---|---|---|---|
| Sample ID | | AVCRAD-MW001-GW | | AVCRAD-MW002-GW | |
| Sample Date | | 09/14/2021 | | 09/14/2021 | |
| Analyte | OSD Screening Level [a] | Result | Qual | Result | Qual |
| **Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)** | | | | | |
| PFBS | 601 | 1.39 | J | ND | U |
| PFHxS | 39 | 1.96 | J | ND | U |
| PFNA | 6 | ND | U | ND | U |
| PFOA | 6 | ND | U | 0.843 | J |
| PFOS | 4 | 1.14 | J | 3.00 | J |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022 Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted DL

Chemical Abbreviations

| | |
|---|---|
| PFBS | perfluorobutanesulfonic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |

Acronyms and Abbreviations

| | |
|---|---|
| AOI | Area of Interest |
| AVCRAD | Aviation Classification Repair Activity Depot |
| DL | detection limit |
| GW | groundwater |
| HQ | hazard quotient |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| OSD | Office of the Secretary of Defense |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| USEPA | United States Environmental Protection Agency |
| ng/l | nanogram per liter |

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| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/25/2022 | GIS BY | MS | 8/25/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 8/25/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/25/2022 |

**Legend**

Facility Boundary

0 170 340 680 Feet

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

N

## PFOA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-1**


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/25/2022 | GIS BY | MS | 8/25/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 8/25/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/25/2022 |

**Legend**

Facility Boundary

0 170 340 680 Feet

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

N

**PFOS Detections in Soil**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-2**


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/25/2022 | GIS BY | MS | 8/25/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 8/25/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/25/2022 |

**Legend**

Facility Boundary

0 170 340 680 Feet

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

N

## PFBS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-3**


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/25/2022 | GIS BY | MS | 8/25/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 8/25/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/25/2022 |

**Legend**

Facility Boundary

0 170 340 680 Feet

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

N

## PFHxS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-4**


| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/25/2022 | GIS BY | MS | 8/25/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 8/25/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/25/2022 |

