FINAL
Preliminary Assessment Report
Fresno TASMG, California

Perfluorooctane-Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

February 2020

Prepared for:

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Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
amsl	above mean sea level
ANGB	Air National Guard Base
AOI	area of interest
ARFF	Aircraft Rescue and Firefighting
ARNG	Army National Guard
AVCRAD	Aviation Classification Repair Activity Depot
bgs	below ground surface
CAARNG	California Army National Guard
CAL FIRE	California Department of Forestry and Fire Protection
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
EDR	Environmental Data Resources
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FBO	Fixed Base Operator
ft	feet
FTA	fire training area
HAZMAT	hazardous materials
NOAA	National Oceanic and Atmospheric Administration
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFHxS	perfluorohexane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
ppt	parts per trillion
PRL	potential release location
RSL	regional screening level
SI	Site Inspection
TASMG	Theater Aviation Sustainment Maintenance Group
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VSI	visual site inspection

Executive Summary

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. The ARNG is assessing the potential exposure to humans and the effect on the environment related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily in the form of aqueous film forming foam (AFFF) released during firefighting activities or training, although other PFAS sources are possible.

AECOM completed a PA for PFAS at the California (CA) ARNG (CAARNG) Fresno 1106th Theater Aviation Sustainment Maintenance Group (TASMG) in Fresno, California, to assess potential PFAS release areas and exposure pathways to receptors. The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources (EDR), Inc. report packages to obtain information relevant to potential PFAS releases
- Conducted a 1-day site visit on 7 March 2019
- Interviewed current Fresno TASMG personnel during the site visit including the CAARNG Aircraft Maintenance Officer and other facility operations staff; and, Fresno Aircraft Rescue and Firefighting (ARFF) personnel
- Completed visual site inspections (VSIs) at known or suspected PFAS release locations and documented with photographs
- Identified areas of interest (AOI) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI

Two AOIs related to potential PFAS releases were identified at Fresno TASMG during the PA. The AOIs are shown on **Figure ES-1** and described in **Table ES-1** below:

Table ES-1: AOIs at Fresno TASMG

Area of Interest	Name	Used by	Release Dates
AOI 1	Hangar Training Area	CAARNG	Potentially as early as 2008
AOI 2	Wash Rack and East Airfield Taxiway	CAARNG	Potentially as early as 2007

Based on information obtained during the PA at these AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. Based on the US Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA lifetime Health Advisories within 20 miles of the facility. As of June 2019, PFAS were sampled and detected below the Health Advisories from the off-facility public water supply well that supplies drinking water to the facility and is adjacent to the eastern facility property line. The PFAS data for this well are included in **Appendix A**. The preliminary CSM for Fresno TASMG, which presents the potential receptors and media impacted is shown on **Figure ES-2**.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fresno TASMG, CA			
REVISED	4/30/2019	GIS BY	MS	4/30/2019
SCALE	1:6,000	CHK BY	ST	4/30/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/30/2019

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Summary of Findings

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Figure ES-1

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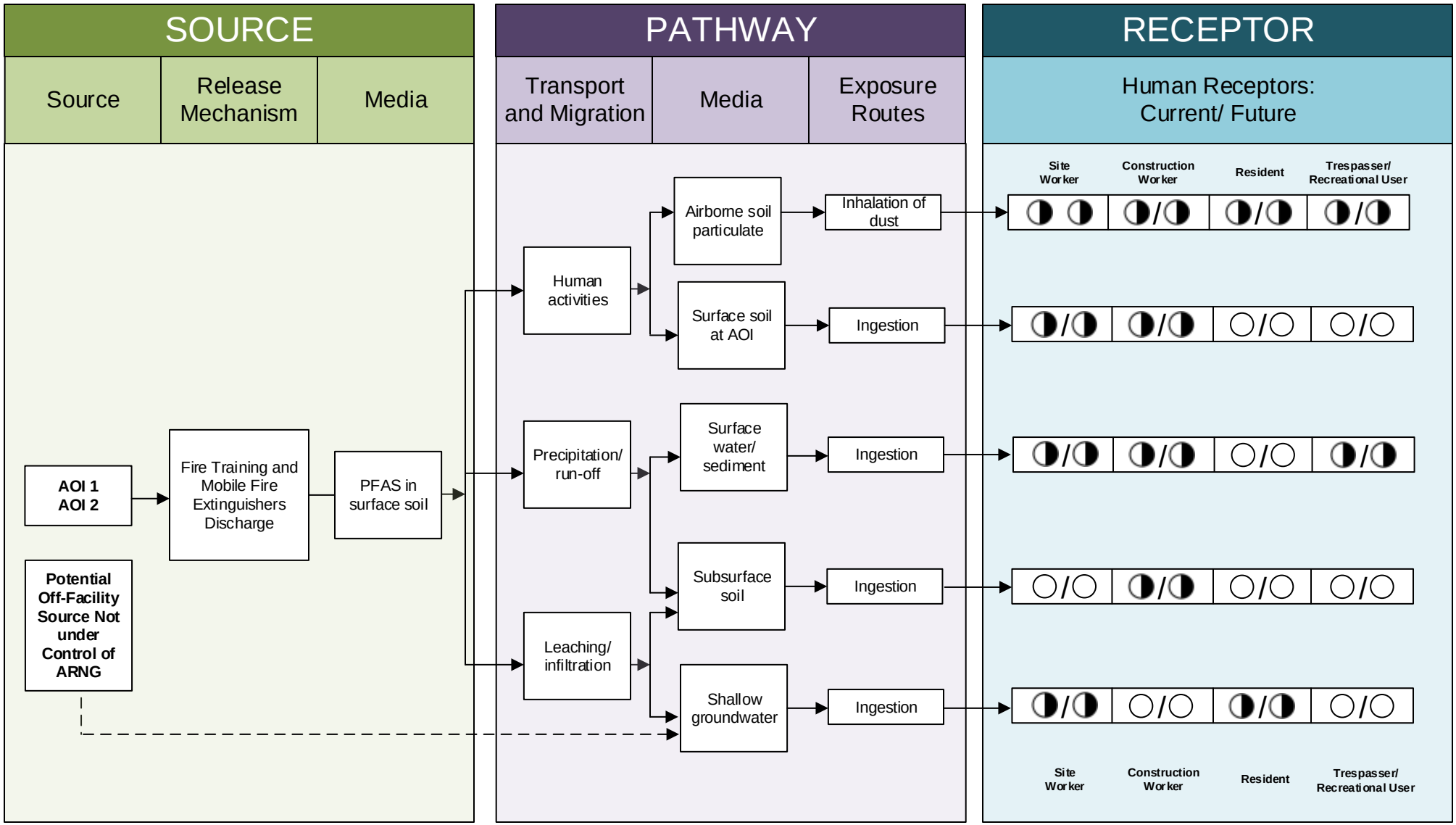


LEGEND

- Flow-chart stops
- Flow-chart continues
- Partial/ possible flow
- Incomplete pathway
- Possible complete pathway
- Complete pathway

Notes:

1. The resident receptor refers to an off-site resident.

2. Current risk practice suggests the exposure pathway for dermal contact is insignificant compared to ingestion, but supporting data are sparse and continue to be studied.

Figure ES-2
Preliminary Conceptual Site Model
Fresno TASMG, CA

1. Introduction

1.1 Authority and Purpose

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (VSIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide* under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG is assessing potential effects on human health related to processes at their facilities that used per- and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily releases of aqueous film forming foam (AFFF) although other sources of PFAS are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of these PFAS compounds in the environment will vary. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. In the absence of federal maximum contaminant levels, some states have adopted their own drinking water standards for PFAS. On 13 July 2018, under the authority of the Deputy Director of the Division of Drinking Water, California issued drinking water notification levels of 14 parts per trillion (ppt) for PFOA and 13 ppt for PFOS. Notification levels are non-regulatory health-based advisory levels established for contaminants in drinking water for which maximum contaminant levels have not been established.

This report presents findings of a PA for PFAS at California (CA) ARNG (CAARNG) Fresno 1106th Theater Aviation Sustainment Maintenance Group (TASMG) in Fresno, California (also referred to as “the facility”), in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300), and USACE requirements and guidance.

This PA documents the known fire training areas (FTAs) as well as additional locations where PFAS may have been released to the environment at Fresno TASMG. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components AFFF.

1.2 Preliminary Assessment Methods

- Reviewed available administrative record documents and Environmental Data Resources (EDR), Inc. report packages to obtain information relevant to potential PFAS releases
- Conducted a 1-day site visit on 7 March 2019
- Interviewed current Fresno TASMG personnel during the site visit including the CA ARNG Aircraft Maintenance Officer and other facility operations staff; and, Fresno Aircraft Rescue and Firefighting (ARFF) personnel
- Completed visual site inspections (VSIs) at known or suspected PFAS release locations and documented with photographs

- Identified areas of interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI

1.3 Report Organization

This report has been prepared in accordance with the USEPA Guidance for Performing Preliminary Assessments under CERCLA (USEPA, 1991). The report sections and descriptions of each are:

- **Section 1** – **Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA.
- **Section 2** – **Fire Training Areas:** describes the FTAs at the facility identified during the site visit.
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit.
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations.
- **Section 5** – **Adjacent Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG.
- **Section 6** – **Conceptual Site Model:** describes the pathways of PFAS transport and receptors at each AOI.
- **Section 7** – **Conclusions:** summarizes the data findings and presents the conclusions of the PA.
- **Section 8** – **References:** provides the references used to develop this document.
- **Appendix A** – Data Resources
- **Appendix B** – Preliminary Assessment Documentation
- **Appendix C** – Photographic Log

1.4 Facility Location and Description

The Fresno 1106th TASMG, formerly known as the Fresno California Aviation Classification Repair Activity Depot (AVCRAD), is located at 5168 East Dakota Avenue, Fresno, California. The mission of the TASMG is to provide support of ARNG aviation activities through depot-level and limited aviation intermediate unit maintenance. The TASMG provides support to 13 western states, 18 Army Aviation Support Facilities, and over 500 rotary wing aircrafts (Radian International, 1991). CA ARNG 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, 1991; White, T., 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 1-1**). 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 (ft) above mean sea level (amsl), respectively.

