FINAL
Site Inspection Report
High Altitude Aviation Training Site
Gypsum, Colorado

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)
ARNG Installations, Nationwide

August 2023

Prepared for:

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

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
%	Percent
µg/kg	Microgram(s) per kilogram
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous Film Forming Foam
AMEC	AMEC Earth and Environmental Inc.
ARFF	Aircraft Rescue and Firefighting
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
BCC	Bird of conservation concern
bgs	Below ground surface
CAF	Compressed Air Foam
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COARNG	Colorado Army National Guard
COC	Chain-of-custody
CSM	Conceptual site model
DA	Department of the Army
DoD	Department of Defense
DQI	Data quality indicator
DQO	Data quality objective
DUA	Data Usability Assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
EB	Equipment Blank
EDR™	Environmental Data Resources Trademarked
EGE	Eagle County Regional Airport
EIS	Extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
EPA	U.S. Environmental Protection Agency
ERWVFA	Eagle River Watershed Valley-Fill Aquifer
FAA	Federal Aviation Administration
FB	Field blank
FedEx	Federal Express
ft	Foot (feet)

FTA	Fire training area
HAATS	High Altitude Aviation Training Site
HAZMAT	Hazardous materials
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
IDW	Investigation-derived waste
ITRC	Interstate Technology Regulatory Council
GA	General Aviation
LC/MS/MS	Liquid chromatography tandem mass spectrometry
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
LOQ	Limit of quantification
MIL-SPEC	military specification
MS	Matrix spike
MSD	Matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
ng/L	Nanogram(s) per liter
NOAA	National Oceanic and Atmospheric Administration
NWIS	USGS National Wetland Information System
OSD	Office of the Secretary of Defense
OWS	Oil-water separator
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
PVC	polyvinyl chloride
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
QSM	Quality Systems Manual
RI	Remedial investigation
RPD	Relative percent difference

SI	Site Inspection
SL	Screening level
TOC	Total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA	U.S. Department of Agriculture
USFW	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VVJC	Vail Valley Jet Center
Wood	Wood Environment & Infrastructure Solutions, Inc.
WSP	WSP USA Environment & Infrastructure Inc.
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

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

The PA identified 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 the relevant compounds. This SI was completed at the High Altitude Aviation Training Site (HAATS) in Gypsum, Colorado and determined further evaluation is warranted for AOI 1: Parking Apron/Taxiway and AOI 2: HAZMAT Storage Area. No further action is warranted for AOI 3: Building 1214. HAATS will also be referred to as the "Facility" throughout this document.

The Facility, operated by the Colorado ARNG (COARNG), encompasses approximately 20 acres leased from the Eagle County Regional Airport (EGE). The Facility is located at 315 N Airport Road, Gypsum, Colorado, which is north of the EGE airfield. The Facility consists of hangar space, classrooms, administrative areas, hazardous material storage, a parking apron and taxiway, and is designed to train military pilots in high altitude mountainous terrain. The Facility and surrounding airport property are zoned as a planned unit development (AMEC Earth and Environmental, Inc., [AMEC], 2010; 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, further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted in a Remedial Investigation (RI) for AOI 1 and AOI 2. No further action is warranted for AOI 3.

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

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

Abbreviations:
µg/kg = microgram(s) per kilogram
bgs = below ground surface
ng/L = nanogram(s) per liter

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	Parking Apron/Taxiway	●	●	●	Proceed to RI
2	HAZMAT Storage Area	●	●	NA	Proceed to RI
3	Building 1214	○	◐	NA	No further action

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

1. INTRODUCTION

1.1 PROJECT AUTHORIZATION

The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum regarding Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program (Assistant Secretary of Defense, 2022) from the Office of the Secretary of Defense (OSD) dated 6 July 2022. The six compounds listed in the July 2022 OSD memorandum are referred to as "relevant compounds" throughout this document and include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA)[1]. The ARNG performed this SI at the High Altitude Aviation Training Site (HAATS) in Gypsum, Colorado. The High Altitude Aviation Training Site is also referred to as the "Facility" throughout this document.

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

1.2 SITE INSPECTION PURPOSE

A PA was performed at the High Altitude Aviation Training Site (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 HAATS property encompasses approximately 20 acres leased from the Eagle County Regional Airport (EGE) for Colorado ARNG (COARNG) use in the town of Gypsum, within Eagle County, Colorado (**Figure 2-1)**. The Facility includes hangar space, classrooms, administrative areas, hazardous material [HAZMAT] storage, a parking apron and taxiway, and is designed to train military pilots in high altitude mountainous terrain. The Facility and surrounding airport property are zoned as a planned unit development (AMEC Earth and Environmental, Inc. [AMEC], 2010; AECOM, 2020).

Starting in approximately 1990, the COARNG HAATS Facility originally operated out of Building 1213A. Building 1213A was constructed in the 1970s and was used as the main hangar for the Mountain Flying Service until the building was leased to the COARNG. Construction on the current Facility (which includes Building 1214, HAZMAT Storage, and the current flight ramp and parking apron/taxiway) began in 2011 and was completed in 2013. In 2013, the COARNG moved operations to Building 1214, which serves as the COARNG HAATS main hangar. After moving operations to the new Facility, Building 1213A was transferred to the Vail Valley Jet Center (VVJC), and the COARNG ceased to maintain or operate the building (AECOM, 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

HAATS and the area surrounding the larger EGE complex are a mix of industrial and commercial properties, undeveloped land, agricultural land, and residential areas. The Eagle River is located approximately 0.5 miles north of the Facility and flows west, and Highway 6 is located approximately 400 feet (ft) north of the Facility. The Facility sits within the Eagle River Valley on the western slope of the Colorado Rocky Mountains. Topography across the Facility has been graded to drain to the northwest, and the greater area surrounding the Facility generally slopes northwest towards the Eagle River (AMEC, 2010; AECOM, 2020).

Most of the Facility is paved with asphalt or concrete, with the exception of some gravel and grassy areas surrounding the improved portions of the Facility. The HAATS property is bounded on the north side by a chain-link fence. Sanitary sewer service and potable water are provided to the Facility by the Town of Gypsum (AECOM, 2020).

The adjoining properties to the east, west, and south are all included within the EGE, which is zoned as a planned unit development. The VVJC Maintenance Hangar, which is the former location of the COARNG HAATS, is located immediately to the east. The property to the west includes the air traffic control tower. The runway and taxiways are located to the south of the Facility. The EGE commercial terminal is located further to the south, across the airfield. The property to the north, between the Facility and Highway 6, is zoned as industrial (AMEC, 2010; AECOM, 2020). It is currently undeveloped and is being used as a gravel mine.

2.2.1 Geology

According to the 1978 Geologic Map of the Leadville Quadrangle compiled for the U.S. Geological Survey (USGS), the primary geologic unit occurring in the vicinity of the Facility is the unconsolidated gravel and alluvium deposited as stream, terrace, and outwash material during the Quaternary Period (USGS, 1978; AECOM, 2020). The much older Eagle Valley Evaporite, a series of gypsum, anhydrite, and interbedded siltstone and dolomite, make up the valley walls not far from the Facility and likely lie beneath the unconsolidated surficial deposits at the Facility (AECOM, 2020).

Based on soil survey data published by the US Department of Agriculture (USDA) Natural Resources Conservation Service, the primary soil type at the subject property is the Dotsero sandy loam, which forms on terraces and toes of mountain slopes through the weathering of colluvium derived from basalt and other igneous rocks. The Dotsero sandy loam forms with 1 to 12 percent (%) slopes and is typically well drained with moderate infiltration rates and high conductivity. Runoff is classified as low, and the frequency of flooding or ponding is low to none. The depth to the water table in the soil type is greater than 80 inches (USDA, 2019; AECOM, 2020).

During the SI, well graded gravel with sand and silt was observed as the dominant lithology of the unconsolidated soils below the Facility, encountered below 10 to 18.5 ft below ground surface (bgs), with interbedded layers of clay, with variable amounts of silt and sand, and silty sand. The rounded to subangular gravel was comprised of sedimentary and igneous rocks and included rock up to 15 centimeters in diameter. The upper lithologies consisted of organic soils with variable amounts of sand and lean clay with sand. Bedrock was recovered at one boring (from 103 ft bgs), HAATS-03, and determined to be mudstone with quartz veins. The borings were completed at depths between 80 and 120 ft bgs. Samples for grain analyses were collected at three locations, AOI01-05, AOI02-01, and AOI03-01, and analyzed via American Society for Testing and Materials (ASTM) Method D-422. The results from samples collected within the dominant lithology show sand range from 31.1% to 86.9%, silt from 5% to 60.7%, gravel from 0% to 14.5%, and clay from 0.6% to 8.2%. These results underrepresent gravel in the lithology due to the size of gravel encountered and the packing of soil in sample jars for shipment. Results from an upper lithology logged as lean clay with sand report silt at 37.8%, sand at 31.7%, clay at 18.87%, and gravel at 11.7%. These results and Facility observations are consistent with the reported depositional environment of the region. Boring logs are presented in **Appendix E** and grain size results are presented in **Appendix F**.

2.2.2 Hydrogeology

The groundwater flow direction in the vicinity of the Facility is to the northwest due to topography and the influence of the Eagle River, as shown in **Figure 2-2**. Based on the preliminary data review conducted for this SI through the USGS National Wetland Information System (NWIS), the depth to groundwater in the vicinity of the Facility varies from 25 to 117 ft bgs.

The Town of Gypsum overlies the Eagle River watershed valley-fill aquifer (ERWVFA). The ERWVFA is an unconfined aquifer found within the alluvial deposits along the Eagle River and

its tributaries, starting near the town of Vail, CO and heading west to Dotsero, CO (USGS, 2009; AECOM, 2020). Being unconfined, recharge of the aquifer across HAATS occurs through direct infiltration of precipitation and/or irrigation and drainage ditch water. Deep groundwater at HAATS is found in bedrock aquifers comprised of the hydrogeologic units associated with the Eagle Basin-Central Colorado Trough. The uppermost group includes the Weber Aquifer, Maroon-Minturn Aquifer, and the Belden-Molas confining unit. The primary water-bearing rock type in this group is sandstone (Barkmann et al., 2020; AECOM, 2020).

Potable and non-potable water is provided to EGE and its tenants through the Town of Gypsum. There are no water wells located at the Facility. Potable water is used for drinking water at HAATS, and non-potable water is strictly used for irrigation. The water is owned by the Town of Gypsum and stored in various large water tanks throughout the town. The Town of Gypsum 2022 Drinking Water Quality Report (covering data for calendar year 2021) lists four sources of water; Eagle River (surface water intake), Little Gypsum Creek (surface water intake), Mosher Springs Pond (surface water intake), and Gypsum Creek (surface water intake, Town of Gypsum, 2022). Most of the known intake points associated with Mosher Springs and Gypsum Creek would be unaffected by potential PFAS releases at the HAATS Facility because they are located upstream from the creek's confluence with the Eagle River. The Norgaard Water Treatment Plant and associated intake point is located on Gypsum Creek upstream of the confluence of Gypsum Creek and Eagle River. Based on the synoptic water level measurements made during the SI, the intake point is likely cross-gradient of the Facility. The locations of the Eagle River intake and the T2 well (identified in the 2016 town water quality report), are unknown (AECOM, 2020).

The airport receives its water through several water mains located on the south side of the airfield to support the commercial terminal area and on the north side of the airfield to support the HAATS and GA hangars (EGE, 2014). As part of the PA, an Environmental Data Resources (EDR™) well search was conducted within a 1-mile radius surrounding the Facility. Using additional online resources, such as state and local GIS databases, wells were researched to a 4-mile radius of the Facility. Numerous wells of various use exist in all directions surrounding the Facility (AECOM, 2020). Based on the synoptic water level measurements made during the SI, there are three commercial wells that are potentially downgradient of the Facility. One of the commercial wells is located on the property just north of the facility that is currently being used to mine gravel. Commercial well permits allow for commercial use that includes drinking and sanitation facilities inside a business (Colorado Division of Water Resources, 2023).

No PFAS analyses results for the Town of Gypsum public water system were available. Based on information available, it does not appear that the Town of Gypsum public water system was included in the EPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) program. Additionally, the Town of Gypsum 2022 Drinking Water Quality Report (covering data for calendar year 2021) does not include results for the analysis of PFAS.

Depths to water measured in July 2022 during the SI ranged from 75.04 to 94.24 ft bgs. Groundwater elevation contours from the SI are presented on **Figure 2-5** and indicate the groundwater flow direction primarily to the northwest, toward the Eagle River.

2.2.3 Hydrology

The Facility is located within the Eagle River Watershed. Surface water at HAATS is limited to drainage ditches that intermittently contain water. There are several nearby surface water areas designated by the US Fish and Wildlife Service (USFWS) National Wetlands Inventory (USFWS, 2019; AECOM, 2020), **Figure 2-4**. The "Chattfield and Bartholomew Ditch" is designated as a freshwater emergent wetland or as riverine habitat, depending on location and encroaches on the southern and western boundaries of the Facility. The "CKP Ditch" is also designated as both freshwater emergent wetland and riverine habitat depending on location, and it encroaches on the northern and western boundaries of the Facility as well (USFWS, 2019; AECOM, 2020).

The HAATS 2017 Spill Prevention, Control, and Countermeasure Plan indicates that surface runoff generally flows to the northwest, with some local flow to the southwest, on the Flight Ramp, immediately south of Building 1214 (COARNG, 2017; AECOM, 2020). As-built utility drawings show stormwater inlets on the north side of Building 1214 that discharge to a low point at the north Facility boundary. Another stormwater inlet is located in a low point north of the apron which flows toward a ditch on the east side of the apron. An oil-water separator (OWS), associated with the sanitary sewer, is located near the northeast corner of Building 1214. The stormwater system ultimately flows north towards the Eagle River (COARNG, 2017; AECOM, 2020). The storm sewer and Facility drainage information are shown on **Figure 2-4**.

Stormwater runoff across the airport property drains to the north and west, into the Eagle River, towards the Town of Gypsum. The EGE stormwater system is composed of open channels and pipes directing the flow of water, and drainage basins to collect runoff. The majority of the airport drains to the northwest, while the eastern edge of the airfield drains east before turning north towards the Eagle River (EGE, 2014; AECOM, 2020).

Sanitary services are provided through the Town of Gypsum, Public Works Department. Wastewater is collected and processed through the Town's nitrification/de-nitrification wastewater treatment plant (WWTP) located approximately 2.6 miles west of the Facility. Sludge disposal is performed by a third-party contractor (EGE, 2014; AECOM, 2020).

Flood Insurance Rate Maps for Eagle County and the region immediately surrounding the airport indicate that no flood zones are located within airport property. The nearest flood zone is north of the airport by approximately one-half mile (EGE, 2014; AECOM, 2020).

2.2.4 Climate

Data from the EGE weather station indicate that the annual average temperature between 1981 and 2010 was 44.7 degrees Fahrenheit (ºF). The warmest months are July and August, with normal daily average temperatures of 67.2ºF and 66.0ºF, respectively. January is the coldest month, with an average temperature of 21.3ºF. Average annual precipitation measured from 1981 to 2010 at the airport was 11.31 inches, with the most rain occurring August through September (National Oceanic and Atmospheric Administration [NOAA], 2020; AECOM, 2020). The average annual snowfall for EGE, as reported by the Western Regional Climate Center, is 48

inches. The majority of snowfall occurs between December and January (Western Regional Climate Center, 2020; AECOM, 2020).

2.2.5 Current and Future Land Use

HAATS is the primary training center for ARNG helicopter pilots conducting high-altitude flying in mountainous terrain and/or high temperatures. HAATS is the only Department of Defense Aviation Training site for high altitude power management environmental training. The Facility trains over 400 aircrews annually from all branches and components for the National Guard Bureau and Fort Rucker as well as active Army, Army Reserves, and international military aircrews. The Facility is fenced as part of EGE airport property and access to parking apron, taxiway, and runway is restricted by gate to Transportation Security Administration trained badged personnel. The Facility was recently expanded to add entirely new features and amenities, with the ability for continued expansion. Future use of the HAATS Facility is anticipated to remain the same (AECOM, 2020).