**Legend**

Facility Boundary

0 170 340 680 Feet

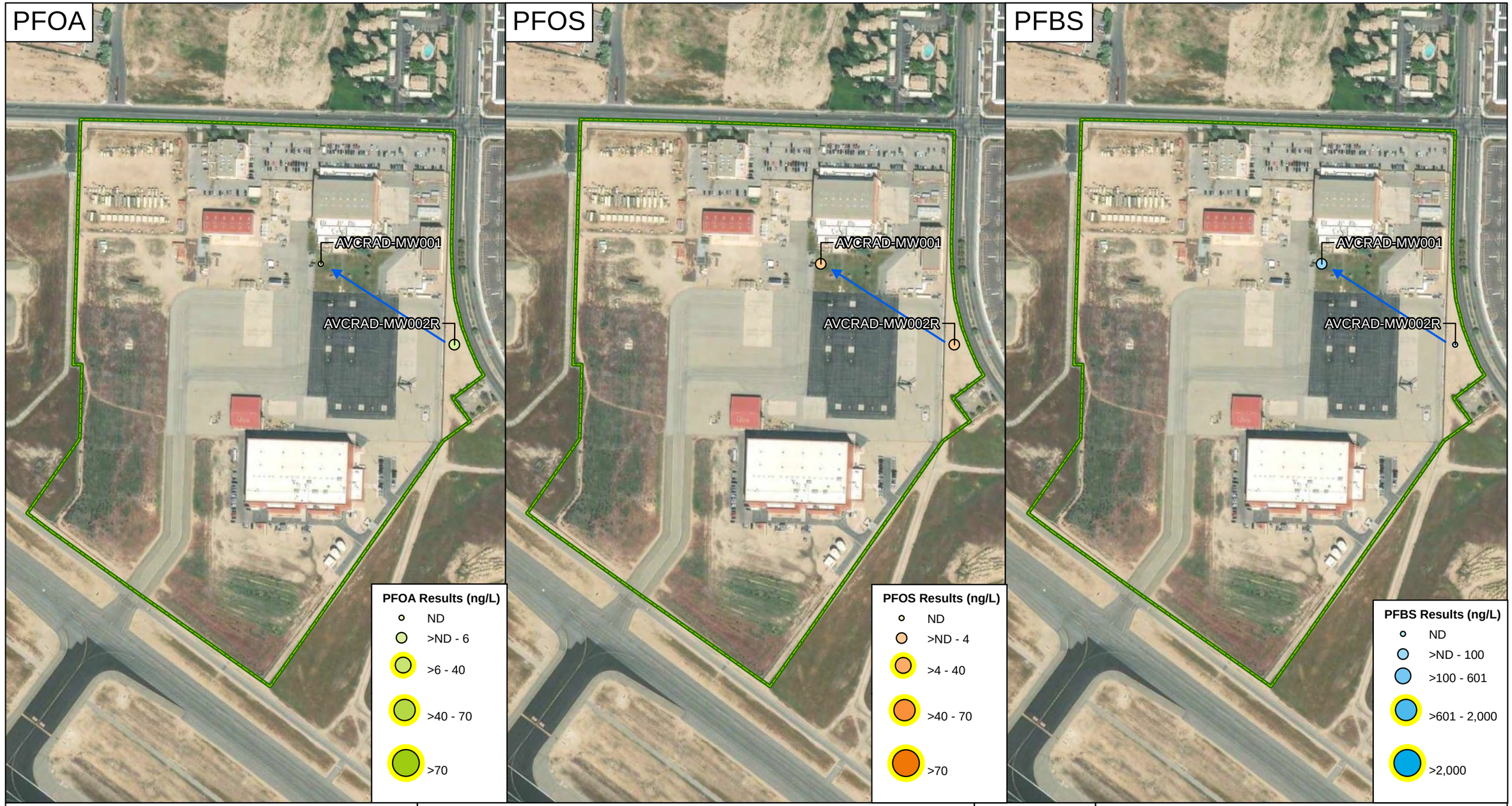
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

## PFNA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-5**




| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 10/13/2022 | GIS BY | MS | 10/13/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 10/13/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 10/13/2022 |

**Legend**

Facility Boundary

Inferred Groundwater Flow Direction

0 170 340 680 Feet

N

Exceedances of the OSD SL are depicted with a yellow halo.

# PFOA, PFOS, and PFBS Detections in Groundwater

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-6**

PFHxS


**PFHxS Results (ng/L)**

- ND
- >ND - 39
- >39 - 100
- >100 - 1,000
- >1,000

PFNA


**PFNA Results (ng/L)**

- ND
- >ND - 6
- >6 - 100
- >100 - 1,000
- >1,000

| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Fresno AVCRAD, CA | | | |
| REVISED | 8/10/2022 | GIS BY | MS | 8/10/2022 |
| SCALE | 1:4,080 | CHK BY | EB | 8/10/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 8/10/2022 |

**Legend**

- Facility Boundary
- Inferred Groundwater Flow Direction

0 170 340 680 Feet

N

Exceedances of the OSD SL are depicted with a yellow halo.

# PFHxS and PFNA Detections in Groundwater

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-7**

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# 7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-3**. 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 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:

1. Contaminant source;
2. Environmental fate and transport;
3. Exposure point;
4. Exposure route; and
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 an incomplete 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 RI or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs.

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

## 7.1 Soil Exposure Pathway

The SI results in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1, AOI 2, and AOI 3 based on the aforementioned criteria.

### 7.1.1 AOI 1

From approximately 2008 to 2011, and in 2014, controlled AFFF releases occurred annually during fire training activities. At AOI 1, PFOA, PFOS, PFHxS, and PFNA were detected in surface soil, and PFOS and PFHxS were detected in the shallow subsurface soil at AOI 1.

Active construction was observed at the facility during the SI. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust; therefore, the soil exposure pathway for those receptors is considered potentially complete. Current and future construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the soil exposure pathway for this receptor is considered potentially complete. Additionally, off-facility residents and recreational users may potentially be exposed to these constituents via inhalation of dust caused by on-facility ground disturbing activities. The CSM for AOI 1 is presented on **Figure 7-1**.