1.5 Facility Environmental Setting

Fresno TASMG 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 TASMG is in a relatively flat area with no significant natural topographic features. The surface elevation ranges from 326 to 344 ft amsl. The general topographic gradient is west/ southwest.

1.5.1 Soil

As indicated in the 2019 EDR report (**Appendix A**), there are three major soil components found at the Fresno TASMG property: Atwater, Delhi, and Handford. The properties of each soil component are listed below.

Soil Component Name	Soil Surface Texture	Hydrologic Group	Soil Drainage Class	Hydric Status	Corrosion Potential
Atwater	Loamy Sand	Class B	Well drained	Not hydric	Moderate
Delhi	Loamy Sand	Class A	Somewhat excessively drained	Partially hydric	Moderate
Handford	Sandy Loam	Class B	Well drained	Not hydric	Moderate

During a Phase I Preliminary Site Assessment by Leedshill-Herkenhoof Inc. (1990), soil samples were collected from five soil borings near an aboveground storage tank at the facility. The borings were advanced to 15 to 30 ft below ground surface (bgs) and were found to contain soils of unconsolidated to moderately consolidated sands and clayey sands material. The moisture content varied with the clay content, as clay-free soils were found to be generally less moist than clay-containing sands (Radian International, 1991).

1.5.2 Geology

Fresno TASMG is located along the eastern margin of California's San Joaquin Valley. In the San Joaquin Valley, the principle freshwater-bearing units are the unconsolidated deposits that extend to depths of 3,500 ft bgs. The unconsolidated valley floor alluvium deposits are characterized by fine-grained silt and sand. Localized clay beds are also common below 200 ft bgs. Finer 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).

1.5.3 Hydrogeology

Fresno TASMG lies within the Kings Subbasin 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 TASMG is located. Seven water-bearing zones have been identified in the vicinity of the TASMG.

As indicated in the 2019 EDR report (**Appendix A**), twenty-one wells are located within a one-mile radius of the Fresno TASMG. Eleven of the twenty-one wells are listed as federal United States Geological Survey (USGS) wells. The remaining ten 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 ft away. PFAS sampling from one of two drinking water wells at this adjacent city pump station was conducted in June 2019. Perfluorohexane sulfonic acid (PFHxS), PFOS, and PFOA were detected at 0.93, 6.1, and 1.0 nanograms per liter, respectively. The sampling data is included in **Appendix A**. Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA lifetime Health Advisories within 20 miles of the facility.

According to well database entries in the EDR report, groundwater depth readings taken in 1963 ranged from 54.56 to 73.85 ft 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 ft bgs (ERM-West, Inc. 1998). Based on this historical information, the groundwater flow direction is inferred to be primarily east. Groundwater features are presented on **Figure 1-2**.

Groundwater was measured in a 2018 Site Inspection (SI) at the adjacent Fresno Air National Guard Base (ANGB), located approximately 1.3 miles southeast of Fresno TASMG. Depth to groundwater ranged from 111 to 120 ft bgs, and the groundwater flow direction was northwest (AECOM, 2019).

1.5.4 Hydrology

Fresno TASMG lies within the Mill Ditch Watershed, and overland surface flow from Fresno TASMG runs southwest and joins the Fresno Yosemite International Airport drainage system. 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).

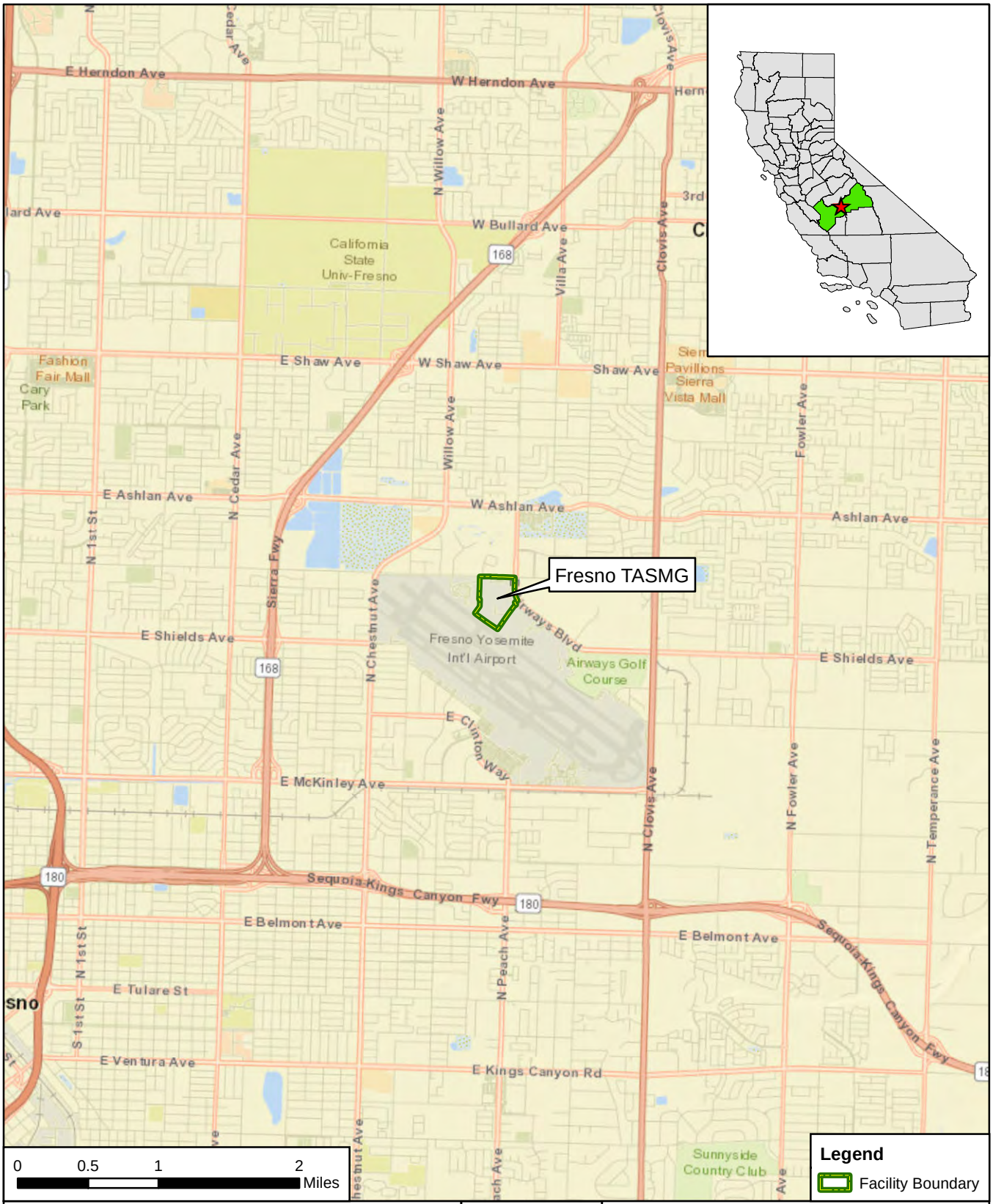
Storm water is drained radially outwards in the facility airfield and is captured in the storm drains located around the airfield boundary. The storm drainage system on the western side of the TASMG facility has a gate valve that can be manually shut to control the release of storm water. The facility 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 1-3**.

1.5.5 Climate

Fresno TASMG 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 [NOAA], 2019).

1.5.6 Current and Future Land Use

Fresno TASMG serves as a maintenance shop for rotary wing aircraft. The TASMG 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-quantify hazardous waste generator because it houses several oil storage locations and manages a variety of hazardous materials (HAZMAT). The facility operates 10 hours per day from Monday through Friday and employs approximately 230 personnel (HazCon, 2017). The current lease with the city of Fresno Airport Authority is set to expire in 2058 (White, T., 2019). Reasonably anticipated future land use is not expected to change from the current land use described above.



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SCALE	1:63,360	CHK BY	ST	4/22/2019
Base Map: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI,		PM	RG	4/22/2019