EGE is the major conduit for commercial airline passengers to and from the Vail Valley. The airport's location provides access to the heart of the Colorado Rocky Mountains and is a short drive to the Vail & Beaver Creek Ski Resorts, making EGE a primary gateway for tourists during both winter and summer seasons. Future use of EGE is anticipated to remain the same (EGE, 2014; AECOM, 2020).

2.2.6 Sensitive Habitat and Threatened/Endangered Species

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

The following species are listed as federally endangered, threatened, proposed, and/or candidate species in Gypsum, Colorado (USFWS, 2022):

Birds: Mexican Spotted Owl, *Strix occidentails lucida* (threatened), Yellow-billed Cuckoo, *Coccyzus americanus* (threatened)

Birds (migratory presence from June to early July): Bald Eagle, *Haliaeetus leucocephalus* (vulnerable), Black Swift, *Cypseloides niger* (Bird of conservation concern [BCC]), Brown Capped Rosy-finch, *Leucosticte australis* (BCC), California Gull, *Larus californicus* (BCC), Cassin's Finch, *Carpodacus cassinii* (BCC), Clark's Nutcracker, *Nucifraga columbiana* (BCC), Evening Grosbeak, *Coccothraustes vespertinus* (BCC), Lewis's Woodpecker, *Melanerpes lewis* (BCC), Olive-sided Flycatcher, *Contopus cooperi* (BCC), Pinyon Jay, *Gymnorhinus cyanocephalus* (BCC), Virginia's Warbler, *Vermivora virginiae* (BCC), Western Grebe, *aechmophorus occidentalis* (BCC)

Fishes: Bonytail, *Gila elegans* (endangered), Colorado Pikeminnow, *Ptychocheilus lucius* (endangered), Humpback Chub, *Gila cypha* (threatened), Razorback Sucker, *Xyrauchen texanus* (endangered)

Flowering Plants: Ute Ladies'-tresses, *Spiranthes diluvialis* (threatened)

Insects: Monarch Butterfly, *Danaus plexippus* (candidate)

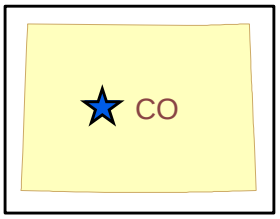
Mammals: Canada Lynx, *Lynx canadensis* (threatened), Gray Wolf, *Canis lupus* (endangered)

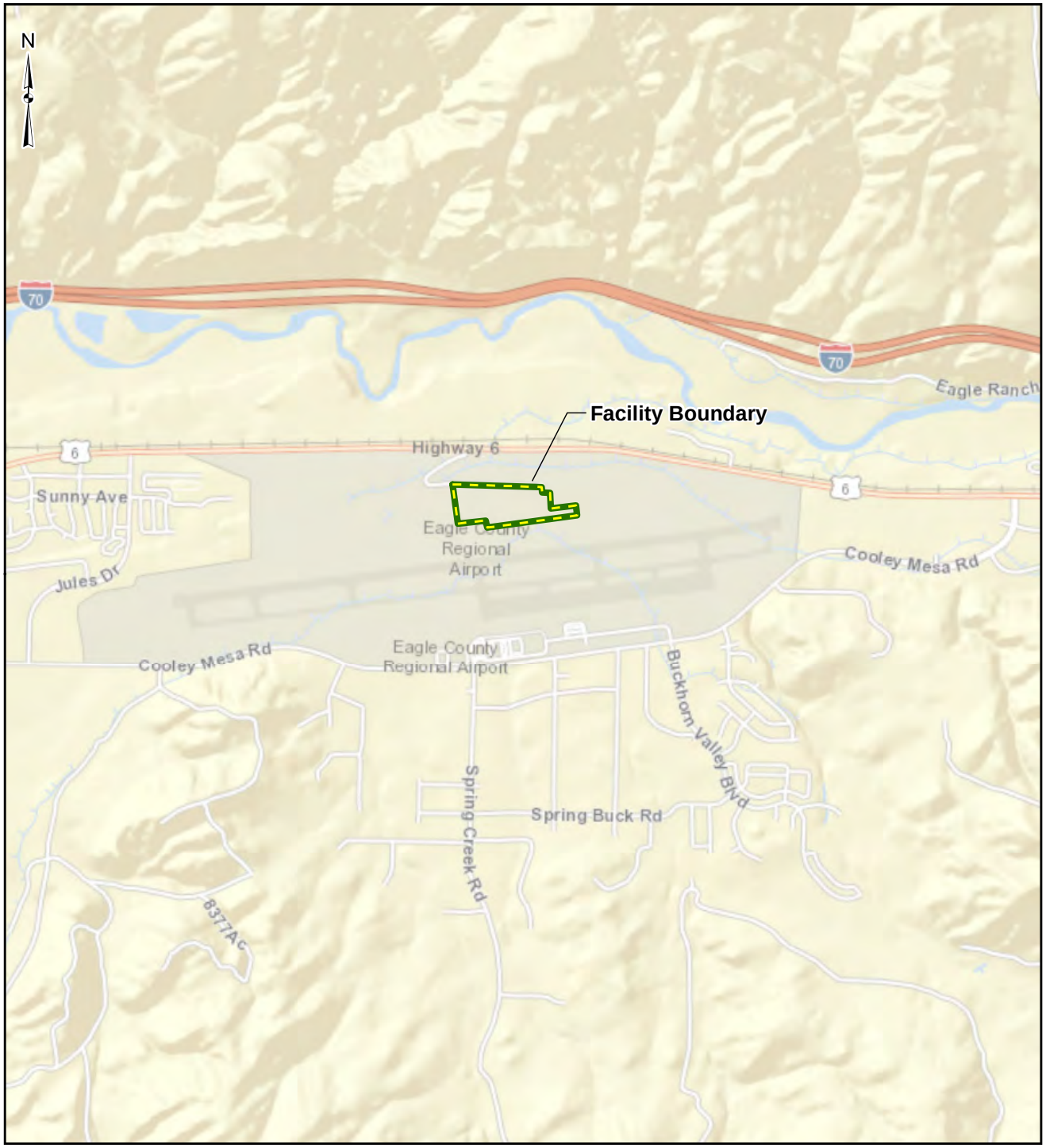
2.3 HISTORY OF PFAS USE

Three AOIs were identified in the PA where aqueous film-forming foam (AFFF) may have been used, stored, disposed, or released historically at the Facility, although there are no known PFAS releases since the construction of the Facility in 2013. Five potential release areas were grouped into three AOIs based on preliminary findings and presumed groundwater flow directions. These AOIs were identified as the Parking Apron/Taxiway, HAZMAT Storage Area, and Building 1214. A description of each AOI is presented in **Section 3**.

Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

Figure 2-1
Facility Location





Facility Data

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....JANUARY 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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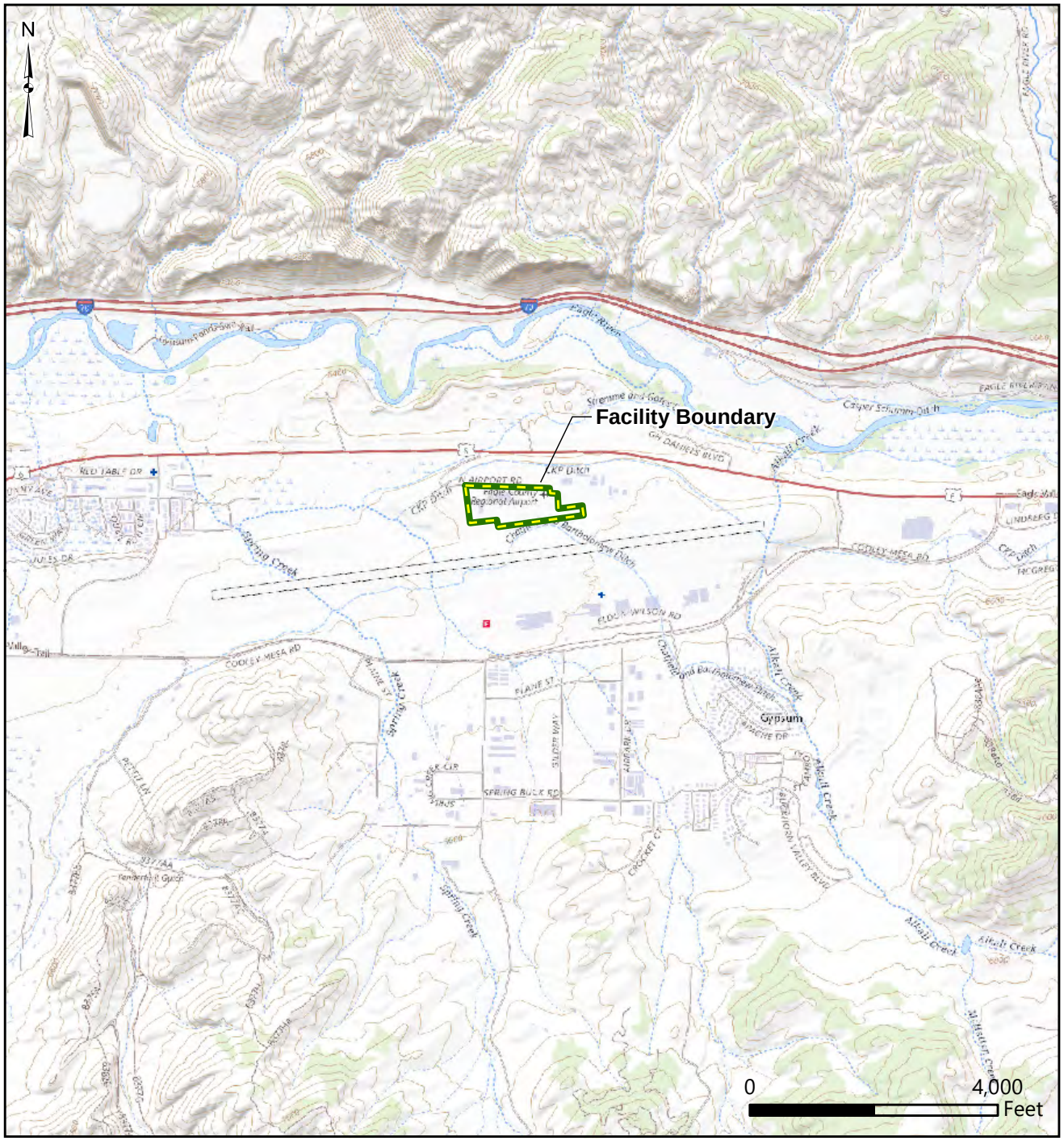
Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

CO

Figure 2-2
Facility Topography



Facility Data

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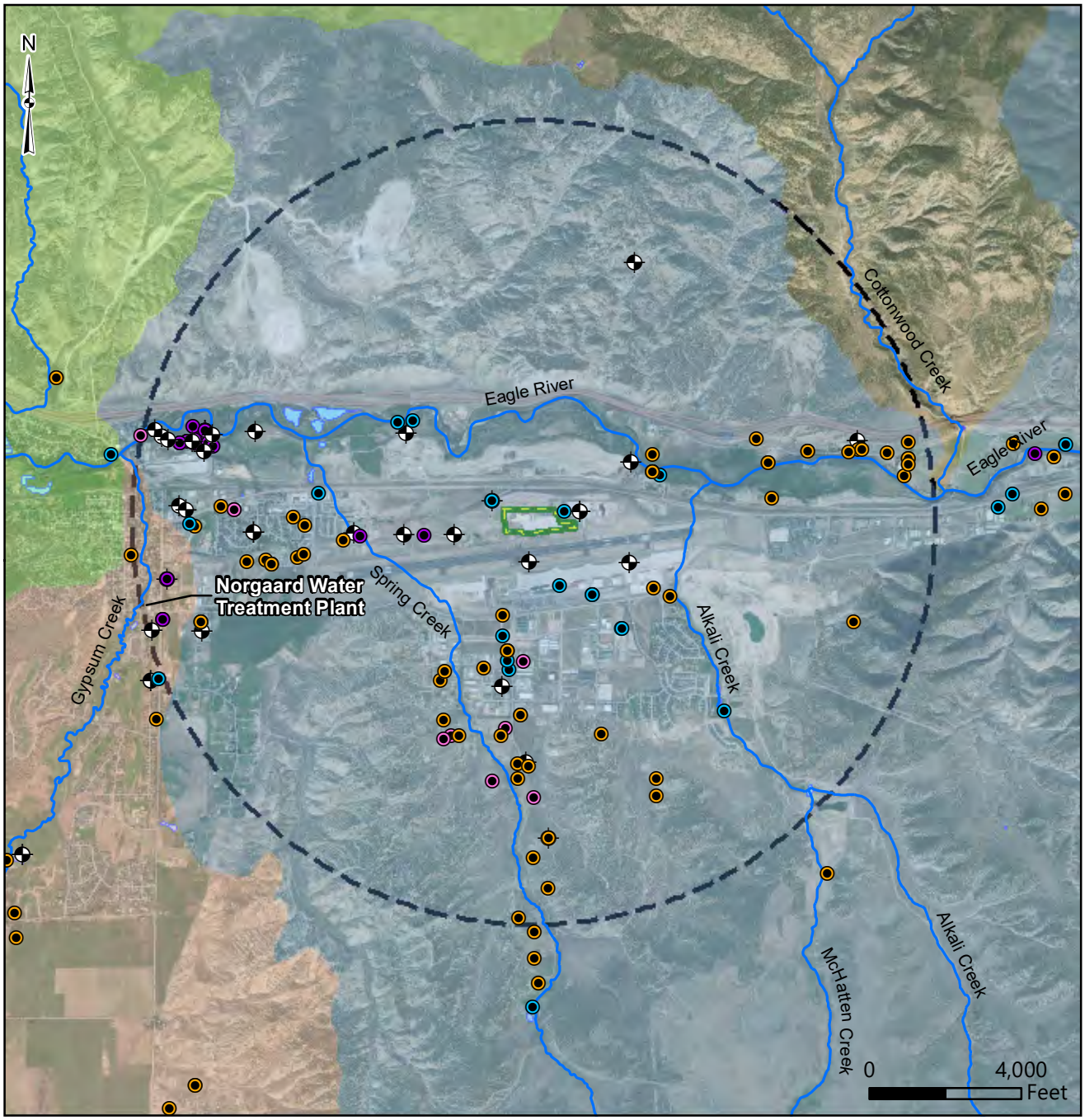
Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

CO

Figure 2-3
Groundwater Features



Facility Data

- Commercial
- Domestic
- Industrial
- Irrigation
- Monitoring/Sampling
- 4-Mile Radius
- FacilityBoundary
- Streams And Rivers
- Water Bodies
- Lower Gypsum Creek WaterShed
- Outlet Eagle River Water Shed
- Spring Creek-Eagle River Water Shed