### 7.1.2 AOI 2

From 2007 to 2010, AFFF was periodically released to the Wash Rack. AOI 2 also includes the East Airfield Taxiway, where AFFF was released in 2015 during the servicing of Tri-Max™ fire extinguishers. PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in the surface soil at AOI 2.

Active construction was observed at the facility during the SI. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust; therefore, the soil exposure pathway for those receptors is considered potentially complete. Constituents were not detected in the shallow subsurface soil; therefore, the soil exposure pathway for this receptor is considered incomplete. Additionally, off-facility residents and recreational users may potentially be exposed to these constituents via inhalation of dust caused by on-facility ground disturbing activities. The CSM for AOI 2 is presented on **Figure 7-2**.

### 7.1.3 AOI 3

The Corrosion Control Facility contains an AFFF fire suppression system with a 1,100-gallon capacity AFFF tank, containing 3% AFFF. A small drip leak at fire suppression system was reported approximately six to eight months after the system installation in June 2011. Only surface soil was sampled at AOI 3. PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in the surface soil at this AOI.

Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust; therefore, the soil exposure pathway for those receptors is considered potentially complete. Current and future construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the soil exposure pathway for this receptor is considered potentially complete. Additionally, off-facility residents and recreational users may potentially be exposed to these constituents via inhalation of dust caused by on-facility ground disturbing activities. The CSM for AOI 3 is presented on **Figure 7-3**.

## 7.2 Groundwater Exposure Pathway

The SI results in groundwater were used to determine whether a potentially complete pathway exists at AOI 1 and AOI 2 between the source and potential receptors based on the aforementioned criteria.

### 7.2.1 AOI 1

PFOS, PFBS, and PFHxS were detected at concentrations below their respective SLs in the one permanent monitoring well sampled at AOI 1. Municipal drinking water wells exist within one mile northwest of the facility boundary, therefore, the ingestion exposure pathway for site workers and off-facility residents is considered potentially complete. Depths to water measured in November 2021 during the SI ranged from 124.46 to 124.96 feet bgs. Construction activities were observed to be occurring near the facility's northern boundary at the time of the SI field work. However,

groundwater at the potential source area exceeds 120 feet bgs; therefore, a construction worker during trenching activities would not reasonably come into contact with groundwater, and the exposure pathway is considered incomplete. The CSM for AOI 1 is presented on **Figure 7-1**

### 7.2.2 AOI 2

PFOA and PFOS were detected at concentrations below their respective SLs in the one permanent monitoring well sampled at AOI 2. Municipal drinking water wells exist within one mile of the facility boundary, therefore, the ingestion exposure pathway for site workers and off-facility residents is considered potentially complete. The inferred groundwater flow direction is to the east; however, at the time of synoptic gauging of the two wells installed during the SI, groundwater flow was inferred to be to the northwest. Construction activities were observed to be occurring near the facility's northern boundary at the time of the SI field work. Groundwater at the potential source area exceeds 120 feet bgs; therefore, a construction worker during trenching activities would not reasonably come into contact with groundwater, and the exposure pathway is considered incomplete. The CSM for AOI 2 is presented on **Figure 7-2**.

## 7.3 Surface Water and Sediment Exposure Pathway

The SI results in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. Because PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at the AOIs, it is possible that those compounds may have migrated from soil and groundwater via surface water runoff to the Fresno Yosemite International Airport drainage system which flows into Mills Creek and feeds into Herndon Canal. Therefore, the surface water and sediment ingestion exposure pathway for the off-facility recreational user is considered potentially complete. The Herndon Canal is a tributary to the San Joaquin River, which eventually discharges into the San Francisco Bay (HazCon, 2017). The CSMs for AOI 1, AOI 2, and AOI 3 are presented on **Figure 7-1**, **7-2**, and **7-3**, respectively.