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Facility Location

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Figure 1-1

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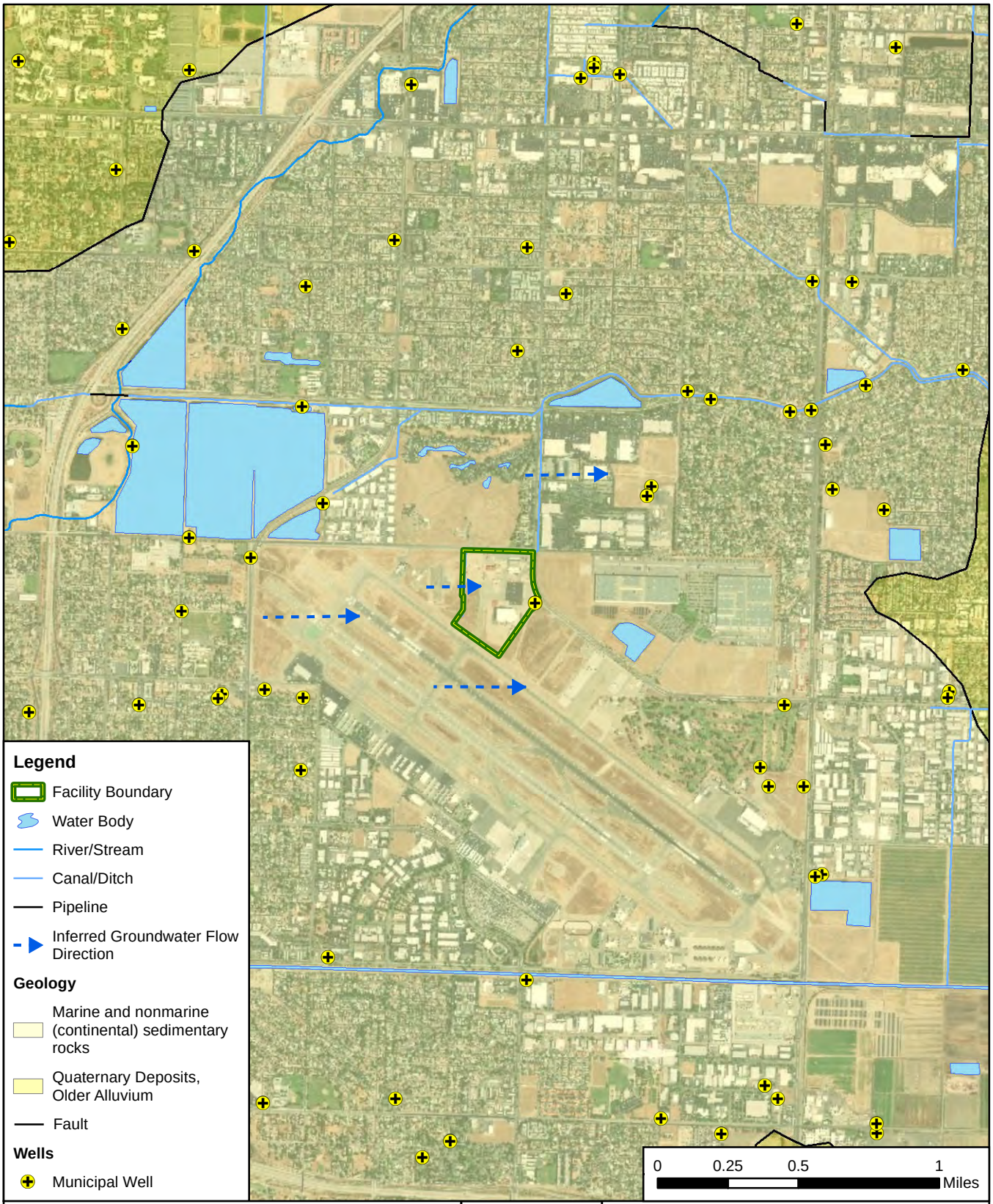

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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/30/2019

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Groundwater Features

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Figure 1-2

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CLIENT	ARNG			
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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/30/2019

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

Two former FTAs were identified through record reviews and site visit interviews during the PA. A description and the location of the FTAs are shown on **Figure 2-1**. PA interview and VSI documents and photographs are included in **Appendix B** and **Appendix C**, respectively. Interviewees had direct knowledge of ARNG operations covering the span of 1987 to present.

2.1 Wash Rack

The wash rack area is located at geographic coordinates 36°46'04.9"N; 119°43'07.6"W and is comprised of approximately 0.35 acres. A HAZMAT locker is located on the southeast corner of the wash rack. During the PA site visit, three 5-gallon AFFF canisters of the brand FireAde 3% AFFF Liquid Foam Concentrate were observed in the HAZMAT locker.

According to interviews with site personnel, an unknown number of Tri-Max™ 30 fire extinguishers were serviced with AFFF in the wash rack area. During the servicing, the Tri-Max™ fire extinguisher would be discharged. Training sessions where personnel would familiarize themselves with discharging the Tri-Max™ fire extinguishers, also referred to as "familiarization training", were additionally conducted in the wash rack area. These events were estimated to occur periodically during the years 2007 to 2010. The volume of AFFF used during these events is unknown. Presumably, approximately three 5-gallon canisters of 3% AFFF were used collectively throughout the years, as six 5-gallon canisters of AFFF were originally procured, and three 5-gallon canisters now remain in the HAZMAT locker. There is no inventory or procurement system to track AFFF usage.

The drains in the wash rack area lead to an oil water separator, which then flows into the Fresno sanitary sewer. However, according to information gathered during the interview, site personnel were instructed to plug the drains in the wash rack area whenever the Tri-Max™ fire extinguishers were sprayed. The AFFF would be then left in place to evaporate or disperse in the wind.

Familiarization training may have also been conducted in this area prior to 2007. However, the training would have most likely involved the usage of dishwashing soap as opposed to AFFF. The original Tri-Max™ fire extinguishers were reportedly filled with dishwashing soap and were replaced with newer AFFF-containing Tri-Max™ fire extinguishers in approximately 2007 to 2008.

2.2 Hangar Training Area

The pavement area outside the TASMG Hangar, located at geographic coordinates 36°47'07.3"N; 119°43'12.5"W, was the site of fire training exercises. According to site personnel, the exercises involved extinguishing active fire, which resulted from the ignition of fuel that was collected in a pan. The training exercises were conducted annually from approximately 2008 to 2011 and once in 2014. Tri-Max™ fire extinguishers containing 3% AFFF were used in the exercises. Presumably, approximately three 5-gallon canisters of 3% AFFF were used collectively throughout the years, as six 5-gallon canisters of AFFF were originally procured, and three 5-gallon canisters now remain in the HAZMAT locker. There is no inventory or procurement system to track AFFF usage.

Familiarization training may have also been conducted in this area prior to 2008; however, the training would have most likely involved the usage of dishwashing soap as opposed to AFFF. The original Tri-Max™ fire extinguishers were reportedly filled with dishwashing soap and were replaced with newer AFFF-containing Tri-Max™ fire extinguishers in approximately 2007 to 2008.

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SCALE	1:3,600	CHK BY	ST	4/22/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/22/2019

Fire Training Areas

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Figure 2-1

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3. Non-Fire Training Areas

Two non-FTAs where AFFF was stored and/or potentially released were identified during the PA. A description of each non-FTA is presented below, and the non-FTAs are shown on **Figure 3-1**.

3.1 East Airfield Taxiway

According to an interview with the mechanic supervisor responsible for maintaining the Tri-Max™ fire extinguishers, six Tri-Max™ 30 fire extinguishers were serviced in the taxiway east of the airfield near the perimeter fence. Two areas were identified with geographic coordinates 36°47'05.9"N; 119°43'07.2"W and 36°47'04.7"N; 119°43'06.5"W.

During the servicing, the Tri-Max™ fire extinguisher was discharged onto the taxiway at the two locations. The AFFF was then left in place to evaporate or disperse in the wind. This servicing occurred in 2015 after the previous servicing on the extinguishers had expired. No more than 30-gallons (the capacity of the Tri-Max™ 30 fire extinguisher) of 3% AFFF mixture was discharged for each extinguisher serviced.

Tri-Max™ fire extinguishers were observed stationed in various places around the airfield during the VSI. According to the aircraft maintenance supervisor, four Tri-Max™ fire extinguishers remain charged with AFFF, and the remaining two extinguishers are not in service.

3.2 Corrosion Control Facility

The corrosion control facility, also known as the paint shop facility, is located south of the airfield. The facility contains an AFFF fire suppression system and houses operations for large-scale painting, paint stripping, and paint storage. The corrosion control facility's geographic coordinates are 36°46'59.8"N; 119°43'11.8"W.

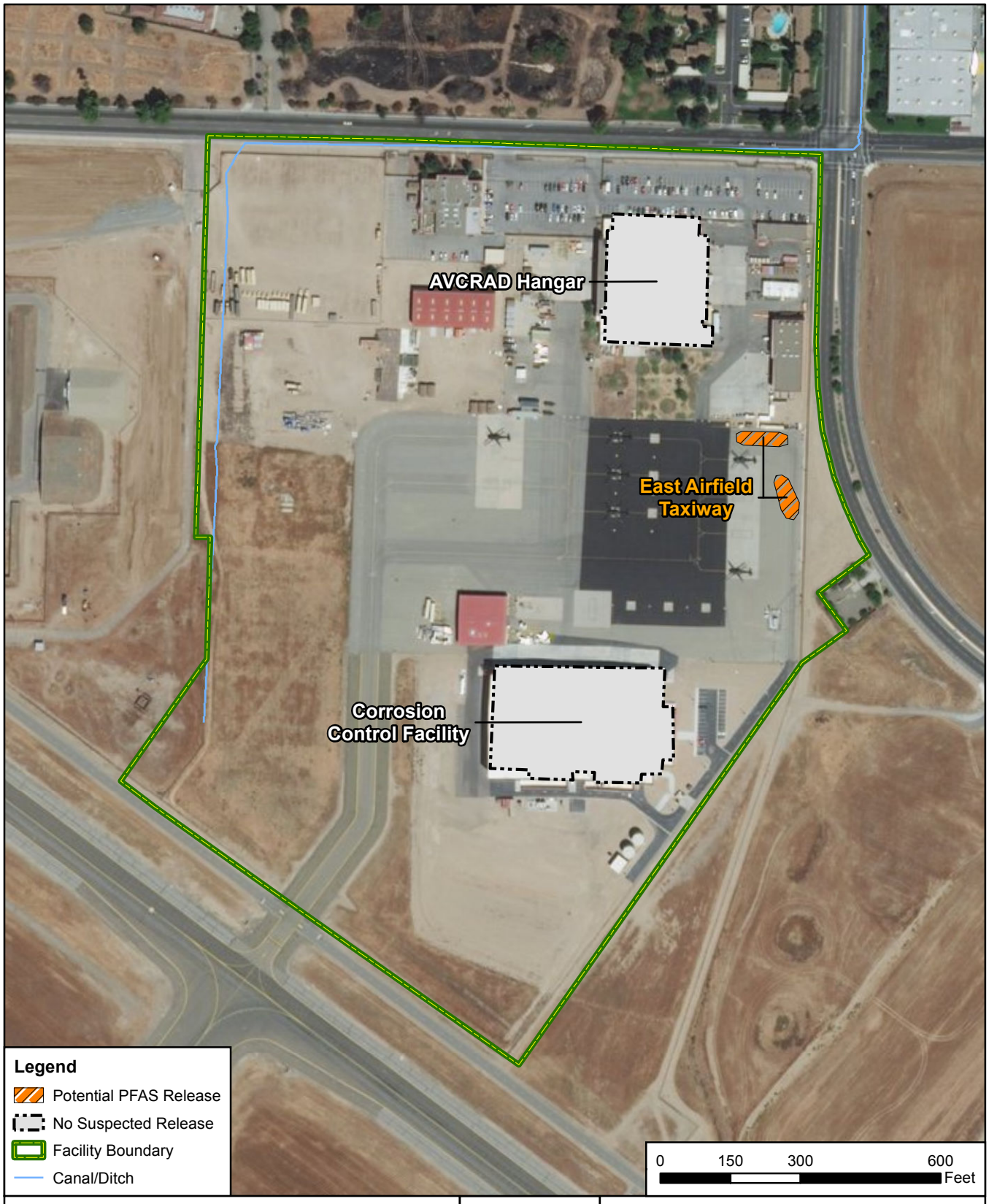
The AFFF fire suppression system was installed in June 2011. The deluge system is located on the upper level on the southeastern side of the building. The AFFF tank has a 1,100-gallon capacity and contains 3% AFFF, manufactured by Chemguard, Inc. The facility also contains a waterfall paint spray booth, a patio area for paint stripping, and a strip rack. A large floor drain is located in the paint booth, but it is unknown whether the drain leads to the sanitary sewer system or storm drain system (Ayerza, 1999).