Data Sources:
ESRI 2020
AECOM 2020

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

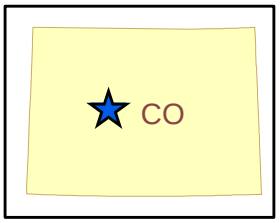
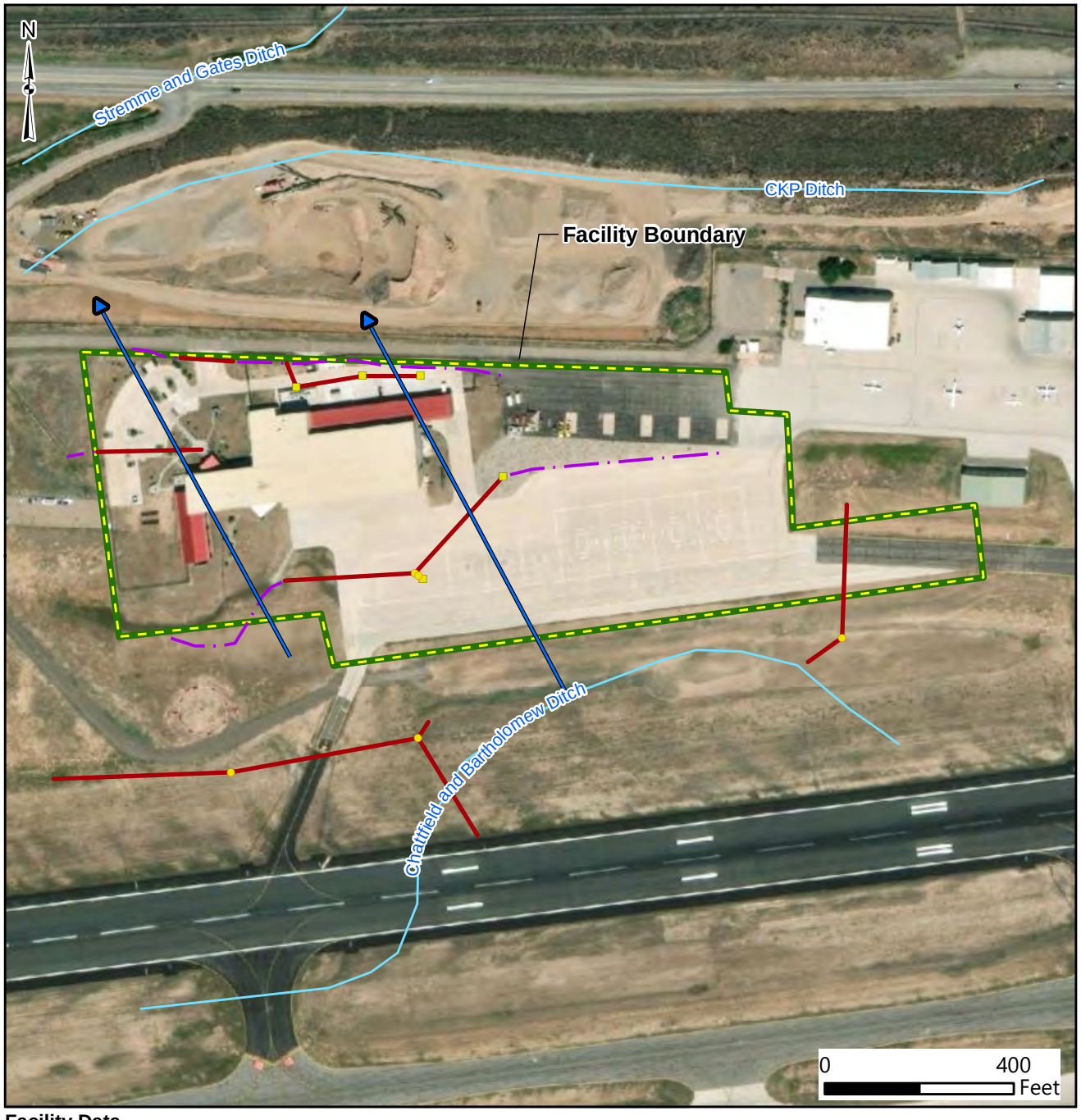


Figure 2-4
Surface Water Features



Facility Data

- Inlet
- Manhole
- Ditches
- Surface Water Flow Direction
- Storm Sewer
- Drainage Swale
- Streams And Rivers
- Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....JANUARY 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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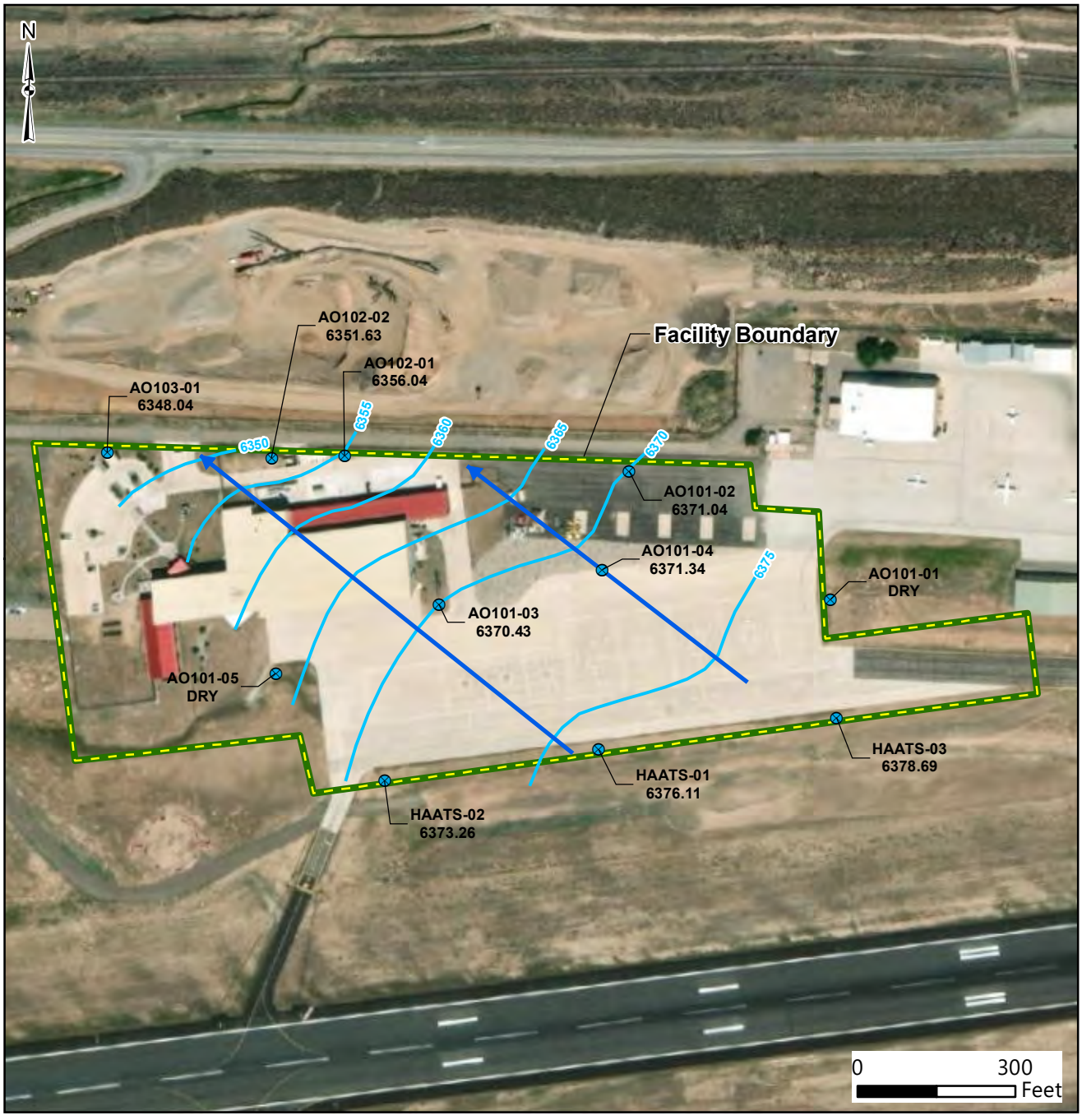
Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

CO

Figure 2-5
Groundwater Elevations



Facility Data

- Groundwater Wells
- Groundwater Flow Direction
- Groundwater Elevation Contour
- Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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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 HAATS and grouped into three AOIs, identified as AOI 1 Parking Apron/Taxiway, AOI 2 HAZMAT Storage Area, and AOI 3 Building 1214. The AOIs are shown on **Figure 3-1**.

3.1 AOI 1 – PARKING APRON/TAXIWAY

The Facility parking apron is located southeast of Building 1214 and is circumscribed by a taxiway. The apron is used for aircraft staging and maintenance. According to those interviewed during the PA, no incidents requiring AFFF use have occurred on the parking apron. Four Tri-Max™ wheeled mobile fire extinguishers containing AFFF are staged on the taxiway on the north side of the parking apron. According to Facility personnel, the Tri-Max™ units are in good condition, have no history of leaks or spills, have never been used at the Facility, and are inspected monthly for integrity; however, based on the corrosive nature of AFFF and the storage of the Tri-Max™ units outside, it is possible that AFFF may have been released to the parking apron area. Monthly inspection records for the Tri-Max™ extinguishers were not made available for inclusion in the PA report. The type and concentration of AFFF stored within the Tri-Max™ extinguishers are unknown (AECOM, 2020).

Occasionally, water salutes are performed for retiring pilots on the taxiway on the south side of the parking apron. The salutes involve EGE Fire Department firetrucks spraying water across the taxiway while a grounded aircraft is taxiing. The water sprayed during the salutes likely travels across the taxiway and parking apron on the HAATS property. Only water is sprayed during the water salutes; however, it is possible the water is sprayed from EGE firetrucks that also store AFFF (AECOM, 2020).

Due to the corrosive nature of AFFF and the storage of the Tri-Max™ units outside, and the performance of water salutes across the Facility's southern taxiway, the parking apron was identified as an AOI (AECOM, 2020).

3.2 AOI 2 – HAZMAT STORAGE AREA

HAZMATs stored by the COARNG at the Facility are kept in the HAZMAT storage area located on the north side of Building 1214. The area is also used for the storage of waste and is the location of an aboveground storage tank containing diesel fuel. According to Facility personnel, one Tri-Max™ 30 Cold Compressed Air Foam (CAF) fire extinguisher containing AFFF is stored in the HAZMAT storage area, however, the Tri-Max™ unit has not been used. The Tri-Max™ unit is in good condition, has no history of spills or leaking, and is inspected monthly for integrity; however, based on the corrosive nature of AFFF and the storage of the Tri-Max™ unit outside, it is possible that AFFF may have been released to the HAZMAT storage area. Tri-Max™ unit inspection records were not available for inclusion in the PA report. No emergencies requiring the use of the Tri-Max™ unit have occurred in the HAZMAT storage area, or anywhere else on the Facility. Additionally, COARNG personnel do not train with the Tri-Max™ units. The Eagle Fire Department responds to emergencies at the Facility. The type and concentration of AFFF stored within the unit is unknown. A fire hydrant is also located adjacent

to the HAZMAT storage area for use in response to an emergency. Due to the corrosive nature of AFFF and the storage of the Tri-Max™ fire extinguisher outside, the HAZMAT storage area was identified as an AOI (AECOM, 2020).

3.3 AOI 3 – BUILDING 1214

Building 1214 is located on the western end of the Facility. Construction of Building 1214 was completed in 2013, and the building serves as the HAATS main hangar and includes classroom areas, administrative office areas, and billets. The building is constructed with an AFFF fire suppression system that contains Buckeye Premium 3% Military Specification AFFF concentrate. Although the Safety Data Sheet for this AFFF product indicates that it does not contain PFOS or PFOA, it is unknown whether it may contain or degrade into other PFAS compounds. The size of the AFFF tank serving the fire suppression system is unknown. A 55-gallon drum containing the same AFFF concentrate product is also stored within Building 1214. According to Facility personnel, whose collective tenure span the entire history of Building 1214, the fire suppression system has never been tested in a manner that released AFFF, nor has it been used in response to an emergency. The fire suppression system is tested annually in an enclosed manner that recycles the AFFF concentrate without a release. Regular maintenance of the alarm, pumps, and valves is also conducted without release (AECOM, 2020).

Fueling of aircraft stored in Building 1214 occurs on the Flight Ramp south of Building 1214. Facility personnel stated that fuel spills in the area are uncommon, and that AFFF is not used as a precautionary measure in response to fuel spills. The EGE Fire Department responds to emergencies at the Facility, but no emergencies have occurred at Building 1214 requiring emergency response (AECOM, 2020).

Floor drains in Building 1214 connect to municipal sanitary sewers. Surface runoff at Building 1214 flows generally to the northwest, except on the southern side of the building, where it flows southwest. Although AFFF is stored indoors at Building 1214, and the fire suppression system undergoes regularly scheduled maintenance, the building has been identified as an AOI due to the storage of materials that potentially contain PFAS (AECOM, 2020).

Facility personnel stated during the PA interviews that annual fire training is performed near the southeastern corner of Building 1214 on the Flight Ramp, adjacent to the parking apron/taxiway. The fire training involves the lighting of diesel fuel in a drip pan and the subsequent extinguishing of the flames using ABC dry chemical handheld fire extinguishers. According to interviewees whose collective tenure span the entire history of the new Facility (2013- present), no AFFF has ever been used during the annual fire training. Records are not kept documenting the annual training. Mobile Tri-Max™ 30 Cold CAF fire extinguishers that contain AFFF are stored at the Facility, but Facility personnel stated that they have never been used for fire training purposes (AECOM, 2020). Based on this information, the PA report did not identify the flight ramp fire training area (FTA) as a potential PFAS release area (AECOM, 2020). However, due to the historic use of AFFF at FTAs in general, it was incorporated into AOI 3.

3.4 ADJACENT SOURCES

Several potential off-Facility sources of PFAS adjacent to the Facility, not under the control of the COARNG, were identified during the PA through interviews, review of the Environmental Data Resources™ report for a 1-mile radius surrounding the Facility, and historical document review.

3.4.1 Vail Valley Jet Center

EGE has one fixed base operator on the airfield, the VVJC. The VVJC main hangar is located south of the runway and east of the EGE commercial terminal, upgradient of the Facility. Services performed at the VVJC include aircraft line service, apron parking, hangar storage space, on-site catering, and flight planning. The VVJC also provides aircraft fueling along with aircraft maintenance and deicing. The VVJC owns and operates two aboveground fuel storage tanks on the north airfield to support its fueling services, which includes fueling for HAATS aircraft operations. The VVJC also occupies the former HAATS, Building 1213A. The VVJCs operation of Building 1213A began in 2013, when construction of the current Facility was complete. Building 1213A was previously occupied by the COARNG and served as the former HAATS between 1990 and 2013. The VVJC uses Building 1213A for additional hangar space (AECOM, 2020).

Information provided from an interview with an EGE Fire Department firefighter indicated that Building 1213A had an AFFF bladder system that was not used or tested. During interviews conducted as part of the PA, COARNG personnel stated that no known AFFF was ever used or stored in the building. The tenure of COARNG personnel interviewed span the use of both the current and former Facility over 32 years (AECOM, 2020).

It is unknown whether the main VVJC hangar space located on the south side of the runway uses an AFFF suppression system, or whether AFFF has ever been used or stored in the area in general. Due to the lack of available data surrounding both VVJC areas, they are considered potential PFAS release areas (AECOM, 2020).

3.4.2 Eagle County Regional Airport

EGE is publicly owned and consists of 632 acres that operate as a commercial airport. Its airfield configuration consists of one active runway, designated as Runway 7/25, that is positioned nearly east/west, immediately upgradient of the Facility. The asphalt taxiway system consists of one full length parallel taxiway on the south side of Runway 7/25, one partial parallel taxiway on the north side, and several connector taxiways. There are several aprons serving different needs at EGE. Both the Commercial Aviation Apron and the General Aviation (GA) Apron for the fixed base operators at the airport are located south of the runway. There are two aprons located on the north side of Runway 7/25. These aprons include the COARNG apron, which supports the Facility, as well as an additional GA Apron to the east of the Facility, serving the associated GA hangars and the VVJC (AECOM, 2020).

The EGE commercial terminal was constructed in 1996, but the runway was dedicated for GA

services in 1947. The terminal is located on the west end of the main Commercial Aviation Apron. At the time of the PA, five airlines leased space throughout the terminal: American, Continental, Delta, United, and United Express (AECOM, 2020).