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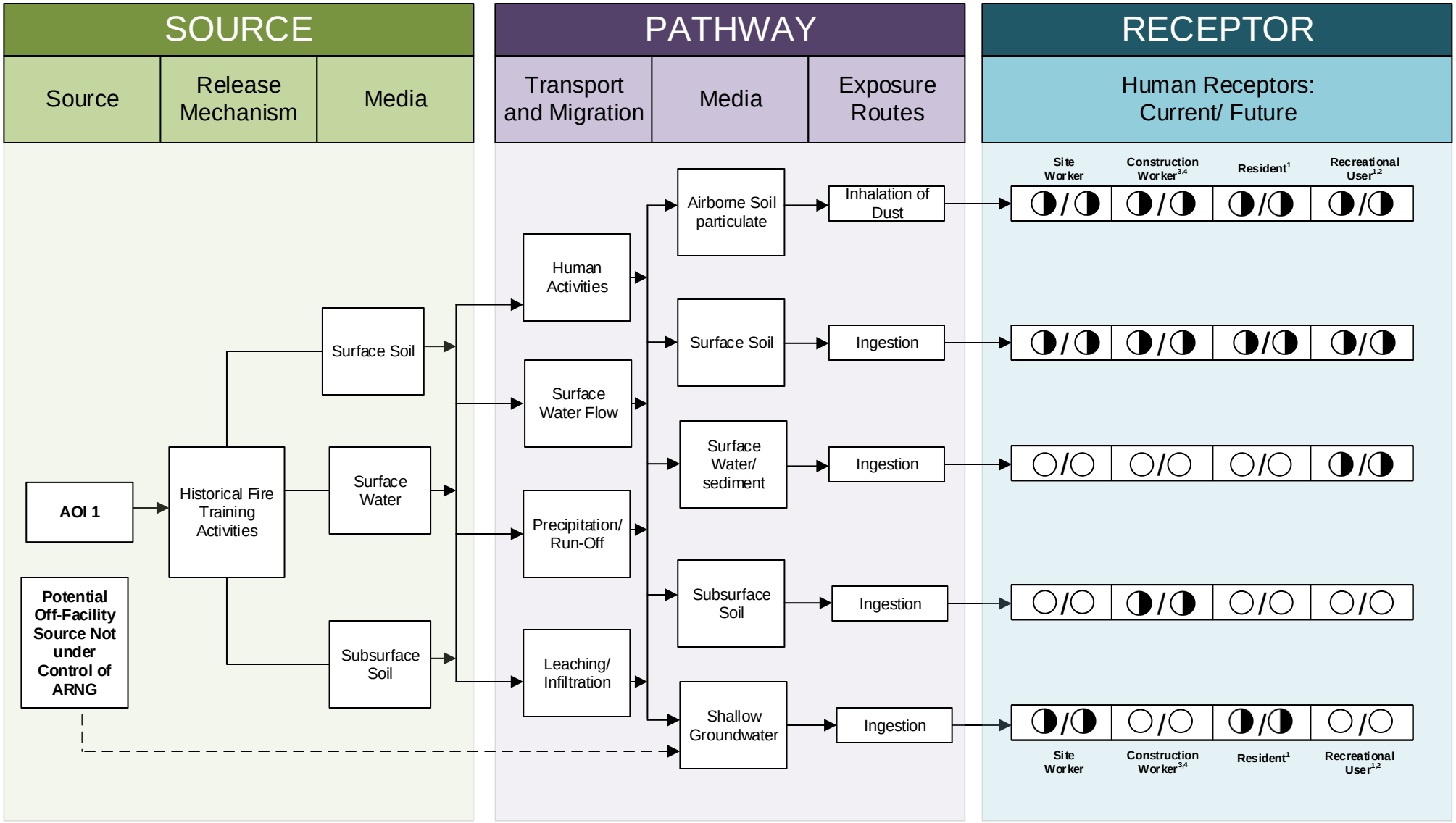