Site personnel with first-hand knowledge did not recall any accidental release of AFFF since the time of installation; however, it was reported that there was a small drip leak at one of the pumps approximately six to eight months after the AFFF fire suppression system was installed. The leak was fixed and cleaned by an outside contractor approximately one week after the incident was reported. This leak is not considered to be a significant PFAS release.

3.3 AVCRAD Hangar

The AVCRAD Hangar is located near the northern facility gate. The hangar maintains several rotary-wing aircraft and houses various related maintenance shops, offices, and supply rooms. The hangar's geographic coordinates are 36°47'09.3"N; 119°43'10.3"W.

The hangar was toured during the VSI and was not found to have any storage of AFFF or contain a fire suppression system. The building is equipped with ABC fire extinguishers. According to interviews with CAARNG, AFFF has not been stored or used historically at the hangar.



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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/22/2019

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Non-Fire Training Areas

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Figure 3-1

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4. Emergency Response Areas

Emergency responses to crashes sometimes require flame suppression, which may result in the release of PFAS to the environment in the form of AFFF. No emergency response areas were identified within the current TASMG facility during the PA through interviews or EDR Reports. The CAARNG Maintenance Officer's knowledge extends to 33 years but includes timeline gaps due to years of active military service. Information was also corroborated by an interview with Fresno ARFF Captain, whose tenure is 19 years. Aircraft emergencies are responded to by the Fresno ARFF unit (also referred to as "the Airport Crash/Fire/Rescue Division") stationed at the Fresno Yosemite International Airport, and all other emergency services are provided by the municipal fire department. A mutual aid agreement for providing fire protection also exists between the Fresno ARFF and the Fresno Air National Guard Fire Department and is included in **Appendix A.**

5. 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. A description of each adjacent source is presented below, and the adjacent sources are shown on **Figure 5-1**.

5.1 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 144th 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). The Fresno ANGB PFAS investigation reports are included in **Appendix B**. A mutual aid agreement for fire protection and fire training services between the Fresno Air National Guard Fire Department, and the Fresno ARFF is included in **Appendix A**.

5.2 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 TASMG at geographic coordinates 36°46’49.8”N; 119°42’57.2”W and 36°46’40.6”N; 119°42’42.9”W.

5.3 Former Fire Training Area #1

A former FTA is located on Fresno Yosemite International Airport property at approximate geographic coordinates 36°46’43.1”N; 119°42’55.4”W. 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.

5.4 Former Fire Training Area #2

A former FTA is located on Fresno Yosemite International Airport property at approximate geographic coordinates 36°46’07.6”N; 119°42’49.6”W. 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.

5.5 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. One hangar is a Signature TECHNICAir aircraft maintenance facility at address 4885 East Shields Avenue, and the other hangar is the Signature Fixed Base Operator (FBO) at address 3050 North Winery Avenue. On 16 October 2015, it was reported by ARFF personnel that the AFFF deluge system at the Signature FBO hangar had an accidental trip, which resulted in a release of AFFF. The ARFF personnel stated there was no AFFF release from the TECHNICAir facility.

SkyWest Airlines maintains a hangar on a parcel of land adjacent to R-29 Runway. The hangar contains an AFFF deluge system. During an interview with the Fresno ARFF Captain, a call by the Captain was made to the facility manager of the SkyWest hangar, and it was confirmed that there were no leakage or trips of the AFFF deluge system. A record of this conversation is provided in **Appendix B**.

Rogers Helicopters, Inc. maintains a hangar on a parcel of land adjacent to R-29 Runway at address 5484 East Perimeter Road. Rogers Helicopters, Inc. is a private helicopter operator and provides helicopter charter services, maintenance, and logistical support. It is unknown whether AFFF is used at the Rogers Helicopters, Inc. facility, or if emergency responses using AFFF have occurred at the location.

5.6 California Department of Forestry and Fire Protection

The California Department of Forestry and Fire Protection (CAL FIRE) maintains a hangar on a parcel of land adjacent to R-29 Runway. Fresno ARFF staff indicated during the interview that the hangar uses Phos-Chek fire retardants (non-AFFF).

5.7 California Highway Patrol Aviation Facility

The California Highway Patrol Aviation Facility is located at 3770 North Pierce Avenue (adjacent to L-11 Runway). Fresno ARFF indicated during the interview that the facility does not contain an AFFF deluge system.

5.8 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.

5.9 Aramark Uniform Services

An Aramark Uniform Services facility is located at 3333 North Sabre Drive, Fresno, California 93727. The facility provides uniform-related services such as uniform cleaning and fire-resistant

workwear. According to interviews with TASMG personnel, the facility has a large groundwater release. PFAS contamination from these industrial applications is unknown but possible.

5.10 1994 Learjet Crash

On December 14, 1994, a Learjet on a military training exercise with the Air National Guard crashed into Olivewood Apartments at the intersection of Olive Avenue and Recreation Avenue. The location is approximately two miles southwest of the Fresno Yosemite International Airport. City of Fresno firefighters and paramedics, FAA investigators, and military men were present at the scene. According to one first responder account, “the flames were 20 feet high for at least two blocks” (Harrison, 2014). An article from a past issue of *The Los Angeles Times* recounted that “flame retardant foam was everywhere” (Arax, 1994). The quantity and type of foam (Class A or AFFF) used in the emergency response is unknown.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fresno TASMG, CA			
REVISED	4/30/2019	GIS BY	MS	4/30/2019
SCALE	1:24,000	CHK BY	ST	4/30/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/30/2019

Adjacent Sources

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Conceptual Site Model

Based on the PA findings, there were two areas where fire training occurred and two areas where AFFF may have been incidentally spilled to the ground surface. As such, these AOIs may be potential PFAS source areas. The AOIs and CSM for the AOIs are shown on **Figure 6-1** and **Figure 6-2**, respectively, and summarized below.

Although the use of AFFF could not be confirmed, the following AOIs were identified that could be PFAS source areas:

- AOI 1 – Hangar Training Area
- AOI 2 – Wash Rack and East Airfield Taxiway

The following sections describe the CSM components and the specific CSMs developed for each AOI. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

In general, the potential PFAS exposure pathways are ingestion and inhalation. Dermal contact is not considered to be a potential exposure pathway, as studies have shown very limited absorption of PFAS through the skin (National Ground Water Association, 2018). Receptors for Fresno TASMG include site workers, construction workers residents, recreational users, and trespassers. Groundwater is too deep in the region for direct exposure; however, it is used as water supply. The CSMs for each AOI indicate which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1: Hangar Training Area

AOI 1 is the Hangar Training Area, which borders the TASMG 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 and in the inferred downgradient groundwater flow path 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.

Ground-disturbing activities to soil at AOI 1 could result in site and construction worker exposure to potential PFAS contamination via inhalation of dust or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in construction worker exposure via ingestion or inhalation of subsurface soil. Off-facility recreational users and residents may be exposed to inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. Therefore, the inhalation and ingestion pathways for these receptors are considered potentially complete.