EGE has several hangars on the airfield. VVJC provides the majority of hangar space on the main GA Apron with four hangars. There is also one additional privately-owned corporate hangar on the east end of the main GA Apron. On the GA Apron north of the runway, there are nine medium sized hangars that are either airport- or privately-owned. In addition to the hangars, there are ten airport-owned, T-Hangar style aircraft storage units (AECOM, 2020).

Representatives of EGE were not interviewed as a part of the PA. As such, it is unknown whether any of the EGE hangars store or use AFFF or any other known PFAS-containing materials (AECOM, 2020).

In 2005, a Gates Learjet 35A crashed and came to rest in a shallow ravine approximately 331 feet north of the runway. The crash fire was responded to by EGE Fire Department. In 2017, a private Cessna crashed onto a small road east of the EGE runway; it is unknown whether a fire occurred during the crash. It is unknown if AFFF was used in response to either of these crashes (AECOM, 2020).

The EGE Fire Station 10, which is located on the south side of the EGE runway and west of the commercial terminal, responds to emergencies at the airport and for airport tenants, including COARNG. Due to the lack of data regarding responses to crashes on the EGE runway and surrounding areas, and the propensity for runways to be used during nozzle testing and fire training by airport fire departments, Runway 7/25 is considered a potential PFAS release area (AECOM, 2020).

3.4.3 Eagle County Regional Airport Fire Department

The EGE Fire Station 10 is located south of the runway at the southwest corner of the EGE Commercial Apron, upgradient of the Facility. The building was built in 1989 and serves as the administrative offices for EGE staff, as well as the airport administration office, maintenance, and operations center. Maintenance on equipment occurs at the fire station inside the vehicle bays. There is additional storage for fire department equipment on the north airfield, in storage buildings; however, firefighters with the EGE Fire Department stated that Aircraft Rescue and Firefighting (ARFF) equipment has only ever been stored in the fire station on the south side of the runway (AECOM, 2020).

As a commercial airport, the EGE Fire Department must comply with FAA safety and emergency requirements, including ARFF services. To comply with FAA ARFF requirements, the EGE Fire Department has four active ARFF response vehicles for aircraft emergencies. According to the 2014 EGE Master Plan, these vehicles include one 2006 Oshkosh Striker 3000, one 1988 Oshkosh T-1500, one 1993 Oshkosh T-1500, and one 2004 Tote ARFF foam trailer (EGE, 2014; AECOM, 2020).

According to interviewees, the EGE Fire Department trains in Denver, Colorado; however, it is unknown whether the fire department has ever trained within the EGE airport property, or

whether it has ever been necessary to use AFFF in response to an emergency on EGE property. According to the EGE master plan, the fire department performs vehicle maintenance at Fire Station 10; however, it is unclear if any other maintenance, such as nozzle tests, are performed elsewhere at the airport. Due to the likelihood that AFFF has been stored and/or released at the fire station as a result of training and maintenance exercises, Fire Station 10 is considered a potential PFAS release area (AECOM, 2020).

3.4.4 Gypsum Fire Protection District

The Gypsum Fire Protection District is a combination fire department comprised of full-time and part-time personnel as well as volunteer firefighters serving the Town of Gypsum. The Gypsum Fire Protection District fire station is located approximately two miles west of the Facility, in the Town of Gypsum, cross gradient of the Facility. It is unknown whether the fire department stores or uses AFFF during training or emergency response. Given the tendency for local fire departments to store AFFF for emergency purposes, it is possible AFFF is stored at the Gypsum Fire Protection District fire station. It is also unclear whether the fire department performs vehicle maintenance, such as nozzle tests, at the fire station. Due to the likelihood that AFFF has been stored and/or released at the fire station as a result of potential training and maintenance, the Gypsum Fire Protection District fire station is considered a potential PFAS release area according to the PA. Although the Gypsum Fire Protection District is identified in the PA as a potential adjacent source, the river potentially acts as a hydraulic barrier between the Facility and the Gypsum Fire Protection District, so it is unlikely that a release at the fire station would impact the Facility (AECOM, 2020).

3.4.5 Town of Gypsum Wastewater Treatment Plant

There are no WWTPs located at the Facility. The Town of Gypsum WWTP is the nearest WWTP and is located approximately 2.6 miles to the west, along the Eagle River. WWTPs are not usually a primary potential release area of PFAS, but sludges and liquids from areas of potential release that are treated at WWTPs may create a secondary source of contamination. No known PFAS releases have occurred at the Facility, but AFFF releases may have occurred elsewhere on the larger EGE property and could have resulted in the migration of PFAS in wastewater to the Town of Gypsum WWTP. If undocumented releases of AFFF have entered floor drains at the Facility, then it is possible the Facility has contributed to PFAS migration to and through the WWTP. The WWTP uses nitrification/de-nitrification technology to treat wastewater. Sludge generated at the WWTP is removed and disposed of by a third-party contractor. The location of disposed sludge is unknown. Due to the potential for AFFF releases to have occurred elsewhere on the EGE property and in the town of Gypsum, the WWTP is considered a potential PFAS release area. Although the WWTP is identified in the PA as a potential adjacent source, the river potentially acts as a hydraulic barrier between the Facility and the WWTP (AECOM, 2020).

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Army National Guard Site Inspections
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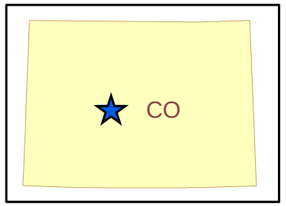
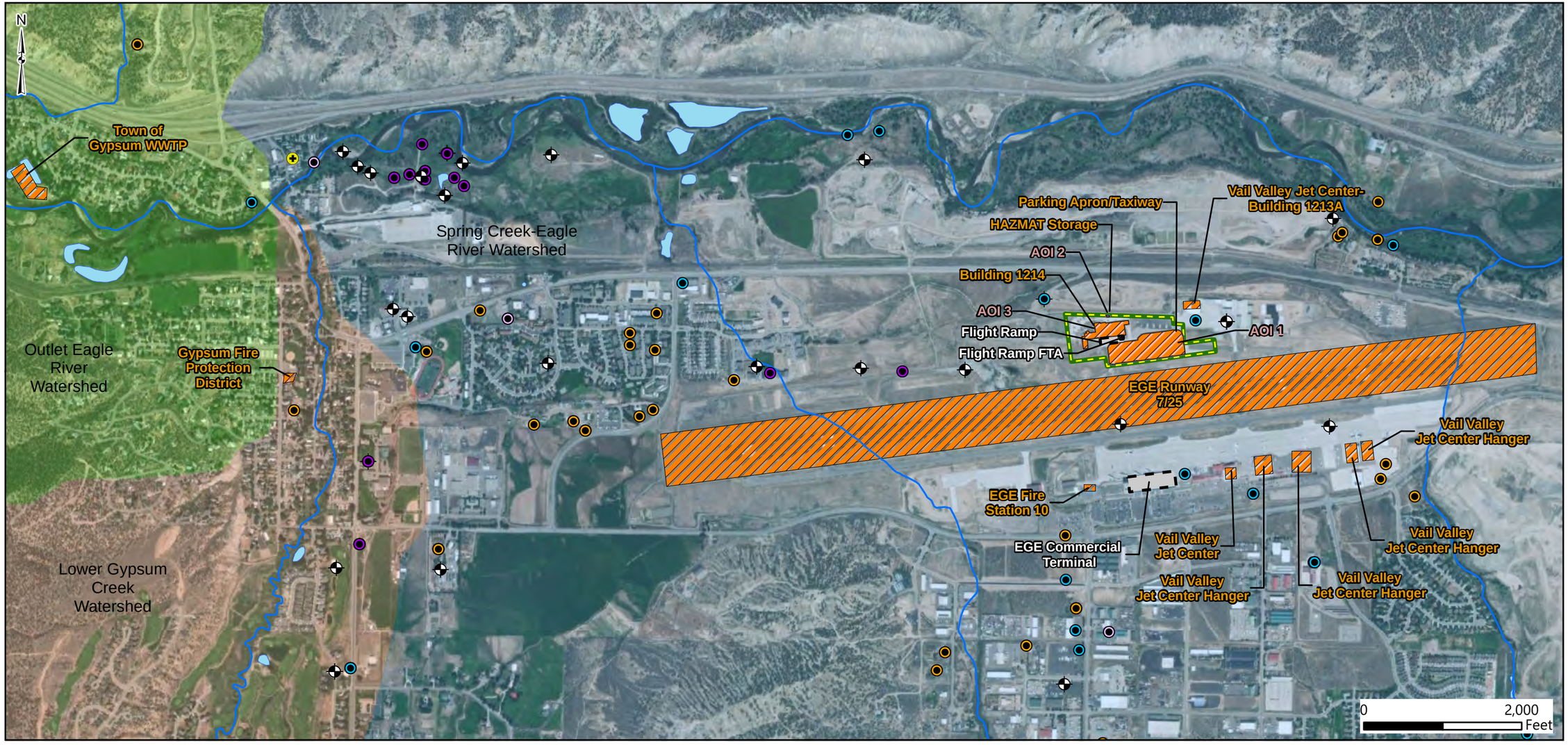


Figure 3-1
Areas of Interest



Facility Data

Well Type
- Domestic
- Commercial
- Industrial
- Irrigation
- Monitoring/Sampling
- Municipal

Hydrology/Hydrogeology
- River/Stream
- Water Bodies

Facility Data
- Potential PFAS Release
- No Suspected Release
- Area of Interest
- Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....JANUARY 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

P:\Project\AMEC Inter-Office Projects\303120026 HAATS\303120026 HAATS\3-1 AreaofInterest.mxd

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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4. PROJECT DATA QUALITY OBJECTIVES

As identified during the Data Quality Objective (DQO) process and outlined in the SI Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (EA Engineering, Science, and Technology, Inc., PBC [EA]/ Wood Environment & Infrastructure Solutions, Inc. [Wood], 2022), the objective of the SI is to identify whether there has been a release to the environment at the AOIs identified in the PA. For each AOI, ARNG determines if further investigation is warranted, a removal action is required to address immediate threats, or whether no further action is warranted. This SI evaluated groundwater and soil for the 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 for the SI include the following:

- The PA Report for HAATS (AECOM, 2020);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific UFP –QAPP Addendum (EA/Wood, 2022); 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 horizontally by the property limits of the Facility (**Figure 2-2**). The scope of the SI was bounded vertically by the depth of temporary monitoring wells installed within groundwater, where encountered (maximum depth of 120 feet bgs). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). Temporal boundaries were limited to the earliest available time field resources were available to complete the study.

4.4 ANALYTICAL APPROACH

Samples were analyzed by Eurofins, accredited under the Department of Defense (DoD) Environmental Laboratory Accreditation Program (DoD ELAP; Accreditation Number 1.01) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 021). Data were compared to applicable SLs within this document and decision rules as defined in the UFP-QAPP Addendum (EA/Wood, 2022).

4.5 DATA USABILITY ASSESSMENT

The Data Usability Assessment (DUA), which is provided in **Appendix A**, is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD 2019a, DoD 2019b, EPA 2017).

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. While not all planned samples were collected due to field conditions (see **Section 5.9**), the data that was obtained allowed for an assessment of whether there had been a release to the environment at the three AOIs identified in the PA. These data are of sufficient quality to meet the objectives and requirements of the UFP-QAPP (EA, 2020).

5. SITE INSPECTION ACTIVITIES

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

- *Final Preliminary Assessment Report, HAATS, Gypsum, Colorado,* dated August 2020 (AECOM, 2020)

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

- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, HAATS, Colorado* dated January 2022 (EA/Wood, 2022)

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

- *Accident Prevention Plan/Site Safety and Health Plan Addendum, HAATS, Gypsum, Colorado* dated August 2021 (EA/Wood, 2021)

The SI field activities were conducted during two mobilizations to the Facility. The first mobilization was from 13 April to 14 April 2022. and consisted of utility clearance, hand auguring to a depth of 2 ft bgs and soil sample collection. The second mobilization occurred from 7 June to 14 July 2022 and consisted of additional utility clearance, rotosonic boring and soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA/Wood, 2022), except as noted in **Section 5.9**.

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

- Twenty seven (27) soil samples from 11 boring locations;
- Nine (9) grab groundwater samples from 11 temporary well locations;
- Fifty-one (51) quality assurance (QA)/QC samples.

Figure 5-1 provides the sample locations for all media across the Facility. **Table 5-1** presents the list of samples collected for each medium. Field documentation is provided in **Appendix B**. A log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2**, land survey data are provided in **Appendix B3**, a Field Change Request form is provided in **Appendix B4**, and investigation-derived waste (IDW) polygons 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 a Technical Project Planning (TPP) meeting, performed utility clearance, and sampled decontamination source water. Details of these activities are presented below.

5.1.1 Technical Project Planning

The U.S. Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (DA, 2016a) 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 7 October 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 included COARNG, ARNG, USACE, Colorado Department of Public Health and Environment (CDPHE), 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 UFP-QAPP Addendum (EA/Wood, 2022).

A TPP Meeting 3 was held after the field event 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 results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

WSP USA Environment & Infrastructure Inc. (WSP), previously doing business as Wood, contacted the Utility Notification Center of Colorado to notify them of intrusive work at the Facility. WSP contracted On Point Locating, a private utility location service, to perform utility clearance at the Facility. Utility clearance was performed at each of the proposed boring locations on 13 April 2022 with input from the WSP field team. Additional utility clearance was conducted on 23 June 2022 to accommodate sample step out locations and a concern with a potential obstruction at one sample location. WSP contracted Roaring Forks Utility Locators, LLC, a private utility location service, to perform the additional utility clearance at the Facility. General locating services and ground-penetrating radar (GPR) were used to complete the clearance. Additionally, the first 8 feet of each boring were pre-cleared by WSP's drilling subcontractor, Traut Companies, using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered. The utilities were cleared to this depth based on utility information provided by Facility personnel.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to meet acceptability criteria, as defined in the UFP-QAPP Addendum, prior to the start of field activities. A sample from a potable water source at the outside spigot on the northeast corner of Building 1214, was collected on 7 October 2021, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (DoD, 2020). During field activities, the previously sampled source did not provide sufficient flow for the volume of water needed for drilling. The water source was then moved to a larger valve in the maintenance room on the building's direct source of county water, which was tested on 9 June 2022. The results of the initial potable water sample and the second potable water sample (through the refill hose) used for drilling and decontamination of drilling equipment during the SI are provided in **Appendix F**. A discussion of the results is presented in the Data Usability Assessment (**Appendix A**).

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

5.2 HAND AUGER SOIL SAMPLING

During the first field event (13 April to 14 April 2022), a surface soil sample was collected from all eleven sample locations from 0 to 2 ft bgs using a hand auger. As AOI01-02 was located in a paved area, a sample of soil that had collected on the pavement near the AOI01-02 location, designated in this report as AOI01-2a, was taken to represent that location. The purpose of collecting surface soil samples prior to drilling activities was to use the results to determine how to manage IDW. All soil sample locations are shown on **Figure 5-1**. The hand auger locations were selected based on the AOI information provided in the PA (AECOM, 2020) and as agreed upon by stakeholders during the TPP and review of the UFP-QAPP Addendum (EA/Wood, 2022). Non-dedicated sampling equipment (i.e., hand auger) was decontaminated between sampling locations.

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain-of-custody (COC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15) in accordance with the UFP-QAPP Addendum. QC samples and analysis were performed as described in the UFP-QAPP Addendum (EA/Wood, 2022).

5.3 SOIL BORINGS AND SOIL SAMPLING

During the second field event (7 June to 14 July 2022), soil samples were collected via rotosonic drilling methods in accordance with Standard Operating Procedure 025 *Soil Sampling* (EA/Wood, 2022). A Layne track-mounted rig with 6-inch and 4-inch diameter core barrels were used to collect continuous soil cores to the target depth at five of the eleven sample locations (see Section 5.9 for a description of exceptions). The soil boring locations are shown on **Figure 5-1** and boring sample depths are provided in **Table 5-1**. Two boring locations were adjusted within

a 10-feet offset for reasons including drill rig access, utility avoidance and bias toward sampling within observed drainage features.