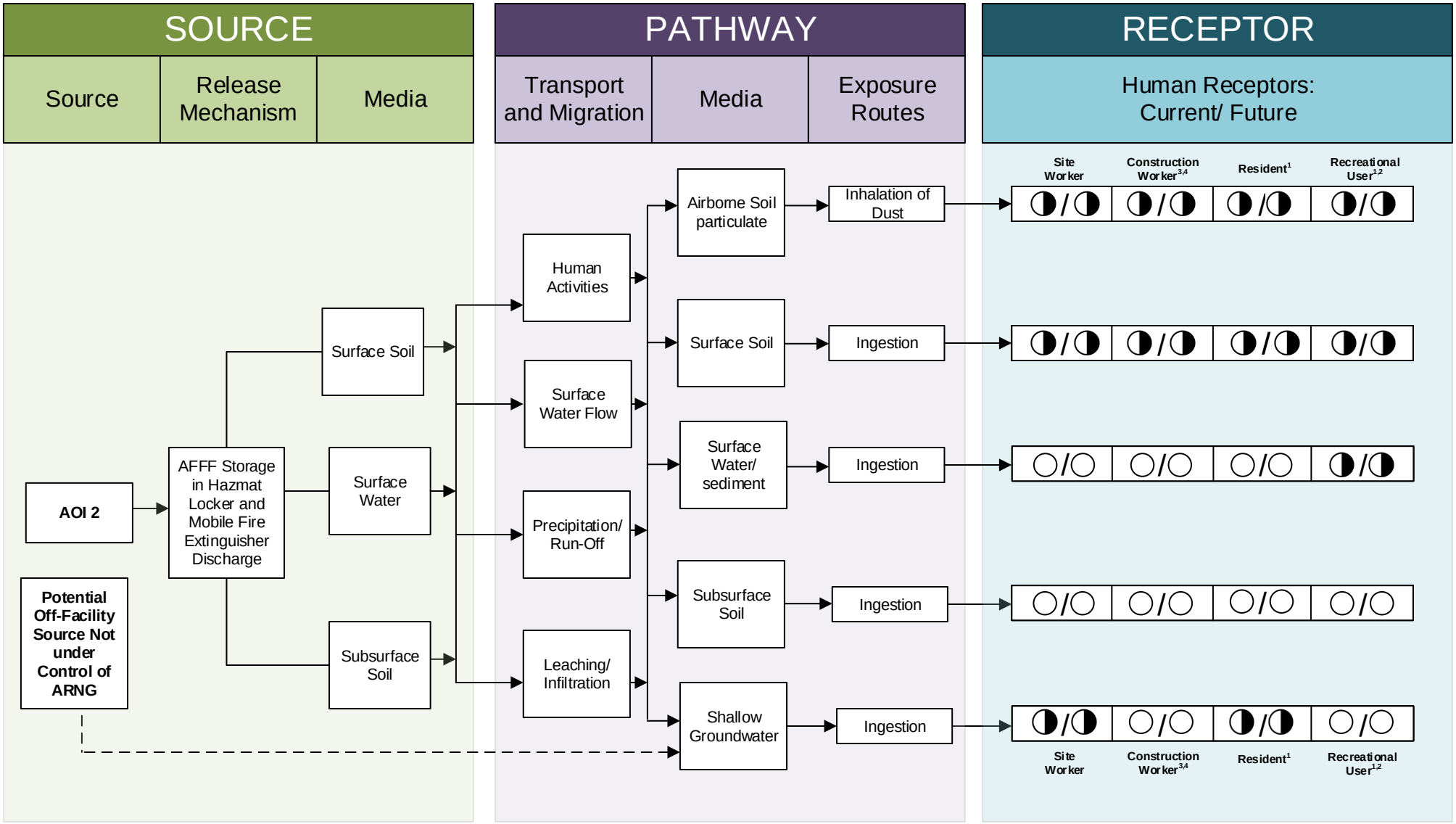

**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors.
2. Human consumption of fish potentially affected by PFAS is possible.
3. Active construction within AOI 1 was observed at the facility during SI field work.
4. Groundwater was encountered at depths greater than 120 feet below ground surface at AOI 1.