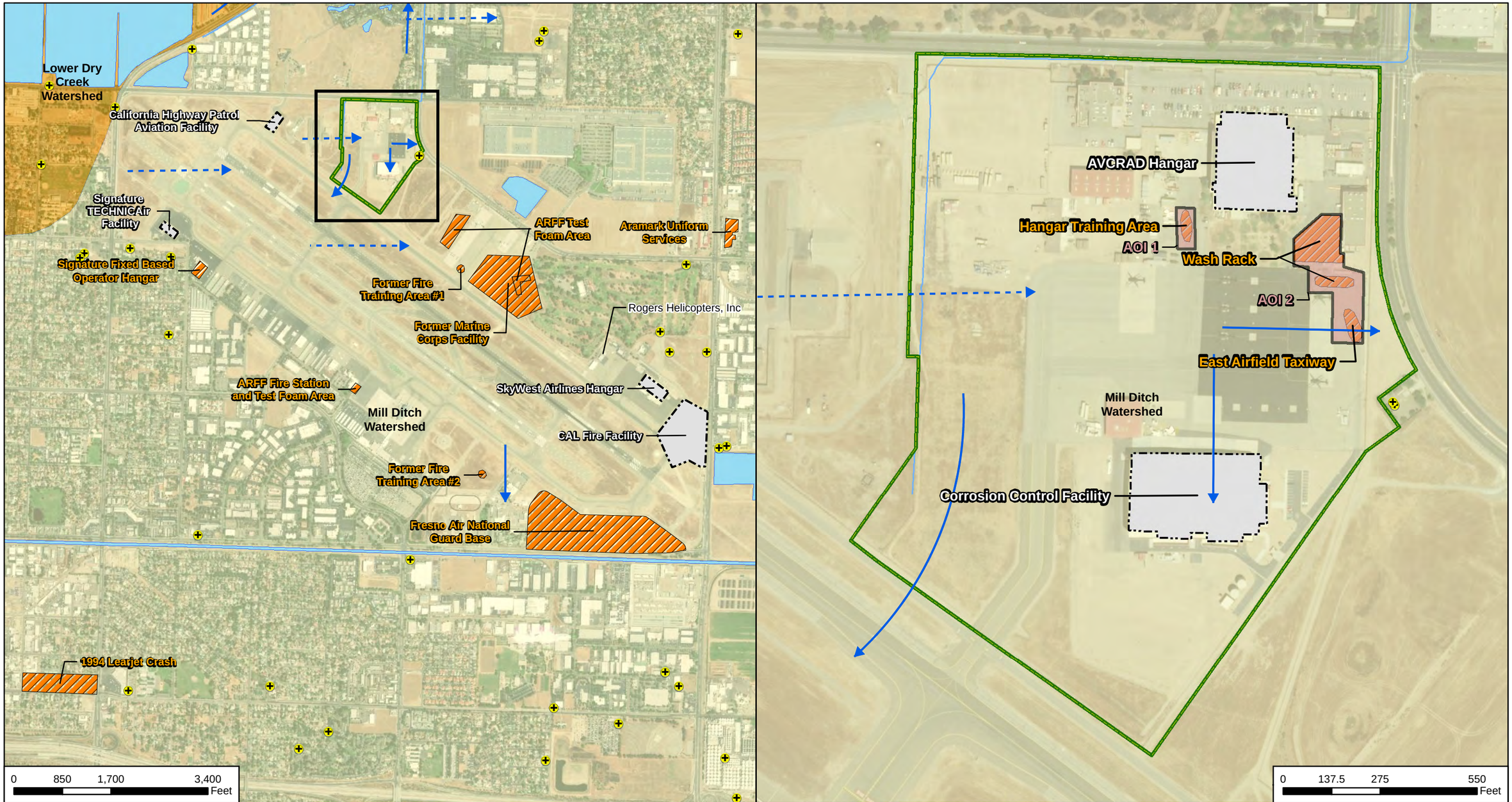
One of the two drinking water wells at the adjacent city pump station was sampled in June 2019, and PFOS and PFOA were detected below the Health Advisories. The city pump station supplies water for the facility and residents; therefore, the exposure pathway for groundwater is considered

potentially complete for site workers and residents. Site workers, construction workers, and trespassers at the facility may be exposed to PFAS via ingestion of surface water and sediment in the San Joaquin River and its tributaries. Similarly, residents and recreational users may be exposed to PFAS in surface water and sediment off-facility. The preliminary CSM for AOI 1 is shown on **Figure 6-2**.

6.2 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, all potentially contaminated surface water at AOI 2 would 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. With inferred groundwater flow to the east, the water supply well is potentially downgradient of the AOI. The pathways and receptors for AOI 2 are the same as described in **Section 6.1**. The preliminary CSM for AOI 2 is shown on **Figure 6-2**.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fresno, TASMG			
REVISED	6/3/2019	GIS BY	MS	6/3/2019
SCALE	1:20,400	CHK BY	ST	6/3/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	6/3/2019

- Area of Interest
- Potential PFAS Release
- No Suspected Release
- Facility Boundary
- Water Body
- Canal/Ditch
- Inferred Groundwater Flow Direction
- Surface Water Flow Direction
- Municipal Well

N

Areas of Interest

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

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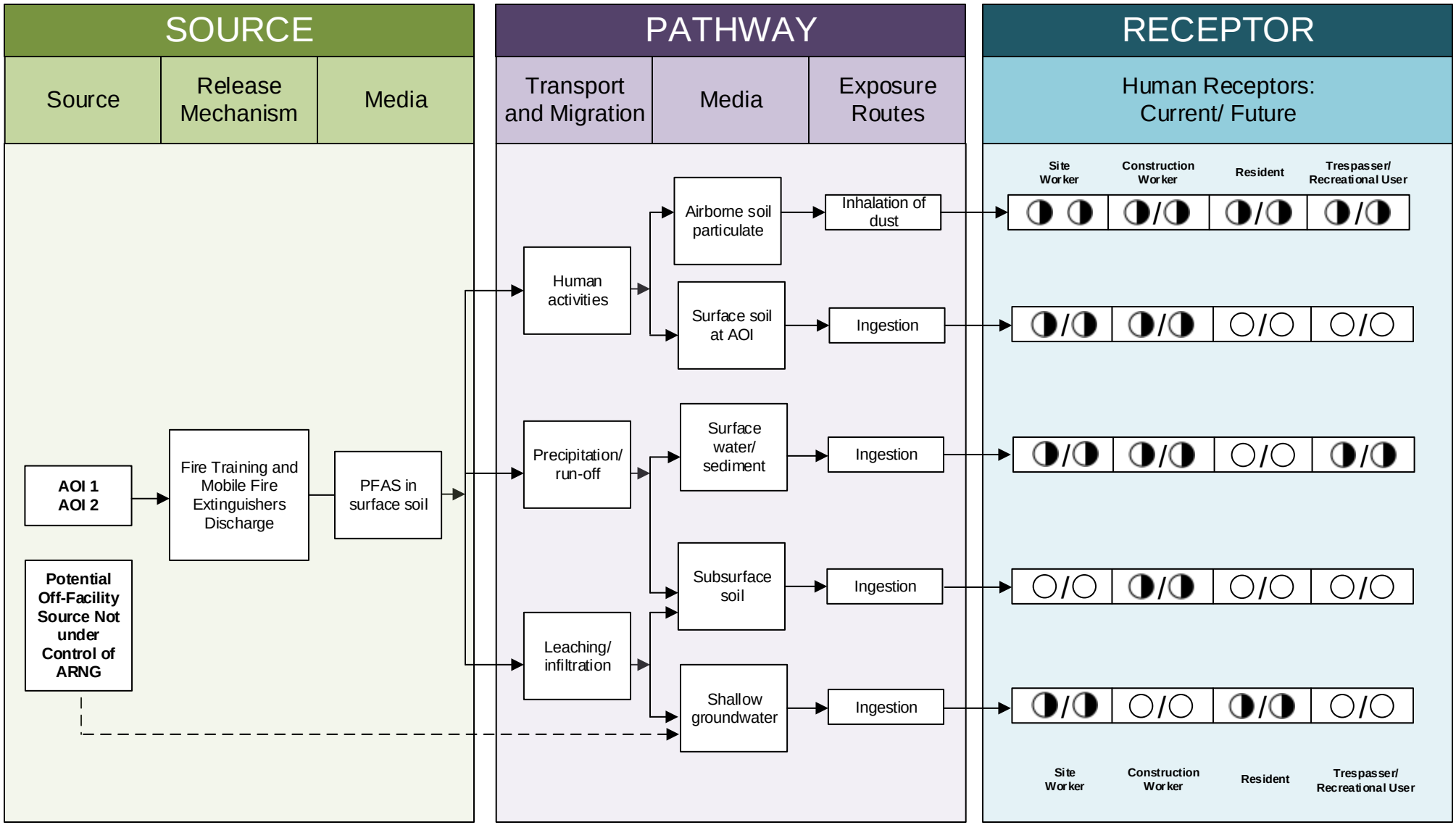

LEGEND

- Flow-chart stops
- Flow-chart continues
- Partial/ possible flow
- Incomplete pathway
- Possible complete pathway
- Complete pathway

Notes:

1. The resident receptor refers to an off-site resident.

2. Current risk practice suggests the exposure pathway for dermal contact is insignificant compared to ingestion, but supporting data are sparse and continue to be studied.

Figure 6-2
Preliminary Conceptual Site Model
Fresno TASMG, CA

7. Conclusions

This report presents a summary of available information gathered during the PA on the use and storage of AFFF and other PFAS-related activities at Fresno TASMG. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Two AOIs related to potential PFAS release were identified (**Table 7-1**) at Fresno TASMG during the PA (**Figure 7-1**).

Table 7-1: AOIs at Fresno TASMG

Area of Interest	Name	Used by	Release Dates
AOI 1	Hangar Training Area	CA ARNG	Potentially as early as 2008
AOI 2	Wash Rack and East Airfield Taxiway	CA ARNG	Potentially as early as 2007

The Corrosion Control Facility and AVCRAD Hangar at Fresno TASMG were determined to have no suspected PFAS release to the environment. The AVCRAD Hangar did not have any historical and current storage or use of AFFF. The Corrosion Control Facility contains an AFFF deluge system but did not have any accidental trips of the system since the time of operation (2011 to present). A drip leak at one of the system pipes occurred after installation but was fixed shortly after and cleaned from the facility.

Numerous potential off-facility sources of PFAS were considered in the local area surrounding Fresno TASMG. These include:

- Fresno ANGB – a PFAS SI at the base has reported PFAS exceedances of the RSL for soil and health advisory limits for groundwater
- Fresno ARFF – stores AFFF at the fire station and uses AFFF in several areas of the Fresno Yosemite International Airport property for bi-annual FAA certification
- Former FTAs – two former FTAs on Fresno Yosemite International Airport property were reportedly used by ARFF and ANGB and may have involved AFFF in training exercises
- Private Aviation Companies – Signature Flight Support Corporation, Inc. maintains two hangars with AFFF deluge systems, one of which had an accidental trip, and SkyWest Airlines also maintains a hangar with an AFFF deluge system
- Former Marine Corps Facility – reportedly had a fire unit with a P-19 firetruck and conducted fire training activities with Fresno ANGB, which may have involved AFFF usage
- Aramark Uniform Services – conducts industrial activities related to uniform manufacturing and fireproofing, which may involve PFAS-containing chemicals
- 1994 Learjet Crash – in 1994, a Learjet crashed onto Olive Avenue approximately two miles southwest of the airport; an unknown quantity and type of foam was used in the incident response

Based on information obtained during the PA at these AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for Fresno TASMG, which presents the potential receptors and media impacted is shown on **Figure 6-2**.