Up to three discrete soil samples were collected for chemical analysis from each soil boring: one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples. Surface samples were collected by hand auger at all 11 boring locations during the first field event. As AOI01-02 was located in a paved area, the initial surface soil sample was from soil that had collected on the paved area near the location (designated in this report as AOI01-02a), therefore, a second surface soil sample was collected under the pavement at the actual sample location during the second mobilization. One subsurface soil sample was collected at a shallow depth between 14 to 15 ft bgs at all eleven boring locations. Due to subsurface conditions, collecting a deep soil sample was possible at only five of the boring locations. These samples were collected approximately one foot above the groundwater saturation observed at drilling. Groundwater was encountered at depths ranging from 73.70 to 94 ft bgs during drilling. Total boring completion depths, ranged from 80 to 120 ft bgs, to accommodate temporary well installation.

During the drilling, the soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System at five of the eleven sample locations (see **Section 5.9** for a description of exceptions). A photoionization detector (PID) was used to screen the breathing zone during boring activities as a part of personal safety requirements. Observations and measurements were recorded on electronic sampling forms (**Appendix B2**). Depth interval, recovery thickness, PID concentrations, moisture, relative density, Munsell color, and Unified Soil Classification System texture were recorded. The boring logs are provided in **Appendix E**.

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard COC procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15), total organic carbon (TOC) (EPA Method 9060A), pH (EPA Method 9045D), and grain size (ASTM Method D-422) in accordance with the UFP-QAPP Addendum (EA/Wood, 2022).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike/matrix spike duplicate (MS/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 surface soil samples, one equipment blank (EB) was collected per day and analyzed for the same parameters as the soil samples. A temperature blank was placed in each cooler for use in confirming that samples were preserved at or below 6 degrees Celsius (°C) during shipment.

The sonic drilled borings were converted to temporary wells, which were subsequently abandoned after sampling and surveying in accordance with the UFP-QAPP Addendum (EA/Wood, 2022). After removal of the casings to a depth of at least 5 ft bgs, boreholes were abandoned using bentonite chips. Most boring were installed in grass or gravel areas to avoid disturbing concrete or asphalt surfaces. One location, AOI01-02, was drilled through the asphalt of a storage area off the flight apron/taxiway and surface completed with dyed asphalt cold

patch. A Facility member approved surface completions at all boring locations before the field crew demobilized.

5.4 TEMPORARY WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

Temporary wells were installed using a Layne track mounted sonic drilling rig with 6-inch and 4-inch core barrels. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 10 ft section of 1- or 2-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach the ground surface. New PVC pipe and screen were used at each location to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected from nine of the eleven temporary wells. Following installation of two wells (AOI01-01 and AOI01-05), the water level dropped below the screen, and it was not possible to collect groundwater samples. Water samples were collected after a period of time following well installation to allow drilling water to dissipate and groundwater to infiltrate and recharge the temporary well screen intervals, using a PFAS-free portable bladder pump with PFAS-free polyethylene bladders and dedicated HDPE tubing. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, oxidation-reduction potential, and turbidity) were measured using a water quality meter and turbidimeter and recorded on the field sampling form (**Appendix B2**) before each grab sample was collected in a separate container. Due to a damaged well casing, the groundwater sample from one location (HAATS-02) was collected using a 0.46” clear PVC Geotech Disposable Geobailer. A subsample of each groundwater sample was collected in a separate container, and a shaker test was completed to identify if there were any foaming. No foaming was noted in any of the groundwater samples.

Each sample was collected in 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 Version 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA/Wood 2022).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. When sampling, one FB was collected a day in accordance with the UFP-QAPP Addendum (EA/Wood, 2022). In instances when non-dedicated sampling equipment was used, such as a bladder pump, one EB was collected a day and analyzed for the same parameters as the groundwater samples. A temperature blank was placed in each cooler for use in confirming that samples were preserved at or below 6°C during shipment.

Following well surveying (described below in **Section 5.6**), temporary wells were abandoned in accordance with the SI UFP-QAPP Addendum (EA/Wood, 2022) by removing the PVC and backfilling the hole with bentonite chips.

5.5 SYNOPTIC WATER LEVEL MEASUREMENTS

A synoptic groundwater gauging event was performed on 14 July 2022. Groundwater elevation measurements were collected from nine of the eleven new temporary monitoring wells. Water level measurements were taken from the survey mark on the northern side of the well casing. Groundwater elevation data is provided in **Table 5-3**. A groundwater flow contour map is provided as **Figure 2-5**.

5.6 SURVEYING

The northern side of each new temporary well casing and ground surface at the top of each boring were surveyed using a Trimble R10 real-time kinematic differential global positioning system. Positions were collected in the applicable Universal Transverse Mercator zone projection for the Colorado Central 0502 State Plane Grid North American Datum 1983. Surveying data were collected on 14 July 2022 and are provided in **Appendix B3**.

5.7 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS IDW is not regulated federally. IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the UFP-QAPP Addendum (EA/Wood 2022).

For select locations where surface soil samples did not exceed SLs and the location condition allowed, soil cuttings were thin spread using a bucket loader or placed to not disturb the landscaping, depending on the volume returned. For locations where surface soil did exceed the SL, soil IDW (i.e., soil cuttings) generated during the SI activities were contained in labeled 55-gallon DOT approved steel drums and left onsite in an area designated by Facility personnel. The soil IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location. Liquid IDW generated during SI activities (i.e., purge water and decontamination fluids) were containerized in labeled, 275-gallon caged HPDE intermediate bulk containers and left onsite in an area designated by Facility personnel. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location. For select locations where surface soil samples did not exceed SL and the location condition allowed, return drilling water was purged away from the boring into Facility drainage features. All return water was containerized upon reaching the groundwater bearing zone.

Geographic coordinates were collected around each location where IDW was placed (i.e., an IDW polygon or point). The IDW polygons are displayed on the figure in **Appendix B5**.

The IDW disposal is being managed separately under a contract with EA Engineering, Science, and Technology, Inc. Specifics on the disposal of solid and liquid IDW will be addressed in an IDW Treatment Memorandum.

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.

5.8 LABORATORY ANALYTICAL METHODS

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

Soil samples were also analyzed for TOC using EPA Method 9060A, pH by EPA Method 9045D, and grain size using ASTM Method D-422.

5.9 Deviations from SI UFP-QAPP Addendum

Deviations from the UFP-QAPP Addendum occurred based on conditions encountered during field activities. These deviations were discussed between EA, WSP, ARNG, and USACE. Three deviations from the UFP-QAPP Addendum are noted below:

Due to subsurface conditions, drilling deeper than 20-40 ft bgs with an open ended drill bit proved extremely difficult for the equipment and tooling. In order to complete the borings and install temporary wells at AOI01-02, AOI01-04, AOI02-01, AOI02-02, and AOI03-01, a flat face drill bit was used deeper than approximately 15 ft bgs. As there is no core return when using the flat face drill bit, continuous cores were not collected. No deep subsurface samples were collected at these locations and only surface soil and shallow subsurface samples were collected. This change is noted in the Field Change Request Form provided in **Appendix B4**.

At HAATS-02, the PVC well casing was damaged (likely during installation) causing a constriction approximately 20 ft bgs. When field personnel attempted to collect a groundwater sample, the bladder pump could not be lowered past the constriction. A second attempt was made with a smaller bladder pump; however, it also could not be lowered past the well constriction. In order to get a sample from the temporary well, a 0.46” clear PVC Geotech Disposable Geobailer was used to collect the groundwater sample.

Due to the water used for drilling, it was difficult to accurately determine the groundwater level at the time of drilling. At sample locations AOI01-01 and AOI01-05, the wells were set based on observations made during drilling and groundwater depths observed at adjacent locations. After setting the wells and allowing them to sit overnight, it was determined that the groundwater level was below the bottom of the screen, and the wells were dry. The groundwater level was checked daily at both locations, however both wells remained dry for the duration of the event. Based on conversations with the ARNG, it was determined that it was not necessary to redrill these two wells because the surface soil results were above the SLs and this AOI would be going to RI based on the surface soil exceedances.

During purging of wells HAATS-03, HAATS-01, AOI01-03, AOI02-01, AOI02-02, and AOI03-01, not all water quality parameters stabilized prior to taking a groundwater sample. As the turbidity did not drop below 25 Nephelometric Turbidity Units, groundwater samples were collected after three 20 minute purge cycles had been completed (as indicated in the UFP-QAPP).

Table 5-1. Site Inspection Samples by Medium

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	TOC (EPA Method 9060A)	pH (EPA Method 9045D)	Grain Size (ASTM D422)	Comments
Soil Samples							
AOI01-01-SB-0-2	4/14/2022	0-2	x				Parent Sample of DUP-01-SB-0-2
DUP-01-SB-0-2	4/14/2022	0-2	x				Field Duplicate
AOI01-01-SB-14-15	6/17/2022	14-15	x				
AOI01-01-SB-74-75	6/17/2022	74-75	x				
AOI01-02-SB-0-2	4/14/2022	0-2	x				Collected from AOI01-02a (surface soil sample collected from on top of pavement near the AOI01-02 location)
AOI01-02-SB-0-2	6/28/2022	0-2	x				Surface soil sample collected from actual AOI01-02 location
AOI01-02-SB-1-3	6/28/2022	1-3	x				
AOI01-02-SB-14-15	6/28/2022	14-15	x				
AOI01-03-SB-0-2	4/14/2022	0-2	x				Parent Sample of DUP-02-SB-0-2
DUP-02-SB-0-2	4/14/2022	0-2	x				Field Duplicate
AOI01-03-SB-14-15	6/23/2022	14-15	x				
AOI01-03-SB-74-75	6/23/2022	74-75	x				
AOI01-04-SB-0-2	4/14/2022	0-2	x				
AOI01-04-SB-14-15	7/12/2022	14-15	x	x	x	x	
AOI01-05-SB-0-2	4/14/2022	0-2	x				
AOI01-05-SB-0-2-MS	4/14/2022	0-2	x				
AOI01-05-SB-0-2-MSD	4/14/2022	0-2	x				
AOI01-05-SB-14-15	6/22/2022	14-15	x	x	x	x	Parent Sample of DUP-01-TOC-pH-grain size
DUP-01-TOC-pH-grain size	6/22/2022	14-15	x	x	x	x	Field Duplicate
AOI01-05-SB-84-85	6/22/2022	84-85	x				
AOI02-01-SB-0-2	4/14/2022	0-2	x				
AOI02-01-SB-14-15	6/24/2022	14-15	x	x	x	x	Parent Sample of HAATS-DUP-02-SB
AOI02-01-SB-14-15-MS	6/24/2022	14-15	x				
AOI02-01-SB-14-15-MSD	6/24/2022	14-15	x				
HAATS-DUP-02-SB	6/24/2022	14-15	x				Field Duplicate
AOI02-02-SB-0-2	4/14/2022	0-2	x				

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	TOC (EPA Method 9060A)	pH (EPA Method 9045D)	Grain Size (ASTM D422)	Comments
AOI02-02-SB-14-15	7/1/2022	14-15	x				Parent Sample of HAATS-DUP-03-SB
HAATS-DUP-03-SB	7/1/2022	14-15	x				Field Duplicate
AOI03-01-SB-0-2	4/14/2022	0-2	x				
AOI03-01-SB-14-15	7/13/2022	14-15	x	x	x	x	
AOI03-01-SB-14-15-MS	7/13/2022	14-15	x				
AOI03-01-SB-14-15-MSD	7/13/2022	14-15	x				
HAATS-01-SB-0-2	4/13/2022	0-2	x				
HAATS-01-SB-14-15	6/15/2022	14-15	x				
HAATS-01-SB-78-79	6/16/2022	78-79	x				
HAATS-02-SB-0-2	4/14/2022	0-2	x				
HAATS-02-SB-14-15	6/21/2022	14-15	x				Parent Sample of HAATS-DUP-01-SB
HAATS-DUP-01-SB	6/21/2022	14-15	x				Field Duplicate
HAATS-02-SB-87-88	6/21/2022	87-88	x				
HAATS-03-SB-0-2	4/14/2022	0-2	x				
Groundwater Samples							
AOI01-02-GW	7/12/2022	110	x				
AOI01-02-GW-MS	7/12/2022	110	x				
AOI01-02-GW-MSD	7/12/2022	110	x				
AOI01-03-GW	6/27/2022	115	x				Parent Sample of HAATS-DUP-01-GW
HAATS-DUP-01-GW	6/27/2022	115	x				Field Duplicate
AOI01-04-GW	7/13/2022	110	x				
AOI02-01-GW	6/29/2022	115	x				Parent Sample of HAATS-DUP-02-GW
HAATS-DUP-02-GW	6/29/2022	115	x				Field Duplicate
AOI02-02-GW	6/29/2022	110	x				
AOI03-01-GW	7/14/2022	110	x				
HAATS-01-GW	6/17/2022	80	x				
HAATS-02-GW	7/12/2022	73	x				
HAATS-03-GW	6/16/2022	97	x				
Blank Samples							
EB-04-13	4/13/2022	--	x				Equipment Blank Collected from Hand Auger
EB-04-14	4/14/2022	--	x				Equipment Blank Collected from Hand Auger
EB-DECONHOSE-1-JUN-9	6/9/2022	--	x				Equipment Blank Collected from

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	TOC (EPA Method 9060A)	pH (EPA Method 9045D)	Grain Size (ASTM D422)	Comments
							Decon Water Supply Hose
EB-DECONHOSE-2-JUN-9	6/9/2022	--	x				Equipment Blank Collected from Decon Water Supply Hose
EB-HOSE-2IN-JUN-9	6/9/2022	--	x				Second Potable Water Sample
EB-JUN-15	6/15/2022	--	x				Equipment Blank from Stainless Steel Screen (not used)
EB-JUN-16	6/16/2022	--	x				Equipment Blank Collected from Water Storage Tank
EB-JUN-17	6/17/2022	--	x				Equipment Blank Collected from Water Level Meter
EB-JUN-21	6/21/2022	--	x				Equipment Blank Collected from Hand Auger
EB-JUN-22	6/22/2022	--	x				Equipment Blank Collected from Hand Auger
EB-JUN-27	6/27/2022	--	x				Equipment Blank Collected from Bladder Pump
EB-JUN-28	6/28/2022	--	x				Equipment Blank Collected from Hand Auger
EB-JUN-29	6/29/2022	--	x				Equipment Blank Collected from Water Level Meter
EB-JUN-30	6/30/2022	--	x				Equipment Blank Collected from Drill Rod
EB-1-JUL-12	7/12/2022	--	x				Equipment Blank Collected from Bailer
EB-2-JUL-12	7/12/2022	--	x				Equipment Blank Collected from Drill Rod
EB-1-JUL-13	7/13/2022	--	x				Equipment Blank Collected from Bladder Pump
EB-2-JUL-13	7/13/2022	--	x				Equipment Blank Collected from

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	TOC (EPA Method 9060A)	pH (EPA Method 9045D)	Grain Size (ASTM D422)	Comments
							Drill Rod
EB-JUL-14	7/14/2022	--	x				Equipment Blank Collected from Water Level Meter
FB-04-13	4/13/2022	--	x				Field Blank
FB-04-14	4/14/2022	--	x				Field Blank
FB-JUN-15	6/15/2022	--	x				Field Blank
FB-JUN-16	6/16/2022	--	x				Field Blank
FB-JUN-17	6/17/2022	--	x				Field Blank
FB-JUN-21	6/21/2022	--	x				Field Blank
FB-JUN-22	6/22/2022	--	x				Field Blank
FB-JUN-23	6/23/2022	--	x				Field Blank
FB-JUN-24	6/24/2022	--	x				Field Blank
FB-JUN-27	6/27/2022	--	x				Field Blank
FB-JUN-28	6/28/2022	--	x				Field Blank
FB-JUN-29	6/29/2022	--	x				Field Blank
FB-JUN-30	6/30/2022	--	x				Field Blank
FB-JUL-1	7/1/2022	--	x				Field Blank
FB-JUL-11	7/11/2022	--	x				Field Blank
FB-JUL-12	7/12/2022	--	x				Field Blank
FB-JUL-13	7/13/2022	--	x				Field Blank
FB-JUL-14	7/14/2022	--	x				Field Blank