**Figure 7-1**
Conceptual Site Model, AOI 1
Fresno AVCRAD, California



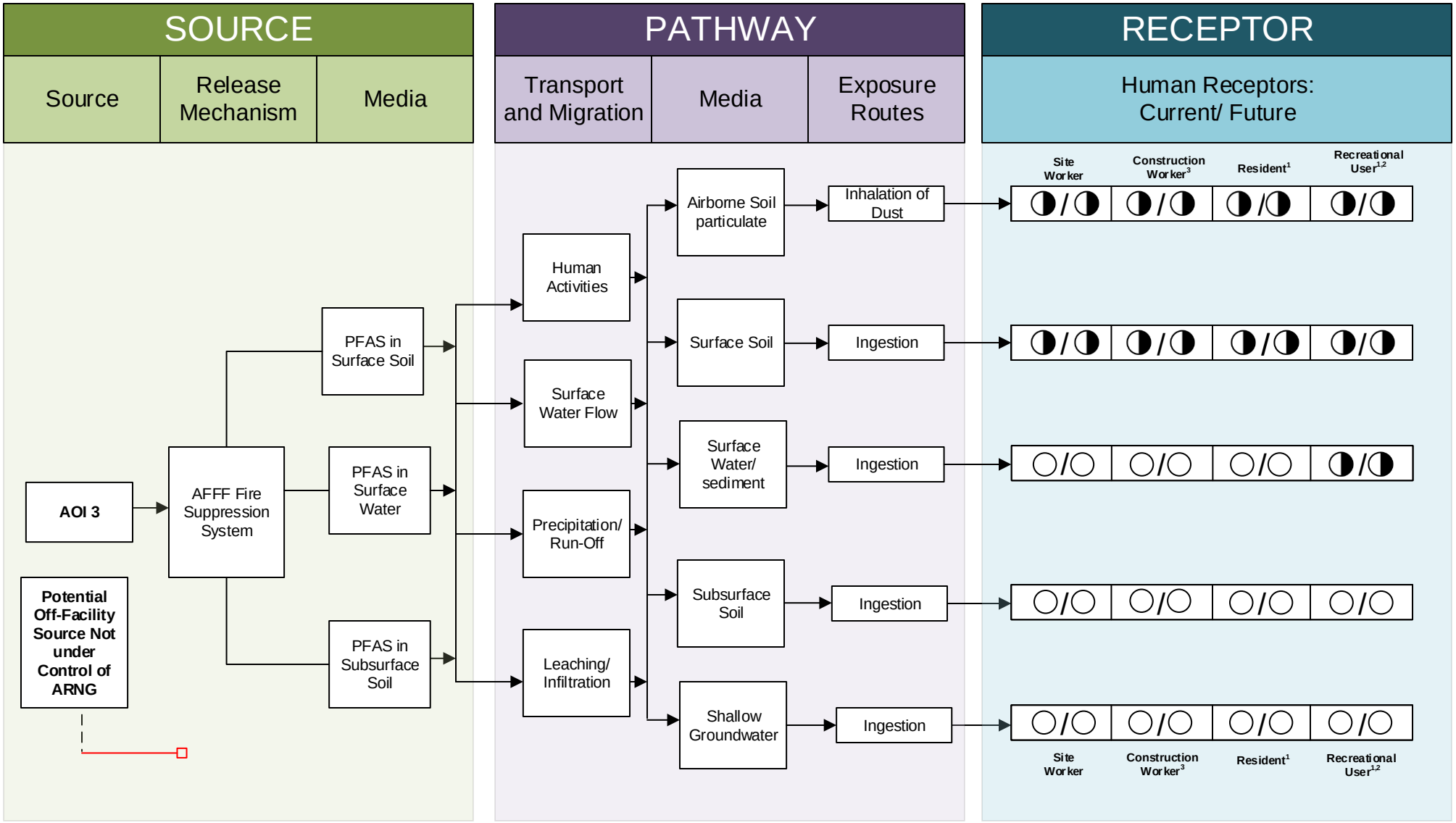

**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors.
2. Human consumption of fish potentially affected by PFAS is possible.
3. Active construction within AOI 1 was observed at the facility during SI field work.
4. Groundwater was encountered at depths greater than 120 feet below ground surface at AOI 2.