7.2 Uncertainties

A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been present, used, or released at the facility. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the use of PFAS in training, firefighting, or other non-traditional activities, or on its disposition.

The conclusions of this PA are predominantly based on the information provided during interviews with personnel who had direct knowledge of PFAS use at the facility. Sometimes, the provided information was vague or conflicted with other sources. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS was first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, retired and current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

The following **Table 7-2** summarizes the uncertainties associated with the PA.

Table 7-2: Uncertainties

Area of Interest	Source of Uncertainty
AOI 1: Hangar Training Area	Dates of AFFF usage are estimated and cannot be confirmed by written documentation. It is unknown what familiarization training may have occurred prior to 2007/2008; however, it is speculated that any training would have been conducted with dishwashing soap as opposed to AFFF, which was first procured in 2007/2008.
AOI 2: Wash Rack and East Airfield Taxiway	The volume of AFFF used during fire training in the wash rack area is unknown. Dates of AFFF usage are estimated and cannot be confirmed by written documentation. It is unknown what familiarization training may have occurred prior to 2007/2008; however, it is speculated that any training would have been conducted with dishwashing soap as opposed to AFFF, which was first procured in 2007/2008.
General	Some facility operations are not well defined given the limitation of interviewee knowledge. CAARNG Maintenance Officer's knowledge extends to 33 years but includes timeline gaps due to years of active military service.

7.3 Potential Future Actions

Based on the documented absence (2011 to present) of the use or release of AFFF from the deluge system in the Corrosion Control Facility, evidence does not indicate that current or former ARNG activities having contributed PFAS contamination to soil, groundwater, surface water, or sediment.

Interviews and records (covering 1987 to present) indicate that current or former ARNG activities may have resulted in potential PFAS releases at the two AOIs identified during the PA. These potential releases occurred after Fresno TASMG received newly commissioned Tri-Max fire extinguishers that were subsequently filled with AFFF in approximately 2007 to 2008. Based on the CSMs developed for the AOIs, there is potential for receptors to be exposed to PFAS contamination in soil, groundwater, surface water, and sediment at these AOIs. **Table 7-3** summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo an SI.

Table 7-3: PA Findings Summary

Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1: Hangar Training Area	36°47’07.3”N; 119°43’12.5”W	Confirmed usage of AFFF during annual training exercises by interviewee with direct knowledge	Proceed to an SI, focus on soil, groundwater, surface water, sediment
AOI 2: Wash Rack and East Airfield Taxiway	36°47'05.9”N; 119°43'07.2"W	Confirmed usage of AFFF during periodic fire training exercises in the wash rack and from servicing of Tri-Max fire extinguishers; interviewees had direct knowledge of these occurrences	Proceed to an SI, focus on soil, groundwater, surface water, sediment

ARNG will evaluate the need for an SI at Fresno TASMG based on the potential receptors, the potential migration of PFAS contamination off the facility, and the availability of resources.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fresno TASMG, CA			
REVISED	4/30/2019	GIS BY	MS	4/30/2019
SCALE	1:6,000	CHK BY	ST	4/30/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	4/30/2019

N

Summary of Findings

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 7-1

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Appendix A
Data Resources

Data resources will be provided separately on CD. Data resources for Fresno TASMG include:

Environmental Data Resources, Inc. Geocheck Report

- 2019 Environmental Data Resources, Inc. Geocheck Report for Fresno TASMG, CA

CAARNG Leasing Information

- 2019 CA ARNG Leasing Documents E-mail from Tom White (CAARNG Real Estate Manager) to Stephanie Tjan (AECOM)

CA Water Board GAMA Groundwater Information System

- Well 306 Drinking Water Analytical Data
- King-22 Well Drinking Water Analytical Data

Material Safety Data Sheets

- 2006 Material Safety Data Sheet – Chemguard 3% AFFF C-301MS
- 2018 Safety Data Sheet – Fire Service Plus, Inc. FireAde Fire Fighting Agent

Previous Investigations

- 1999 Final California Army National Guard Preliminary Assessment for California Aviation Classification Repair Activity Depot, Fresno, California

Miscellaneous Data Resources

- 1983 Reciprocal Fire Protection Agreement
- 2016 Final Perfluorinated Compounds Preliminary Assessment Site Visit Report, 144th Fighter Wing California Air National Guard, Fresno Yosemite International Airport, Fresno California
- 2017 Spill Prevention, Control, and Countermeasure Plan, 1106th Theater Aviation Sustainment Maintenance Group (TASMG), 5168 East Dakota Avenue, Fresno, CA 93727
- 2019 Final Site Inspection Report, Air National Guard Phase II Regional Site Inspections for Per- and Polyfluoroalkyl Substances, Fresno Air National Guard Base, Fresno, California

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Other

Facility:__FresnoTASMG____
Interviewer:___ST_____
Date/Time:___3/7/19_____

Interviewee:[redacted] **Title:**____unknown_____ **Phone Number:**_____ **Email:**_____	Can your name/role be used in the PA Report? Y or N Can you recommend anyone we can interview? Y or N _____
Roles or activities with the Facility/Years working at the Facility:	
unknown	
PFAS Use: Identify accidental/intentional release locations, time frame of release, frequency of releases, storage container size (maintenance, fire training, firefighting, buildings with suppression systems (as builts), fueling stations, crash sites, pest management, recreational, dining facilities, metals plating, or waterproofing). How are materials ordered/purchased/disposed/shared with others?	
Does not recall false trip or foam testing at AFFF deluge system.	
Foam leaked 6-8 months after it was installed, but it was just a drip leak at the tank.	
Refill Tri-Maxes at wash rack with minimal spills.	
Mockup aircraft at FTA was welded steel mockup that looked like jet aircraft.	

PA Interview Questionnaire - Environmental Manager

Facility:__Fresno TASMG___
Interviewer:__ST_____
Date/Time:__3/7/19_____

Interviewee:__multiple (see below)_____ **Title:**_____ **Phone Number:**_____ **Email:**_____	Can your name/role be used in the PA Report? **Y** or N Can you recommend anyone we can interview? Y or N _____

1. Roles or activities with the Facility/years working at the Facility.

[redacted] – was here when they first issued Tri-Max, worked on flightline and serviced Tri-Max, mechanic and technical inspector, at facility for 33 years
[redacted] – started 2003, flights ops and technical inspector
[redacted] – started 2003, maintained Tri-Maxes that were serviced once a year, aircraft electrician, quality manager representative and fire marshall
[redacted] – at facility for 2 years

2. Where can I find previous facility ownership information?

AVCRAD and armory were built in 1996, the perimeter has been the same

3. What can you tell us about the history of PFAS including aqueous film forming foam (AFFF) at the Facility? Was it used for any of the following activities, circle all that apply and indicate years of active use, if known? Identify these locations on a facility map.

   Maintenance [redacted] **said he were perform maintenance events where he serviced Tri-Max and sprayed**
   Fire Training Areas **~annually, training on flightline, often trained with soap**
   Firefighting (Active Fire) **they have no fire truck, in event of real fire they would have also used soap**
   Crash **never on facility, Air Guard crash on Belmont Ave. near school and Chestnut and Olive intersection that was responded by municipal fire department**
   Fire Suppression Systems (Hangers/Dining Facilities) **Paint shop AFFF deluge system**
   Fire Protection at Fueling Stations
   Non-Technical/Recreational/ Pest Management
   Metals Plating Facility
   Waterproofing Uniforms (Laundry Facilities)
   Other

4. Fill out CSM Information worksheet with the Environmental Manager.

5. Are any current buildings constructed with AFFF dispensing systems or fire suppression systems? What are the AFFF/suppression system test requirements? What is the frequency of testing the AFFF/suppression system? Do you have "As Built" drawings for the buildings?

Paint shop has AFFF deluge, was built in 2012 and serviced but never had any releases through testing or accidental trips.

They have an outside contractor and that comes and performs annual maintenance.

PA Interview Questionnaire - Environmental Manager

Facility:__Fresno TASMG___
Interviewer:__ST_____
Date/Time:__3/7/19_____

6. Are fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam? If retrofitted, when was that done?

Paint shop is still charged with AFFF.

7. How is AFFF procured? Do you have an inventory/procurement system that tracks use?

No inventory system, but throughout years 2008-2011, must have used three or four 5-gallon buckets of AFFF

8. What type of AFFF has been/is being used (3%, 6%, Mil Spec Mil-F-24385, High Expansion)? Manufacturer (3M, Dupont, Ansul, National Foam, Angus, Chemguard, Buckeye, Fire Service Plus)?

9. Where is the AFFF stored? How is it stored (tanks, 55-gallon drums, 5-gallon buckets)? What size are the storage tanks? Is the AFFF stored as a mixed solution (3% or 6%) or concentrated material?

They had old Tri-Maxes that used dishwashing soap and air for familiarization training. After they got new Tri-Maxes (procured ~2007/2008), they started using AFFF. AFFF is stored in 5-gallon buckets.

10. How many FTAs are/were on this facility and where are they? Locate on a map. How many FTAs are active and inactive? For inactive FTAs, when was the last time that fire training using AFFF was conducted at them?

    1) Collective training – group would conduct familiarization training, annually from 2008-2011
    2) Individual training, 2007-2010
    3) Wash rack training, plugged drain, individual training, 2007-2010

PA Interview Questionnaire - Environmental Manager

Facility:__FresnoTASMG___
Interviewer:__ST_____
Date/Time:__3/7/19_____

11. When a release of AFFF occurs during a fire training exercise, now and in the past, how is the AFFF cleaned and disposed of? Were retention ponds built to store discharged AFFF? Was the AFFF trickled to the sanitary sewer or left in the pond to infiltrate?

Just let it evaporate

12. Can you recall specific times when city, county, and/or state personnel came on-post for training? If so, please state which state/county agency or military entity? Do you have any records, including photographs to share with us?