Notes:
ASTM = American Society for Testing and Materials
EB = equipment blank
FB = field blank
DUP = field duplicate
ft bgs = feet below ground surface
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = per- and polyfluoroalkyl substances
TOC = total organic carbon
EPA = Environmental Protection Agency

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals

Area of Interest	Boring Location	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval (ft bgs)
Boundary	HAATS-01	90	80 - 90
	HAATS-02	93	83 - 93
	HAATS-03	107	97 - 107
1	AOI01-01	80	70 - 80
	AOI01-02	115	105 - 115
	AOI01-03	120	110 - 120
	AOI01-04	115	105 - 115
	AOI01-05	90	80 - 90
2	AOI02-01	120	110 - 120
	AOI02-02	115	105 - 115
3	AOI03-01	115	105 - 115

Notes:
ft bgs = feet below ground surface

Table 5-3. Groundwater Elevation

Monitoring Well ID	Top of Casing Elevation (ft NAVD88)	Depth to Water (ft btoc)	Groundwater Elevation (ft NAVD 88)
HAATS-01	6451.792	75.68	6376.11
HAATS-02	6447.446	74.19	6373.26
HAATS-03	6458.712	80.02	6378.69
AOI01-01	6458.321	DRY	NA
AOI01-02	6454.755	83.72	6371.04
AOI01-03	6449.029	78.60	6370.43
AOI01-04	6451.414	80.07	6371.34
AOI01-05	6445.444	DRY	NA
AOI02-01	6447.838	91.80	6356.04
AOI02-02	6445.829	94.20	6351.63
AOI03-01	6442.815	94.77	6348.05

Notes:
btoc = below top of casing
ft = feet
NA = not applicable, wells were dry
NAVD88 = North American Vertical Datum 1988

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Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

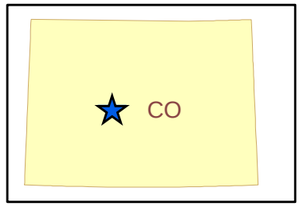

Figure 5-1
Site Inspection Sample Locations

Facility Data

- Site Inspection Sample Location
- Surface Water Flow Direction
- Facility Boundary
- Area of Interest

Data Sources:
ESRI 2020
AECOM 2020

Date:.....JANUARY 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

P:\Project\AMEC Inter-Office Projects\3031200026 HAATS\3031200026 HAATS\5-1_SiteInspectionSampleLocations.mxd

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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** and **Table 6-1**. A discussion of the results for each AOI is provided in **Sections 6.3** through **6.5**. **Tables 6-2** through **6-5** 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 concentration for sampled media exceed the SLs established in the July 2022 OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the July 2022 OSD memorandum apply to the five compounds presented on **Table 6-1**.

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

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

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

Abbreviations:
µg/kg = microgram(s) per kilogram
bgs = below ground surface
ft = feet
ng/L = nanogram(s) per liter

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the Facility: the residential scenario is applied to surface soil results (0 to 2 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, pH, and grain size, which are important for evaluating transport through the soil medium. **Appendix G** contains the results of the TOC, pH, and grain size sampling.

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

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1: Parking Apron/Taxiway. The soil and groundwater results are summarized in **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figures 6-1** through **Figure 6-7**.

6.3.1 AOI 1 Soil Analytical Results

Soil samples were collected from five boring locations associated with AOI 1 during the SI. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Tables 6-2** through **Table 6-4** summarize the soil results.

Surface soil (0 to 2 ft bgs) was sampled from five AOI 1 boring locations (AOI01-01 through AOI01-05) and three locations that were upgradient of AOI 1 (HAATS-01, HAATS-02, and HAATS-03). Soil was sampled from shallow subsurface soil intervals (14 to 15 ft bgs) from boring locations AOI01-01 through AOI01-05, HAATS-01, and HAATS-02. Soil was also sampled from deep subsurface soil intervals (74 to 88 ft bgs) from boring locations AOI01-01, AOI01-03, AOI01-05, HAATS-01, and HAATS-02.

PFOS was detected in surface soil from AOI 1 at concentrations exceeding the SL. PFHxS, PFNA, and PFOA were detected in surface soil below their respective SLs at AOI 1 sample locations. PFOS was detected at four of the five AOI 1 sample locations at concentrations that ranged from 5.2 J micrograms per kilogram (µg/kg) to 38 µg/kg and exceeded the SL at three of the locations (AOI01-01 and its duplicate, AOI01-03 [but not its duplicate], and AOI01-05). PFOS was detected in the initial surface soil sample collected near AOI01-02 (designated as AOI01-02a and taken during the first field event) but was not detected in the surface soil sample taken from beneath the asphalt at the AOI01-02 location. PFOA was detected at three of the five AOI 1 locations with concentrations ranging from 0.24 J µg/kg to 0.42 J µg/kg. PFOA was detected at the surface soil sample taken from AOI01-02a, but was not detected in the surface soil sample taken from AOI01-02. PFHxS was detected at four of the five AOI 1 locations with concentrations ranging from 0.52 J µg/kg to 0.99 µg/kg. PFHxS was detected in both the surface soil sample collected at AOI01-02a and at AOI01-02. PFNA was only detected in the surface soil sample collected from AOI01-02a. PFBS was not detected in the surface soil samples.

PFOS, PFOA, and PFHxS were detected in the surface soil samples taken from the upgradient locations (HAATS-01, HAATS-02, and HAATS-03) below their respective SLs. PFOS was detected at all three locations at concentrations ranging from 0.53 J µg/kg to 9.4 µg/kg. PFOA was detected at two of the three locations at 0.21 J µg/kg and 0.31 J µg/kg. PFHxS was detected at all three locations at concentrations ranging from 0.29 J µg/kg to 0.56 J µg/kg. PFBS and PFNA were not detected in the surface soil samples from the three upgradient locations.

PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in the shallow or deep subsurface soil samples at the AOI 1 (AOI01-01, AOI01-03, and AOI01-05) or the upgradient sample locations (HAATS-01 and HAATS-02).

6.3.2 AOI 1 Groundwater Analytical Results

Groundwater samples were collected from three temporary monitoring wells associated with AOI 1 during the SI (AOI01-02, AOI01-03, and AOI01-04). Additionally, groundwater samples were collected from the three temporary monitoring wells located upgradient of AOI 1 (HAATS-01, HAATS-02, and HAATS-03). **Figures 6-6 and 6-7** presents the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

PFOA was detected at a concentration exceeding its SL at one AOI 1 temporary monitoring well. PFBS and PFHxS were detected at AOI 1 groundwater sample locations below their respective SLs. PFOA was detected at one of the three sampled AOI 1 temporary monitoring wells at a concentration of 8.0 ng/L (AOI01-02), which exceeded the SL. PFBS was detected at two of the three sampled AOI 1 temporary monitoring wells at 0.63 J ng/L (in the duplicate sample taken at AOI01-03, but not the primary sample) and 15 ng/L. PFHxS was detected at one of the sampled AOI 1 temporary monitoring wells at a concentration of 6.3 ng/L. PFNA and PFOS were not detected at the three sampled AOI 1 temporary monitoring wells.

PFOS and PFOA were detected at concentrations exceeding their respective SLs at the temporary monitoring wells located upgradient of AOI 1. PFBS, PFHxS, and PFNA were detected below their SLs at the groundwater sample locations upgradient of AOI 1. PFOA was detected at all three upgradient temporary monitoring wells at concentrations ranging from 2.2 J+

ng/L to 21 ng/L and exceeded its SL at two locations (HAATS-01 and HAATS-03). PFOS was detected at two of the three upgradient temporary monitoring wells at 2.3 J+ ng/L and 5.4 ng/L and exceeded its SL at one location (HAATS-02). PFBS was detected at all three upgradient temporary monitoring wells at concentrations ranging from 0.45 J ng/L to 13 J+ ng/L. PFHxS was detected at all three upgradient temporary monitoring wells at concentrations ranging from 2.9 ng/L to 23 J+ ng/L. PFNA was detected at one of the three upgradient temporary monitoring wells at 1.2 J ng/L.

6.3.3 Conclusions

Based on the results of the SI, PFOS was detected in soil above its SL at three of the five AOI 1 sample locations. PFOA was detected in groundwater exceeding its SL at one AOI 1 sample location. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 1 is warranted. Concentrations of PFOA and PFOS were detected in groundwater above their respective SLs at upgradient temporary monitoring well locations. These results may indicate a potential off-facility source upgradient of AOI 1.

6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2: HAZMAT Storage Area. The soil and groundwater results are summarized in **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figures 6-1** through **Figure 6-7**.

6.4.1 AOI 2 Soil Analytical Results

Soil samples were collected from two boring locations associated with AOI 2 during the SI. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Tables 6-2** through **Table 6-4** summarize the soil results.

Surface soil (0 to 2 ft bgs) was sampled from boring locations AOI02-01 and AOI02-02. Soil was also sampled from shallow subsurface soil (14 to 15 ft bgs) from boring locations AOI02-01 and AOI02-02. No deep subsurface soil samples were collected at AOI 2.

PFOS was detected in surface soil at concentrations exceeding the SL. PFOA and PFHxS were detected in surface soil at concentrations below their respective SLs. PFOS was detected at both sample locations at 0.98 µg/kg and 22 µg/kg and exceeded the SL at one location (AOI02-01). PFOA was detected at one of the sample locations with a concentration of 0.34 J µg/kg. PFHxS was detected at both locations at 0.41 J µg/kg and 0.62 J µg/kg. PFBS and PFNA were not detected in the surface soil samples.

PFOS and PFHxS were detected in shallow subsurface soil at concentrations below their respective SLs. PFOS was detected at one of the two sample locations at 60 J- µg/kg (48 µg/kg in its duplicate). PFHxS was detected at one of the two sample locations at 2.6 µg/kg (2.5 µg/kg in its duplicate). PFOA, PFBS and PFNA were not detected in the shallow subsurface soil samples.

Deep subsurface soil samples were not collected at AOI 2.

6.4.2 AOI 2 Groundwater Analytical Results

Groundwater samples were collected from two temporary wells associated with AOI 2 during the SI. **Figures 6-6 and 6-7** presents the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring well locations AOI02-01 and AOI02-02.

PFOA and PFHxS were detected at concentrations exceeding their respective SLs. PFBS and PFOS were detected at concentrations below their respective SLs. PFOA was detected at one of the two temporary monitoring wells at a concentration of 6.1 ng/L which exceeded the SL. PFHxS was detected at both sample locations at 1.4 J+ ng/L (1.1 J ng/L in the duplicate) and 63 ng/L and exceeded the SL at one location (A0I02-02). PFOS was detected at one location at a concentration of 1.8 J+ ng/L. PFBS was detected at one location at a concentration of 27 ng/L. PFNA was not detected in AOI 2 groundwater samples.

6.4.3 Conclusions

Based on the results of the SI, PFOS was detected in soil above its SL. PFOA and PFHxS were detected in groundwater at concentrations above their respective SLs. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 2 is warranted.

6.5 AOI 3

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 3: Building 1214. The soil and groundwater results are summarized in **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figures 6-1** through **Figure 6-7**.

6.5.1 AOI 3 Soil Analytical Results

Soil samples were collected from one boring location associated with AOI 3 during the SI. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Tables 6-2** and **Table 6-4** summarize the soil results.

Surface soil (0 to 2 ft bgs) was sampled from boring location AOI03-01. Soil was also sampled from shallow subsurface soil (14 to 15 ft bgs) from boring location AOI03-01. No deep subsurface soil samples were collected at AOI 3.

PFOS and PFHxS were detected in surface soil at concentrations below their respective SLs. PFOS was detected with a concentration of 2.8 J µg/kg. PFHxS was detected at a concentration of 0.51 J µg/kg. PFOA, PFNA, and PFBS were not detected in the surface soil samples.

PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in the shallow subsurface soil sample.

6.5.2 AOI 3 Groundwater Analytical Results

Groundwater samples were collected from one temporary well associated with AOI 3 during the SI. **Figures 6-6 and 6-7** presents the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring well location AOI03-01.

PFHxS and PFBS were detected at concentrations below their respective SLs. PFHxS was detected at a concentration of 4.4 ng/L. PFBS was detected at a concentration of 1.9 ng/L. PFOA, PFOS, and PFNA were not detected in the AOI 3 groundwater sample.

6.5.3 Conclusions

Based on the results of the SI, PFOS and PFHxS were detected in soil below their respective SLs. PFHxS and PFBS were detected in groundwater at concentrations below their respective SLs. There were no exceedances of the SLs in soil or groundwater, and no further evaluation at AOI 3 is warranted.

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

Area of Interest		AOI01															
Location ID		AOI01-01		AOI01-01-SB-0-2 (Duplicate)		AOI01-02*		AOI01-02		AOI01-03		AOI01-03-SB-0-2 (Duplicate)		AOI01-04		AOI01-05	
Sample ID		AOI01-01-SB-0-2		DUP-01-SB-0-2		AOI01-02-SB-0-2		AOI01-02-SB-1-3		AOI01-03-SB-0-2		DUP-02-SB-0-2		AOI01-04-SB-0-2		AOI01-05-SB-0-2	
Sample Date		4/14/2022		4/14/2022		4/14/2022		6/28/2022		4/14/2022		4/14/2022		4/14/2022		4/14/2022	
Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		1 - 3 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																	
PFBS	1900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.62	J	0.62	J	0.98		0.86		0.99		0.52	J	ND	U	0.99	
PFNA	19	ND	U	ND	U	0.23	J	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	19	ND	U	ND	U	0.33	J	ND	U	0.24	J	0.25	J	ND	U	0.42	J
PFOS	13	38		23		13		ND	U	27		5.2	J	7.0		26	

Notes

Gray Fill — Detected concentration exceeded OSD Screening Levels

*Surface soil sample collected on 4/14/2022 consisted of sediment collecting on asphalt. A second surface soil sample was collected below the asphalt on 6/28/2022.

Chemical Abbreviations

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

References

1. 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.* The screening levels for soil are 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.

Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
AOI	Area of Interest
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

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

Area of Interest		AOI02				AOI03		HAATS					
Location ID		AOI02-01		AOI02-02		AOI03-01		HAATS-01		HAATS-02		HAATS-03	
Sample ID		AOI02-01-SB-0-2		AOI02-02-SB-0-2		AOI03-01-SB-0-2		HAATS-01-SB-0-2		HAATS-02-SB-0-2		HAATS-03-SB-0-2	
Sample Date		4/14/2022		4/14/2022		4/14/2022		4/13/2022		4/14/2022		4/14/2022	
Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)													
PFBS	1900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.62	J	0.41	J	0.51	J	0.56	J	0.29	J	0.43	J
PFNA	19	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	19	0.34	J	ND	U	ND	U	ND	U	0.21	J	0.31	J
PFOS	13	22		0.98		2.8	J	7.8		0.53	J	9.4	

Notes

Gray Fill Detected concentration exceeded OSD Screening Levels

*Surface soil sample collected on 4/14/2022 consisted of sediment collecting on asphalt. A second surface soil sample was collected below the asphalt on 6/28/2022.

Chemical Abbreviations

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

References

1. 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.* The screening levels for soil are 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.

Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
AOI	Area of Interest
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

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

Area of Interest		AOI01									
Location ID		AOI01-01		AOI01-02		AOI01-03		AOI01-04		AOI01-05	
Sample ID		AOI01-01-SB-14-15		AOI01-02-SB-14-15		AOI01-03-SB-14-15		AOI01-04-SB-14-15		AOI01-05-SB-14-15	
Sample Date		6/17/2022		6/28/2022		6/23/2022		7/12/2022		6/22/2022	
Depth		14 - 15 ft		14 - 15 ft		14 - 15 ft		14 - 15 ft		14 - 15 ft	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFBS	25000	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	ND	U	ND	U	ND	U	ND	U	ND	U

Notes

Gray Fill — Detected concentration exceeded OSD Screening Levels

References

1. 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.* The screening levels for soil are based on Industrial/Commercial Composite Worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = The result is an estimated quantity.
J-= The result is an estimated quantity, but the result may be biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted DL.

Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
AOI	Area of Interest
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

Chemical Abbreviations

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

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

Area of Interest		AOI02								AOI03	
Location ID		AOI02-01		AOI02-01-SB-14-15 (Duplicate)		AOI02-02		AOI02-02-SB-14-15 (Duplicate)		AOI03-01	
Sample ID		AOI02-01-SB-14-15		HAATS-DUP-02-SB		AOI02-02-SB-14-15		HAATS-DUP-03-SB		AOI03-01-SB-14-15	
Sample Date		6/24/2022		6/24/2022		7/1/2022		7/1/2022		7/13/2022	
Depth		14 - 15 ft		14 - 15 ft		14 - 15 ft		14 - 15 ft		14 - 15 ft	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFBS	25000	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	2.6		2.5		ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	60	J-	48		ND	U	ND	U	ND	U

Notes

Gray Fill — Detected concentration exceeded OSD Screening Levels

Chemical Abbreviations

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

References

1. 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.* The screening levels for soil are based on Industrial/Commercial Composite Worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = The result is an estimated quantity.
J-= The result is an estimated quantity, but the result may be biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted DL.

Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
AOI	Area of Interest
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

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

	Area of Interest	HAATS					
	Location ID	HAATS-01		HAATS-02		HAATS-02-SB-14-15 (Duplicate)	
	Sample ID	HAATS-01-SB-14-15		HAATS-02-SB-14-15		HAATS-DUP-01-SB	
	Sample Date	6/15/2022		6/21/2022		6/21/2022	
	Depth	14 - 15 ft		14 - 15 ft		14 - 15 ft	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFBS	25000	ND	U	ND	U	ND	U
PFHxS	1600	ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U
PFOS	160	ND	U	ND	U	ND	U

Notes

Gray Fill — Detected concentration exceeded OSD Screening Levels

References

1. 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.* The screening levels for soil are based on Industrial/Commercial Composite Worker scenario for incidental ingestion of contaminated soil.

Chemical Abbreviations

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

Interpreted Qualifiers

J = The result is an estimated quantity.
J-= The result is an estimated quantity, but the result may be biased low.
U = The analyte was not detected at a level greater than or equal to the adjusted DL.

Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
AOI	Area of Interest
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

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

Area of Interest	AOI01						HAATS			
Location ID	AOI01-01		AOI01-03		AOI01-05		HAATS-01		HAATS-02	
Sample ID	AOI01-01-SB-74-75		AOI01-03-SB-74-75		AOI01-05-SB-84-85		HAATS-01-SB-78-79		HAATS-02-SB-87-88	
Sample Date	6/17/2022		6/23/2022		6/22/2022		6/16/2022		6/21/2022	
Depth	74 - 75 ft		74 - 75 ft		84 - 85 ft		78 - 79 ft		87 - 88 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)										
PFBS	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	ND	U	ND	U	ND	U	ND	U	ND	U

Notes
Screening levels are not applied to deep subsurface soil results (>15 feet bgs) because 15 feet is the anticipated limit of construction activities.

Interpreted Qualifiers
J = The result is an estimated quantity.
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

µg/kg	microgram(s) per kilogram
AOI	Area of Interest
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

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

Area of Interest		AOI01							
Location ID		AOI01-02		AOI01-03		AOI01-03-GW (Duplicate)		AOI01-04	
Sample ID		AOI01-02-GW		AOI01-03-GW		HAATS-DUP-01-GW		AOI01-04-GW	
Sample Date		7/12/2022		6/27/2022		6/27/2022		7/13/2022	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)									
PFBS	601	15		ND	U	0.63	J	ND	U
PFHxS	39	6.3		ND	U	ND	U	ND	U
PFNA	6	ND	U	ND	U	ND	U	ND	U
PFOA	6	8.0		ND	U	ND	U	ND	U
PFOS	4	ND	U	ND	U	ND	U	ND	U

Notes

Gray Fill — Detected concentration exceeded OSD Screening Levels

References

1. 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.
J+ = The result is an estimated quantity, but the result may be biased high.
J-= The result is an estimated quantity, but the result may be biased low.
U = The analyte was not detected 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
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
ng/L	nanogram(s) per liter
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

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

Area of Interest		AOI02						AOI03		HAATS					
Location ID		AOI02-01		AOI02-01-GW (Duplicate)		AOI02-02		AOI03-01		HAATS-01		HAATS-02		HAATS-03	
Sample ID		AOI02-01-GW		HAATS-DUP-02-GW		AOI02-02-GW		AOI03-01-GW		HAATS-01-GW		HAATS-02-GW		HAATS-03-GW	
Sample Date		6/29/2022		6/29/2022		6/29/2022		7/14/2022		6/17/2022		7/12/2022		6/16/2022	
Analyte	**OSD Screening Level [1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)															
PFBS	601	ND	U	ND	U	27		1.9		13	J+	0.45	J	6.9	
PFHxS	39	1.4	J+	1.1	J	63		4.4		23	J+	2.9		9.0	
PFNA	6	ND	UJ	ND	U	ND	U	ND	U	ND	UJ	ND	U	1.2	J
PFOA	6	ND	UJ	ND	U	6.1		ND	U	7.6	J+	2.2	J+	21	
PFOS	4	ND	UJ	ND	U	1.8	J+	ND	U	2.3	J+	5.4		ND	U

Notes

Gray Fill — Detected concentration exceeded OSD Screening Levels

References

1. 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.
J+ = The result is an estimated quantity, but the result may be biased high.
J-= The result is an estimated quantity, but the result may be biased low.
U = The analyte was not detected 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
DUP	duplicate
HAATS	High Altitude Army Training Site
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
ng/L	nanogram(s) per liter
OSD	Office of the Secretary of the Defense
QSM	Quality Systems Manual
PFAS	per- and polyfluoroalkyl substances
SB	soil boring
USEPA	United States Environmental Protection Agency
Qual	interpreted qualifier

Army National Guard Site Inspections
High Altitude Aviation Training Site
Gypsum, Colorado

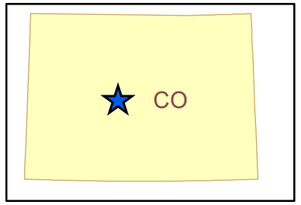
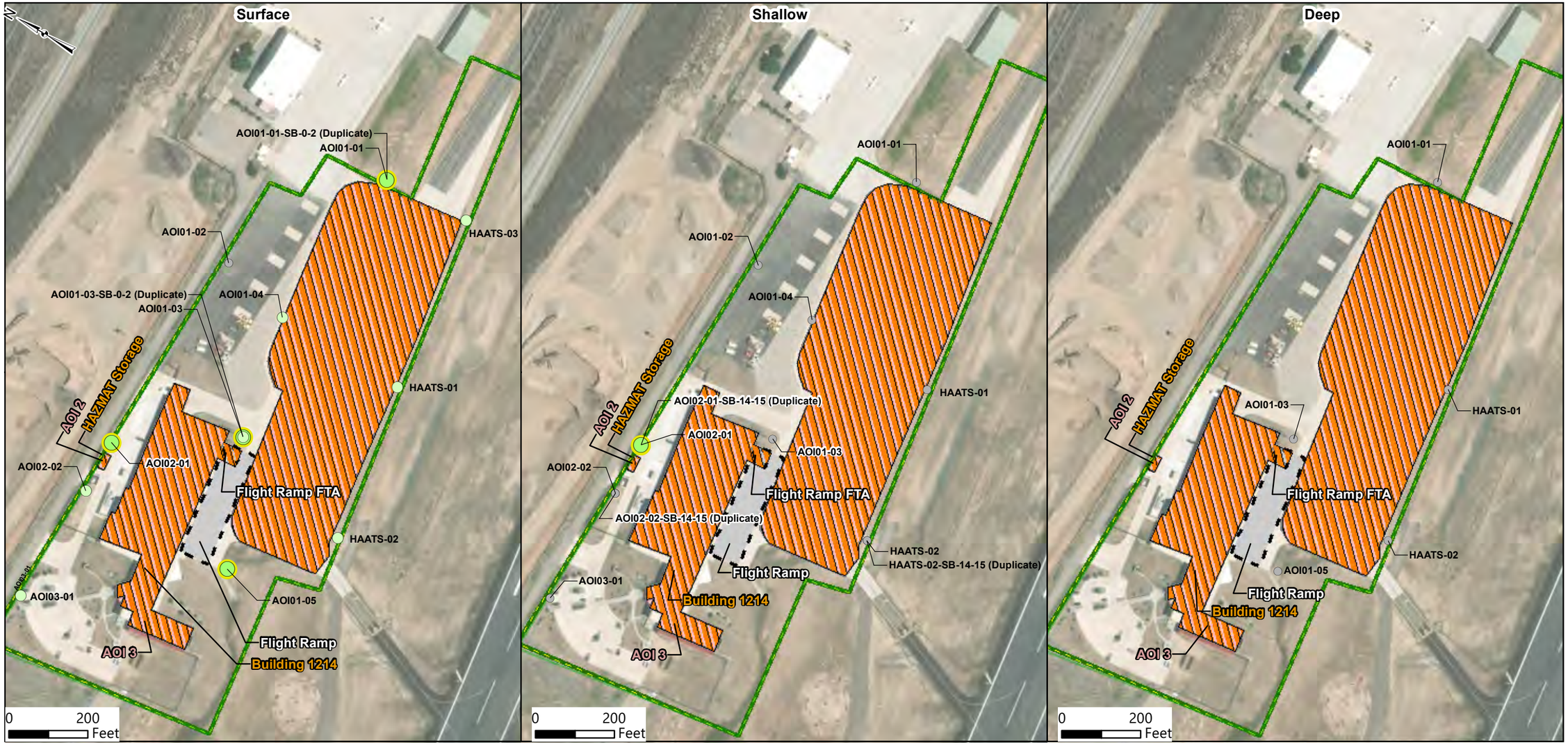


Figure 6-1
PFOS Detections in Soil



Facility Data

- Potential PFAS Release Site
- No Suspected Release
- Facility Boundary
- Area of Interest

PFOS Results (µg/Kg)

- ND
- >ND - 13
- >13 - 250
- >250 - 2,500
- >2,500

Notes:

PFOS = perfluorooctanesulfonic acid
ND = Not Detected
(µg/Kg = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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High Altitude Aviation Training Site
Gypsum, Colorado

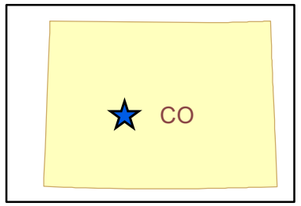

Figure 6-2
PFOA Detections in Soil

Facility Data

- No Suspected Release
- Potential PFAS Release Site
- Facility Boundary
- Area of Interest

PFOA Results (µg/Kg)

- ND
- >ND - 19
- >19 - 160
- >160 - 1,600
- >1,600

Notes:

PFOA = perfluorooctanoic acid
ND = Not Detected
(µg/Kg = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....JANUARY 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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Gypsum, Colorado

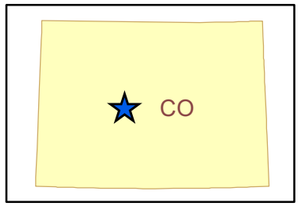

Figure 6-3
PFBS Detections in Soil

Explanation:

- No Suspected Release
- Potential PFAS Release Site
- Facility Boundary
- Area of Interest

PFBS Results (µg/Kg)

- ND
- >ND - 10
- >10 - 1,900
- >1,900 - 25,000
- >25,000

Notes:

PFBS = perfluorobutanesulfonic acid
ND = Not Detected
(µg/Kg = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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High Altitude Aviation Training Site
Gypsum, Colorado

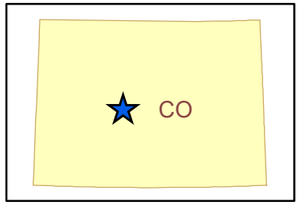

Figure 6-4
PFHxS Detections in Soil

Facility Data

- No Suspected Release
- Potential PFAS Release Site
- Area of Interest
- Facility Boundary

PFHxS Results (µg/Kg)

- ND
- >ND - 10
- >10 - 130
- >130 - 1,600
- >1,600

Notes:

PFHXs = perfluorohexanesulfonic acid
ND = Not Detected
(µg/Kg = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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High Altitude Aviation Training Site
Gypsum, Colorado

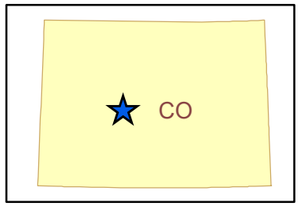
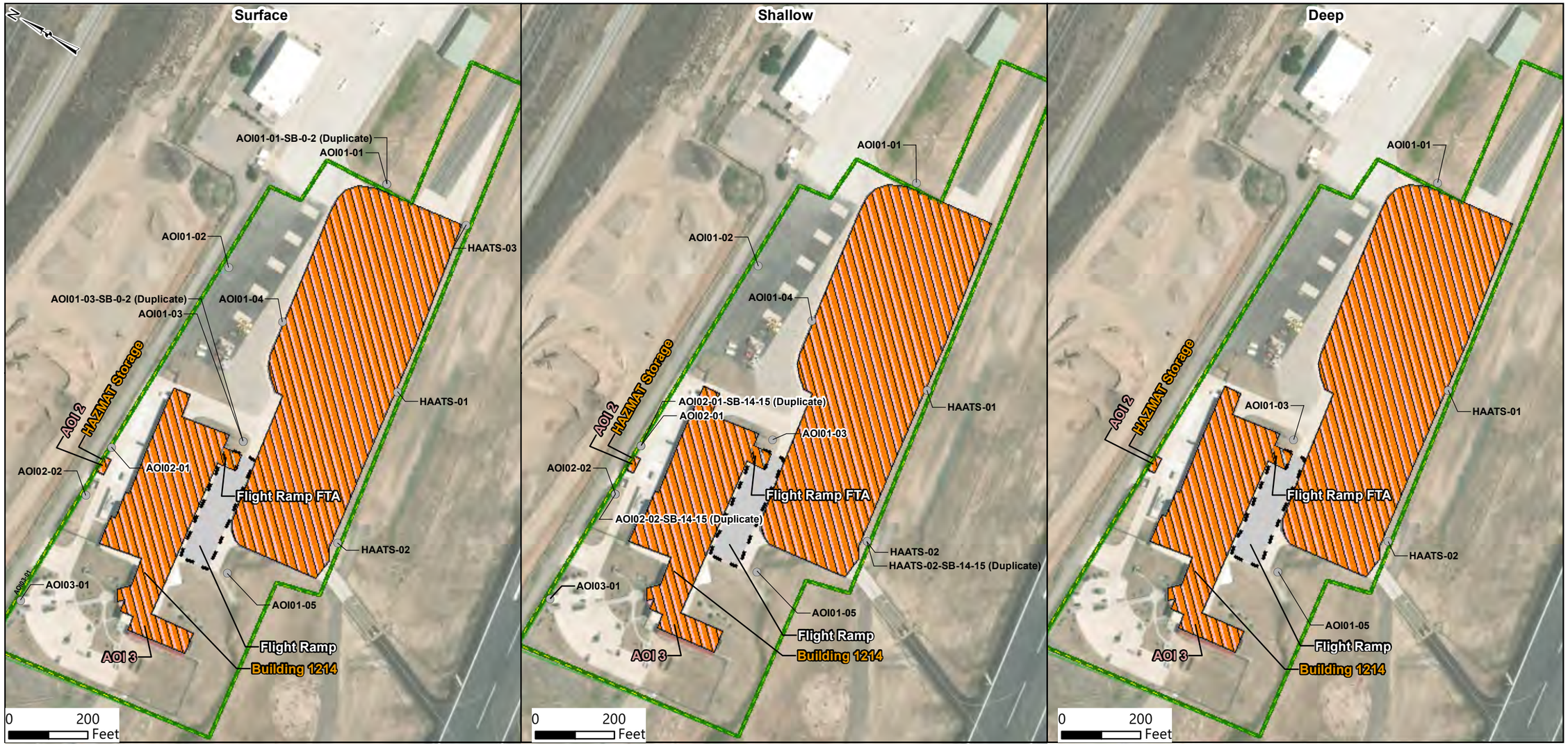