**Figure 7-2**
Conceptual Site Model, AOI 2
Fresno AVCRAD, California




**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors.
2. Human consumption of fish potentially affected by PFAS is possible.
3. Active construction within AOI 1 was observed at the facility during SI field work.
4. Shallow subsurface soil, deep subsurface soil, and grab groundwater samples were not collected at AOI 3.

**Figure 7-3**
Conceptual Site Model, AOI 3
Fresno AVCRAD, California

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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 SI Activities

The SI field activities were conducted in multiple mobilizations, from 15 to 24 June and between 17 August and 14 September 2021 and February 2022 and consisted of utility clearance, sonic drilling, soil sample collection, permanent monitoring well installation, monitoring well development, groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of 18 compounds by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows.

- Twelve (12) soil samples from two (2) boring locations and six (6) surface soil locations;
- Two grab groundwater samples from two (2) newly installed permanent wells;
- Eleven (11) 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, no further evaluation under CERCLA is warranted for each of the three AOIs at this time (see **Table 8-1**). Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1, and AOI 2 from sources on the facility resulting from historical DoD activities. Sample analytical concentrations collected during the 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 the SLs is as follows:

- At AOI 1:
    - The detected concentrations of PFOA, PFOS, PFHxS, and PFNA in soil at AOI 1 were below their respective SLs. PFBS was not detected in the soil.
    - The detected concentrations of PFOS, PFBS, and PFHxS in groundwater were below their respective SLs. PFOA and PFNA were not detected in the groundwater.
    - Based on the results of the SI, no further evaluation of AOI 1 is warranted at this time.
- At AOI 2:

  - The detected concentrations of PFOA, PFOS, PFBS, PFHxS, and PFNA in soil at AOI 2 were below their respective SLs.
  - The detected concentrations of PFOA and PFOS in groundwater were below their respective SLs. PFBS, PFHxS, and PFNA were not detected in the groundwater.
  - Based on the results of the SI, no further evaluation of AOI 2 is warranted at this time.
- At AOI 3:
  - The detected concentrations of PFOA, PFOS, PFBS, PFHxS, and PFNA in soil at AOI 3 were below their respective SLs.
  - Based on the results of the SI, no further evaluation of AOI 3 is warranted at this time.

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 | Hangar Training Area | ◐ | ◐ | N/A | No further action at this time |
| 2 | Wash Rack and East Airfield Taxiway | ◐ | ◐ | N/A | No further action at this time |
| 3 | Corrosion Control Facility | ◐ | N/A | N/A | No further action at this time |

**Legend:**

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

## 8.3 Uncertainties

**Table 8-2** summarized the uncertainties and data gaps associated with this SI. Based on these uncertainties, further investigation may be warranted in a Supplemental SI.

**Table 8-2: Summary of Site Inspection Uncertainties**

| AOI | Potential Release Area | Source of Uncertainty |
|---|---|---|
| **1-3** | All | Soil sampling was limited due to impervious surfaces immediately beneath and surrounding the suspected source areas. Therefore, the presence or absence of relevant compounds above the SLs at locations not sampled is unknown.<br><br>No soil sampling deeper than surficial soil samples were collected directly beneath the AOIs. Therefore, leaching of PFAS constituents from surface soil to subsurface soil and groundwater is unknown. |
| **1-3** | All | The groundwater investigation was limited to two wells. As a result, a site-specific hydraulic gradient could not be established and the inferred groundwater flow direction is uncertain. Additionally, no groundwater sampling was conducted at AOI 3. Based on the inferred groundwater flow direction, the groundwater samples collected during the SI were not located downgradient of the AOIs for which they were intended. |
| **3** | Corrosion Control Facility | No groundwater sampling was conducted at AOI 3. Therefore, the groundwater exposure pathway and the presence or absence of relevant compounds in groundwater are unknown at AOI 3. |

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