Airport FD would use their own truck to spray with water on-post

13. Did military routinely or occasionally fire train off-post? List the units that you can recall used/trained at various areas.

No

14. Did individual units come with their own safety personnel, did they also bring their own AFFF? Was training with AFFF part of these exercises? How were emergencies handled under these circumstances?

No

15. Are there specific emergency response incident reports (i.e., aircraft or vehicle crash sites and fires)? If so, may we please copy these reports? Who (entity) was the responder?

Just the Air Guard crash mentioned above.

PA Interview Questionnaire - Environmental Manager

Facility:__FresnoTASMG___
Interviewer:__ST_____
Date/Time:__3/7/19_____

16. Do you have records of fuel spill logs? Was it common practice to wash away fuel spills with AFFF? Is/was AFFF used as a precaution in response to fuel releases or emergency runway landings to prevent fires?

No

17. Was AFFF used for forest fires or fire management on-post/off-post? If so, please describe what happened and who was involved?

No

18. Are there mutual aid/use agreements between county, city, and local fire department? Please list, even if informal. If formalized, may we have a copy of the agreement?

Municipal FD responds to emergencies. Aircraft emergencies are responded by ARFF.

19. Can you provide any other locations where AFFF has been stored, released, or used (i.e. hangars, buildings, fire stations, firefighting equipment testing and maintenance areas, emergency response sites, storm water/surface water, waste treatment plants, and AFFF ponds)?

Currently there are only four charged Tri-Maxes.

Other potential adjacent sources:
- Marine Corp facility nearby
- Air Guard had FTA with active fire training on aircraft mockup
- ANG facility nearby
- Skywest (commercial maintenance)
- Cal Highway Patrol
- Airmark have huge GW release

20. Are you aware of any other creative uses of AFFF? If so, how was AFFF used? What entities were involved?

No

PA Interview Questionnaire - Environmental Manager

Facility:__FresnoTASMG___
Interviewer:__ST_____
Date/Time:__3/7/19_____

21. Are there past studies you are aware of with environmental information on plants/animals/ groundwater/soil types, etc., such as Integrated Cultural Resources Management Plans or Integrated Natural Resources Management Plans?

22. What other records might be helpful to us (environmental compliance, investigation records, admin record) and where can we find them?

23. Do you have or did you have a chrome plating shop on base? What were/are the years of operation of that chrome plating shop?

No

24. Do you know whether the shop has/had a foam blanket mist suppression system or used a fume hood for emissions control? If foam blanket mist suppression was used, where was the foam stored, mixed, applied, etc.?

25. How is off-spec AFFF disposed (used for training, turned in, or given to a local Fire Station)? If applicable, do you know the name of the vendor that removes off-spec AFFF? Do you have copies of the manifest or B/L?

Disposed of during training. Started with ~six 5-gallon buckets.

PA Interview Questionnaire - Environmental Manager

Facility:__FresnoTASMG___
Interviewer:__ST_____
Date/Time:__3/7/19_____

26. Do you recommend anyone else we can interview? If so, do you have contact information for them?

PA Interview Questionnaire - Other

Facility:_FresnoTASMG_____
Interviewer:__ST_____
Date/Time:___3/7/19_____

Interviewee:__multiple (see below)_____ **Title:**_____ **Phone Number:**_____ **Email:**_____	Can your name/role be used in the PA Report? Y or **N** Can you recommend anyone we can interview? Y or N _____
Roles or activities with the Facility/Years working at the Facility:	
Chief, Captain of Airport Public Safety, 19 years with airport but was part of the Air Guard before since 1989	
engineer, ARFF coordinator, 12 years at facility and coordinator for 7 years	
City of Fresno FD, fire captain	
PFAS Use: Identify accidental/intentional release locations, time frame of release, frequency of releases, storage container size (maintenance, fire training, firefighting, buildings with suppression systems (as builts), fueling stations, crash sites, pest management, recreational, dining facilities, metals plating, or waterproofing). How are materials ordered/purchased/disposed/shared with others?	
There's two FDs (Air Guard and airport) and they always train together.	
Cal Fire has phos check.	
2005-2008, FTA on ANG property, did fire training on City of Fresno bus, combined training with Air Guard, active fire.	
FTA with mockup aircraft – had a fuel pumping system to a lined fire pit.	
ARFF foam would runoff into surface drainage system and into city sewage.	
Signature building has an AFFF deluge system, there was a accidental trip on October 16, 2015. To get rid of all the foam, they sprayed water with a high pressure mist/nozzle.	
Skywest maintenance has a deluge AFFF system but no trips (confirmed via call from Captain to Skywest facility).	
Testing of foam –biannual for FAA certification, still occurring, last time was in November-January	
They used 3% AFFF in the concentrated form, proportioners on fire truck.	
They use 30-50 gallons of concentrated AFFF per testing event from fire truck.	
Fire truck has 500-gallon foam capacity ad 3000 water gallon capacity.	
They perform nozzle testing with just water anywhere.	
AFFF is stored in 45-gallon totes and 5-gallon buckets.	
Marine Corps did have a P-19 and deployable unit, also trained with Air National Guard, Light Anti-	

PA Interview Questionnaire - Other

Facility:_FresnoTASMG_____
Interviewer:__ST_____
Date/Time:___3/7/19_____

Aircraft Missile Battery (or Battalion) (LAAMB 4th)
Marine Corps combined training in 1990-1992 (Capt. has knowledge)
Marine Corps closed shop ~ 5 years ago and property is now part of airport.

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

Names(s) of people performing VSI: S. Tjan, B. Packer

Recorded by: S. Tjan

ARNG Contact: B. Packer

Date and Time: 3/7/19

Method of visit (walking, driving, adjacent): walking

Source/Release Information

Site Name / Area Name / Unique ID: Airfield & Surrounding Pavement areas

Site / Area Acreage: 12 acres

Historic Site Use (Brief Description): airfield for aircraft parking, vehicle parking

Current Site Use (Brief Description): see above

Physical barriers or access restrictions: perimeter fence

1. Was PFAS used (or spilled) at the site/area? (Y) / N

1a. If yes, document how PFAS was used and usage time (e.g., fire fighting training 2001 to 2014):

near eastern side of airfield for servicing of Tri-Mares

2. Has usage been documented? Y / N

2a. If yes, keep a record (place electronic files on a disk):

No

3. What types of businesses are located near the site? (Industrial) / (Commercial) / Plating / Waterproofing / (Residential)

3a. Indicate what businesses are located near the site

Fresno ANGB & airport tenants, residential communities to north

4. Is this site located at an airport/flightline? (Y) / N

4a. If yes, provide a description of the airport/flightline tenants:

Fresno ANGB, ARFF, SkyWest, Signature, Cal Fire, Cal Highway Patrol

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? (Y) / N see Corrosion Control Facility

1a. If yes, indicate which type of AFFF has been used: VSI form

1b. If yes, describe maintenance schedule/leaks:

1c. If yes, how often is the AFFF replaced:

1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) / N

1a. If so, note observation and location:

toward airport

2. Is there channelized flow within the site/area? Y / (N)

2a. If so, please note observation and location:

3. Are monitoring or drinking water wells located near the site? (Y) / N

3a. If so, please note the location:

~ 50 ft east of facility boundary

4. Are surface water intakes located near the site? Y / (N)

4a. If so, please note the location:

5. Can wind dispersion information be obtained? Y / (N)

5a. If so, please note and observe the location.

6. Does an adjacent non-ARNG PFAS source exist? (Y) / N

6a. If so, please note the source and location.

multiple from airport tenants

6b. Will off-site reconnaissance be conducted? Y / (N)

Visual Survey Inspection Log

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? Y / (N)

1a. If so, please describe change (ex. Structures no longer exist):

2. Is the site/area vegetated? (Y) N

2a. If not vegetated, briefly describe the site/area composition:

mostly paved but some grassy areas near hangar

3. Does the site or area exhibit evidence of erosion? Y / (N)

3a. If yes, describe the location and extent of the erosion:

4. Does the site/area exhibit any areas of ponding or standing water? Y / (N)

4a. If yes, describe the location and extent of the ponding:

Receptor Information

1. Is access to the site restricted? (Y) / N

1a. If so, please note to what extent:

perimeter fence & gate

2. Who can access the site? **(Site Workers) / (Construction Workers) / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

3. Are residential areas located near the site? (Y) / N

3a. If so, please note the location/distance:

just north of facility borders

4. Are any schools/day care centers located near the site? (Y) / N

4a. If so, please note the location/distance/type:

Viking Elementary School located ~1 mile northeast

5. Are any wetlands located near the site? Y / (N)

5a. If so, please note the location/distance/type:

Visual Site Inspection Checklist

Names(s) of people performing VSI: S. Tjan, B. Packer

Recorded by: S. Tjan

ARNG Contact: B. Packer

Date and Time: 3/7/19

Method of visit (walking, driving, adjacent): walking

Source/Release Information

Site Name / Area Name / Unique ID: Corrosion Control Facility

Site / Area Acreage: 1.8 acres

Historic Site Use (Brief Description): paint shop and maintenance facility

Current Site Use (Brief Description): see above

Physical barriers or access restrictions: perimeter fence

1. Was PFAS used (or spilled) at the site/area? (Y) / N

1a. If yes, document how PFAS was used and usage time (e.g., fire fighting training 2001 to 2014):

drip leak at AFFF deluge system ~ 6-8 months after installation in 2011

2. Has usage been documented? Y (N)

2a. If yes, keep a record (place electronic files on a disk):

No

3. What types of businesses are located near the site? (Industrial) / Commercial / Plating / Waterproofing / ~~Residential~~

3a. Indicate what businesses are located near the site

Fresno ANGB and airport tenants, residential communities to north

4. Is this site located at an airport/flightline? (Y) / N

4a. If yes, provide a description of the airport/flightline tenants:

Fresno ANGB, ARFF, SkyWest, Signature, Cal Fire, Cal Highway Patrol

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? (Y) / N

1a. If yes, indicate which type of AFFF has been used:

3% AFFF by Chemguard

1b. If yes, describe maintenance schedule/leaks:

drip leak and regulary maintained by outside contractor

1c. If yes, how often is the AFFF replaced:

N/A

1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?

As built drawing available

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) / N

1a. If so, note observation and location:

Toward airport

2. Is there channelized flow within the site/area? Y / (N)

2a. If so, please note observation and location:

3. Are monitoring or drinking water wells located near the site? (Y) / N

3a. If so, please note the location:

~ 50 ft east of facility boundary

4. Are surface water intakes located near the site? Y / (N)

4a. If so, please note the location:

5. Can wind dispersion information be obtained? Y / (N)

5a. If so, please note and observe the location.

6. Does an adjacent non-ARNG PFAS source exist? (Y) / N

6a. If so, please note the source and location.

multiple from airport tenants

6b. Will off-site reconnaissance be conducted? Y / (N)

Visual Survey Inspection Log

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? Y / (N)

1a. If so, please describe change (ex. Structures no longer exist):

2. Is the site/area vegetated? (Y) / N

2a. If not vegetated, briefly describe the site/area composition:

Surrounding grassy, dirt areas

3. Does the site or area exhibit evidence of erosion? Y / (N)

3a. If yes, describe the location and extent of the erosion:

4. Does the site/area exhibit any areas of ponding or standing water? Y / (N)

4a. If yes, describe the location and extent of the ponding:

Receptor Information

1. Is access to the site restricted? (Y) / N

1a. If so, please note to what extent:

perimeter fence & gate

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

3. Are residential areas located near the site? (Y) / N

3a. If so, please note the location/distance:

just north of facility boundary

4. Are any schools/day care centers located near the site? (Y) / N ST

4a. If so, please note the location/distance/type:

Viking Elementary School located ~ 1 mile northeast

5. Are any wetlands located near the site? Y (N)

5a. If so, please note the location/distance/type:

Visual Survey Inspection Log

Additional Notes

no accidental trips since operation (2001–present), 1100-gallon AFFF tank

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Visual Site Inspection Checklist

Names(s) of people performing VSI: S. Tjon, B. Packer

Recorded by: S. Tjon

ARNG Contact: B. Packer

Date and Time: 3/7/19

Method of visit (walking, driving, adjacent): walking

Source/Release Information

Site Name / Area Name / Unique ID: Wash Rack

Site / Area Acreage: 0.4 acres

Historic Site Use (Brief Description): fire training, used for serving TTI-Maxes, washing aircraft

Current Site Use (Brief Description): washing aircraft

Physical barriers or access restrictions: perimeter fence

1. Was PFAS used (or spilled) at the site/area? **Y / N**

   1a. If yes, document how PFAS was used and usage time (e.g., fire fighting training 2001 to 2014):

   familiarization training from 2007-2011 and TTI-Max serving in 20L

2. Has usage been documented? **Y / (N)**

   2a. If yes, keep a record (place electronic files on a disk):

3. What types of businesses are located near the site? **(Industrial) / (Commercial) / Plating / Waterproofing / (Residential)**

   3a. Indicate what businesses are located near the site

   Fresno ANGB & airport tenants, residential communities to north

4. Is this site located at an airport/flightline? **(Y) N**

   4a. If yes, provide a description of the airport/flightline tenants:

   Fresno ANGB, ARFF, Skywest, Signature, Cal Fire, Cal Highway Patrol

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? (Y) / N

1a. If yes, indicate which type of AFFF has been used:

3% AFFF by Chemguard (see Corrosion Control Facility VSI)

1b. If yes, describe maintenance schedule/leaks:

1c. If yes, how often is the AFFF replaced:

1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) / N

1a. If so, note observation and location:

towards airport

2. Is there channelized flow within the site/area? Y / (N)

2a. If so, please note observation and location:

3. Are monitoring or drinking water wells located near the site? (Y) / N

3a. If so, please note the location:

~ 50 ft east of facility boundary

4. Are surface water intakes located near the site? Y / (N)

4a. If so, please note the location:

5. Can wind dispersion information be obtained? Y / (N)

5a. If so, please note and observe the location.

6. Does an adjacent non-ARNG PFAS source exist? (Y) / N

6a. If so, please note the source and location.

multiple from airport tenants

6b. Will off-site reconnaissance be conducted? Y / (N)

Visual Survey Inspection Log

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? Y / (N)

1a. If so, please describe change (ex. Structures no longer exist):

2. Is the site/area vegetated? (Y) / N

2a. If not vegetated, briefly describe the site/area composition:

grassy area to west outside hangar

3. Does the site or area exhibit evidence of erosion? Y / (N)

3a. If yes, describe the location and extent of the erosion:

4. Does the site/area exhibit any areas of ponding or standing water? Y / (N)

4a. If yes, describe the location and extent of the ponding:

Receptor Information

1. Is access to the site restricted? (Y) N

1a. If so, please note to what extent:

perimeter fence & gate

2. Who can access the site? **Site Workers / (Construction Workers) / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

3. Are residential areas located near the site? (Y) N

3a. If so, please note the location/distance:

just north of facility boundary

4. Are any schools/day care centers located near the site? (Y) / N

4a. If so, please note the location/distance/type:

Viking Elementary School located ~1 mile northeast

5. Are any wetlands located near the site? Y / (N)

5a. If so, please note the location/distance/type:

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Fresno TASMG

Why has this location been identified as a site?

Facility has multiple sites containing operations to support maintenance and operation of aircraft. AFFF was used or stored at the facility.

Are there any other activities nearby that could also impact this location?

Facility is near Fresno Yosemite International Airport, which contains numerous aviation industry tenants that use unknown fire suppression techniques. Additionally, Fresno ARFF and Fresno ANGB operate facilities in the vicinity of the TASMG.

Training Events

Have any training events with AFFF occurred at this site? Yes

If so, how often? Approximately once a year from 2008 – 2011 and 2014

How much material was used? Is it documented? No documentation but started with six/seven 5-gallon containers of AFFF and now only three containers remain

Identify Potential Pathways: Do we have enough information to fully understand over land surface water flow, groundwater flow, and geological formations on and around the facility? Any direct pathways to larger water bodies?

Surface Water:

Surface water flow direction? Radially outwards in airfield or public airport

Average rainfall? 12.8 inches

Any flooding during rainy season? No

Direct or indirect pathway to ditches? Direct pathway to ditches

Direct or indirect pathway to larger bodies of water? Storm water drains to Mills Creek and eventually to San Joaquin River

Does surface water pond any place on site? No

Any impoundment areas or retention ponds? No

Any NPDES location points near the site? Yes, on western side of facility

How does surface water drain on and around the flight line? Radially towards storm drains

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? Assumed east

Depth to groundwater? Approximately 55 to 74 ft bgs

Uses (agricultural, drinking water, irrigation)? Drinking water

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? Yes

Is groundwater used for drinking water? Yes

Are there drinking water supply wells on installation? No

Do they serve off-post populations? N/A

Are there off-post drinking water wells downgradient? Yes, approximately 50 ft east of facility boundary

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? No

If so, do we understand the process and which water is/was treated at the plant? N/A

Do we understand the fate of sludge waste? N/A

Is surface water from potential contaminated sites treated? N/A

Equipment Rinse Water

1. Is firefighting equipment washed? Where does the rinse water go?

No

2. Are nozzles tested? How often are nozzles tested? Where are nozzles tested? Are nozzles cleaned after use? Where does the rinse water flow after cleaning nozzles?

Nozzles for Tri-max extinguishers are tested after servicing in the wash rack area and eastern airfield taxiway. Flows to storm water drains. No cleaning.

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker - Yes

Construction Worker - Yes

Recreational User - Yes (potential off-facility user of San Joaquin River for recreation)

Residential - Yes (potential off-facility user of San Joaquin River for recreation)

Child Yes – Yes (potential off-facility user of San Joaquin River for recreation)

Ecological - Yes (eco receptors of Mills Creek or San Joaquin River)

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?
Aviation industry tenants of Fresno Yosemite International Airport, residential communities to the north, commercial areas to the northeast and east

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur?
None known

Appendix C
Photographic Log

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fresno TASMG	Fresno, California

Photograph No. 1

Date 3/7/2019

Time 11:06

Description:

Wash rack area and HAZMAT locker with AFFF storage; Tri-Max 30 mobile fire extinguishers containing AFFF were discharged in the wash rack area

Orientation:

Northeast

Photograph No. 2

Date 3/7/2019

Time 11:08

Description:

Wash rack drains were plugged whenever Tri-Max fire extinguishers were discharged in the wash rack area

Orientation:

South

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fresno TASMG	Fresno, California

Photograph No. 3

Date 3/7/2019

Time 11:09

Description:

Three 19-Liter (5-gallon) canisters of FireAde 3% AFFF Liquid Foam Concentrate stored in the HAZMAT locker

Orientation:

West

Photograph No. 4

Date 3/7/2019

Time 11:11

Description:

Taxiway east of airfield where Tri-Max 30 fire extinguishers containing AFFF were serviced and then discharged

Orientation:

Southeast

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fresno TASMG	Fresno, California

Photograph No. 5

Date 3/7/2019

Time 11:13

Description:

Tri-Max 30 fire extinguisher containing 3% AFFF concentrate; approximately seven Tri-Max extinguishers were observed on or surrounding the airfield

Orientation:

South

Photograph No. 6

Date 3/7/2019

Time 11:21

Description:

1,100-gallon tank of 3% AFFF by Chemguard, Inc. for fire suppression system contained in the upper deck of the Corrosion Control Facility

Orientation:

Southeast

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fresno TASMG	Fresno, California

Photograph No. 7

Date 3/7/2019

Time 11:32

Description:

TASMG personnel demonstrates where collective fire training exercises took place outside the TASMG Hangar

Orientation:

Southwest