Figure 6-5
PFNA Detections in Soil



Facility Data

- No Suspected Release
- Potential PFAS Release Site
- Area of Interest
- Facility Boundary

PFNA Results (µg/Kg)

- ND
- >ND - 19
- >19 - 250
- >250 - 2,500
- >2,500

Notes:

PFNA = perfluorononanoic acid
ND = Not Detected
(µg/Kg = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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Gypsum, Colorado

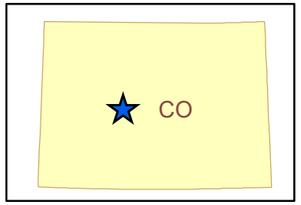

Figure 6-6
PFOA, PFOS, and PFBS Detections in Groundwater

Explanation:

- No Suspected Release
- Potential PFAS Release Site
- Area of Interest
- Facility Boundary

Notes:

PFOS = perfluorooctanesulfonic acid
PFOA = perfluorooctanoic acid
PFBS = perfluorobutanesulfonic acid
ND = Not Detected
ng/L = Nanogram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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High Altitude Aviation Training Site
Gypsum, Colorado

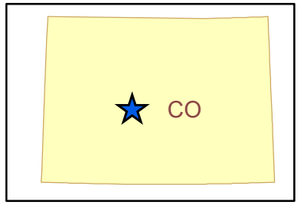
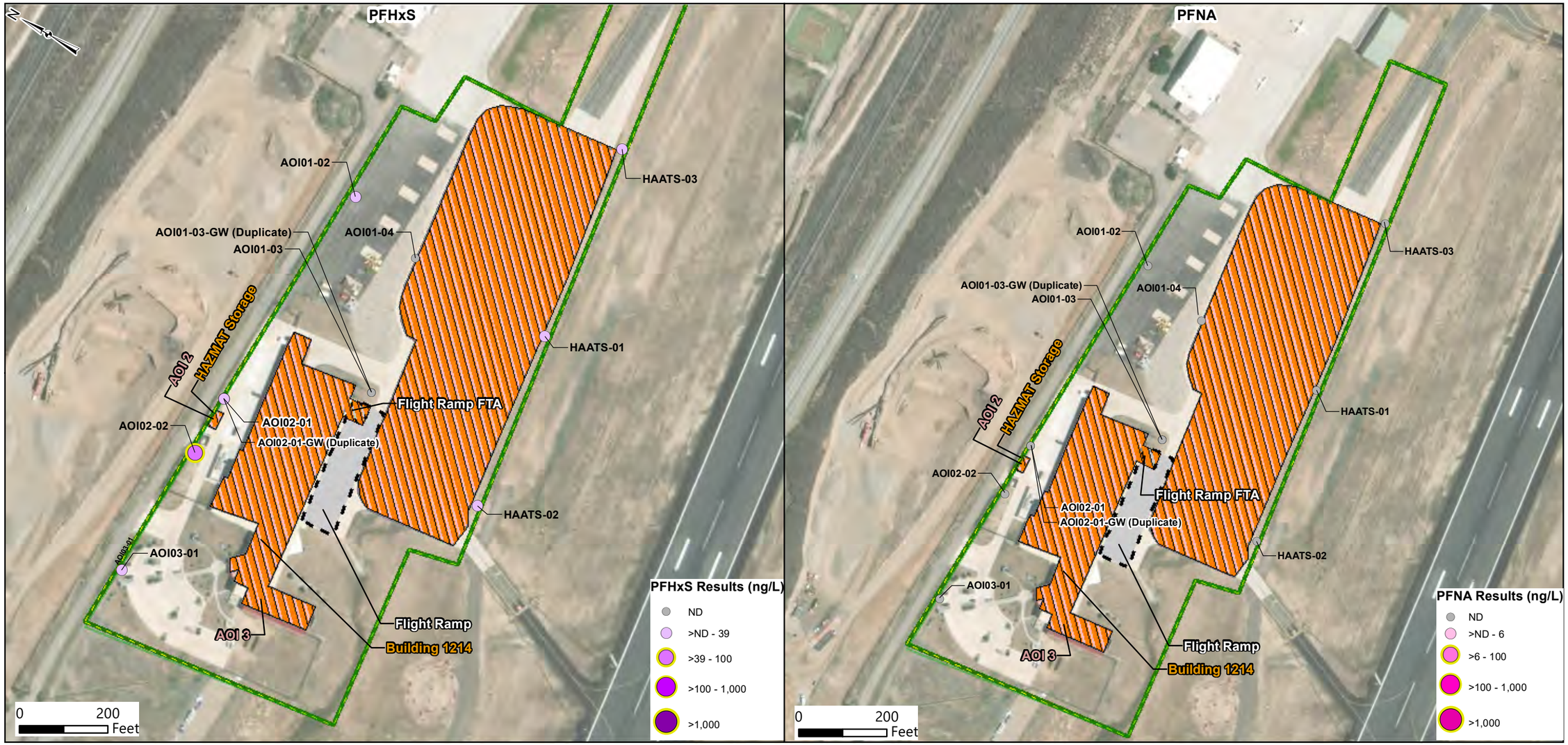


Figure 6-7
PFHxS and PFNA Detections in Groundwater



Facility Data

- No Suspected Release
- Potential PFAS Release Site
- FacilityBoundary
- Area of Interest

Notes:

PFHxS =perfluorohexanesulfonic acid
PFNA = perfluorononanoic acid
ND = Not Detected
ng/L = Nanogram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....APRIL 2023
Prepared By:.....WSP
Prepared For:.....USACE
Projection:.....NAD 83 StatePlane

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7. EXPOSURE PATHWAYS

The Conceptual Site Model (CSM) for each AOI, revised based on the SI findings, is 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 solely based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the Facility 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 no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if the relevant compounds are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of the relevant compounds above the SLs. Areas with an identified potentially complete pathway and a complete pathway 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 EPA guidance for risk screening (EPA 2001). Based on the synoptic water level measurements made during the SI, there are three commercial wells that are potentially downgradient of the Facility. One of the commercial wells is located on the property just north of the facility that is currently being used to mine gravel. Commercial well permits allow for commercial use that includes drinking and sanitation facilities inside a business (Colorado Division of Water Resources, 2023). The commercial well user is considered a potential off-Facility receptor. Due to the facility being secured, trespassers are not considered a potential receptor at this Facility. Receptors at the Facility include site workers (e.g., Facility staff and visiting soldiers) and construction workers. Off-facility residents, commercial well users, and recreational users are receptors located outside 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 each AOI based on the aforementioned criteria.

7.1.1 AOI 1

AOI 1 includes the Facility parking apron and taxiway where potential PFAS releases may have occurred. Although no PFAS releases are known to have occurred since the construction of the Facility in 2013, the storage of Tri-Max™ units outdoors on the parking apron and the history of water salutes performed at the AOI may have led to environmental releases of AFFF (AECOM, 2020).

PFOS was detected in surface soil at AOI 1 above its SL. PFOA, PFNA, and PFHxS were detected in surface soil at AOI 1 below their respective SLs. Site workers and construction workers could potentially be exposed to relevant compounds in surface soil via incidental ingestion and inhalation of dust; therefore, the surface soil exposure pathways are potentially complete for these receptors. As the resident, commercial well user, and recreational user are potential off-Facility receptors, there are no complete exposure pathways to relevant compounds in surface soil (inhalation of dust for off-Facility receptors is likely insignificant). Relevant compounds were not detected in shallow or deep subsurface samples at AOI 1; therefore, the subsurface soil exposure pathway is incomplete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

AOI 2 includes the Facility HAZMAT storage area where potential PFAS releases may have occurred. Although no PFAS releases are known to have occurred since the construction of the Facility in 2013, the storage of one Tri-Max™ unit outdoors in the HAZMAT storage area may have led to environmental releases of AFFF (AECOM, 2020).

PFOS was detected in surface soil at AOI 2 above its SL. PFOA and PFHxS, were detected in surface soil at AOI 2 below their respective SLs. Site workers and construction workers could potentially be exposed to relevant compounds in surface soil via incidental ingestion and inhalation of dust therefore, the surface soil exposure pathways are potentially complete for these receptors. PFOS and PFHxS were detected in shallow subsurface soil below their respective SLs; therefore, the subsurface soil pathway is potentially complete for construction workers at the Facility (due to potential excavation activities). It is not anticipated that the site worker would conduct excavation activities, therefore the exposure pathway to relevant compounds in subsurface soil for site workers is incomplete. As the resident, commercial well user, and recreational user are potential off-Facility receptors, there are no complete exposure pathways to relevant compounds in surface soil or subsurface soil (inhalation of dust for off-Facility receptors is likely insignificant). The CSM for AOI 2 is presented in **Figure 7-2**.

7.1.3 AOI 3

AOI 3 comprises Building 1214 and the Flight Ramp FTA. Building 1214 was constructed with an AFFF suppression system that contains Buckeye Premium 3% Military Specification AFFF concentrate. The building also stores one 55-gallon drum containing the same AFFF product. No known AFFF releases have occurred at Building 1214 since its construction, but it is conservatively considered an AOI based on the potential for undocumented releases (AECOM 2020). The Flight Ramp FTA is located in the northeast corner of the Flight Ramp, just south of Building 1214. While there was no documented use of AFFF at the Flight Ramp FTA, it has been incorporated into AOI 3 due to the historic use of AFFF at FTAs in general.

PFOS and PFHxS were detected in surface soil at AOI 3 below their respective SLs. Site workers and construction workers could potentially be exposed to relevant compounds in surface soil via incidental ingestion and inhalation of dust; therefore, the surface soil exposure pathway is potentially complete for these receptors. As the resident, commercial well user, and recreational user are potential off-Facility receptors, there are no complete exposure pathways to relevant compounds in surface soil (inhalation of dust for off-Facility receptors is likely insignificant). Relevant compounds were not detected in shallow or deep subsurface samples at AOI 3; therefore, the subsurface soil exposure pathway is incomplete. The CSM for AOI 3 is presented in **Figure 7-3**.

7.2 GROUNDWATER EXPOSURE PATHWAY

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

Potable and non-potable water are provided to EGE and its tenants (including the Facility) through the Town of Gypsum; no onsite wells provide drinking water to COARNG personnel. Potable and non-potable water is provided to EGE and its tenants through the Town of Gypsum. There are no water wells located at the Facility. Potable water is used for drinking water at HAATS, and non-potable water is strictly used for irrigation. The water is owned by the Town of Gypsum and stored in various large water tanks throughout the town. The Norgaard Water Treatment Plant and associated intake point is located on Gypsum Creek upstream of the confluence of Gypsum Creek and Eagle River. Based on the synoptic water level measurements made during the SI, the intake point is likely cross-gradient of the Facility. The locations of the Eagle River intake and the T2 well (identified in the 2016 town water quality report) are unknown (AECOM, 2020). Based on the synoptic water level measurements made during the SI, there are three commercial wells that are potentially downgradient of the Facility. One of the commercial wells is located on the property just north of the facility that is currently being used to mine gravel. Commercial well permits allow for commercial use that includes drinking and sanitation facilities inside a business (Colorado Division of Water Resources, 2023). The commercial well user is considered a potential off-Facility receptor.

Depths to groundwater measured at the Facility in July 2022 during the SI ranged from 76.91 to 82.03 feet bgs. Accidental ingestion of groundwater by construction workers during ground-disturbing activities is considered

7.2.1 AOI 1

PFOA was detected in groundwater at AOI 1 above its SL. PFBS and PFHxS were detected in groundwater at AOI 1 below their respective SLs. Due to the presence of the off-Facility commercial wells discussed above, the pathway for exposure to off-Facility commercial well users via ingestion of groundwater is considered potentially complete. The Eagle River is located approximately 0.5 miles to the north (downgradient) of the Facility. It is not known if there is offsite groundwater discharge to surface water bodies (the Eagle River or its tributaries). Based on the depth to groundwater and the elevation of the Eagle River, groundwater interaction with the river may be possible downgradient of the Facility, the ingestion exposure pathway for offsite surface water and sediment is considered potentially complete for recreational users of the river. The area of Eagle River that is downgradient of the Facility does not appear to be upstream of the known locations of the Town of Gypsum water intakes, therefore, the exposure pathway for the ingestion of groundwater is not complete for the site worker, construction worker, or resident. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOA and PFHxS were detected in groundwater at AOI 2 above their respective SLs. PFOS and PFBS were detected in groundwater at AOI 2 below their respective SLs. Due to the presence of the off-Facility commercial wells discussed above, the pathway for exposure to off-Facility commercial well users via ingestion of groundwater is considered potentially complete. The Eagle River is located approximately 0.5 miles to the north (downgradient) of the Facility. It is not known if there is offsite groundwater discharge to surface water bodies (the Eagle River or its tributaries). Based on the depth to groundwater and the elevation of the Eagle River, groundwater interaction with the river may be possible downgradient of the Facility, the ingestion exposure pathway for offsite surface water and sediment is considered potentially complete for recreational users of the river. The area of Eagle River that is downgradient of the Facility does not appear to be upstream of the known locations of the Town of Gypsum water intakes, therefore, the exposure pathway for the ingestion of groundwater is not complete for the site worker, construction worker, or resident. The CSM for AOI 2 is presented on **Figure 7-2**.

7.2.3 AOI 3

PFHxS and PFBS were detected in groundwater at AOI 3 below their respective SLs. Due to the presence of the off-Facility commercial wells discussed above, the pathway for exposure to off-Facility commercial well users via ingestion of groundwater is considered potentially complete. The Eagle River is located approximately 0.5 miles to the north (downgradient) of the Facility. It is not known if there is offsite groundwater discharge to surface water bodies (the Eagle River or its tributaries). Based on the depth to groundwater and the elevation of the Eagle River, groundwater interaction with the river may be possible downgradient of the Facility, the ingestion exposure pathway for offsite surface water and sediment is considered potentially complete for recreational users of the river. The area of Eagle River that is downgradient of the Facility does not appear to be upstream of the known locations of the Town of Gypsum water intakes, therefore, the exposure pathway for the ingestion of groundwater is not complete for the site worker, construction worker, or resident. The CSM for AOI 3 is presented in **Figure 7-3**.

7.3 SURFACE WATER AND SEDIMENT EXPOSURE PATHWAY

Surface water at HAATS is limited to drainage ditches that intermittently contain water. Additionally, there are stormwater inlets on the north side of Building 1214 that discharge to a low point at the north Facility boundary. Another stormwater inlet is located in a low point north of the apron which flows toward a ditch on the east side of the apron. The stormwater system ultimately flows north towards the Eagle River. No surface water or sediment samples were collected as part of the SI.

7.3.1 AOI 1

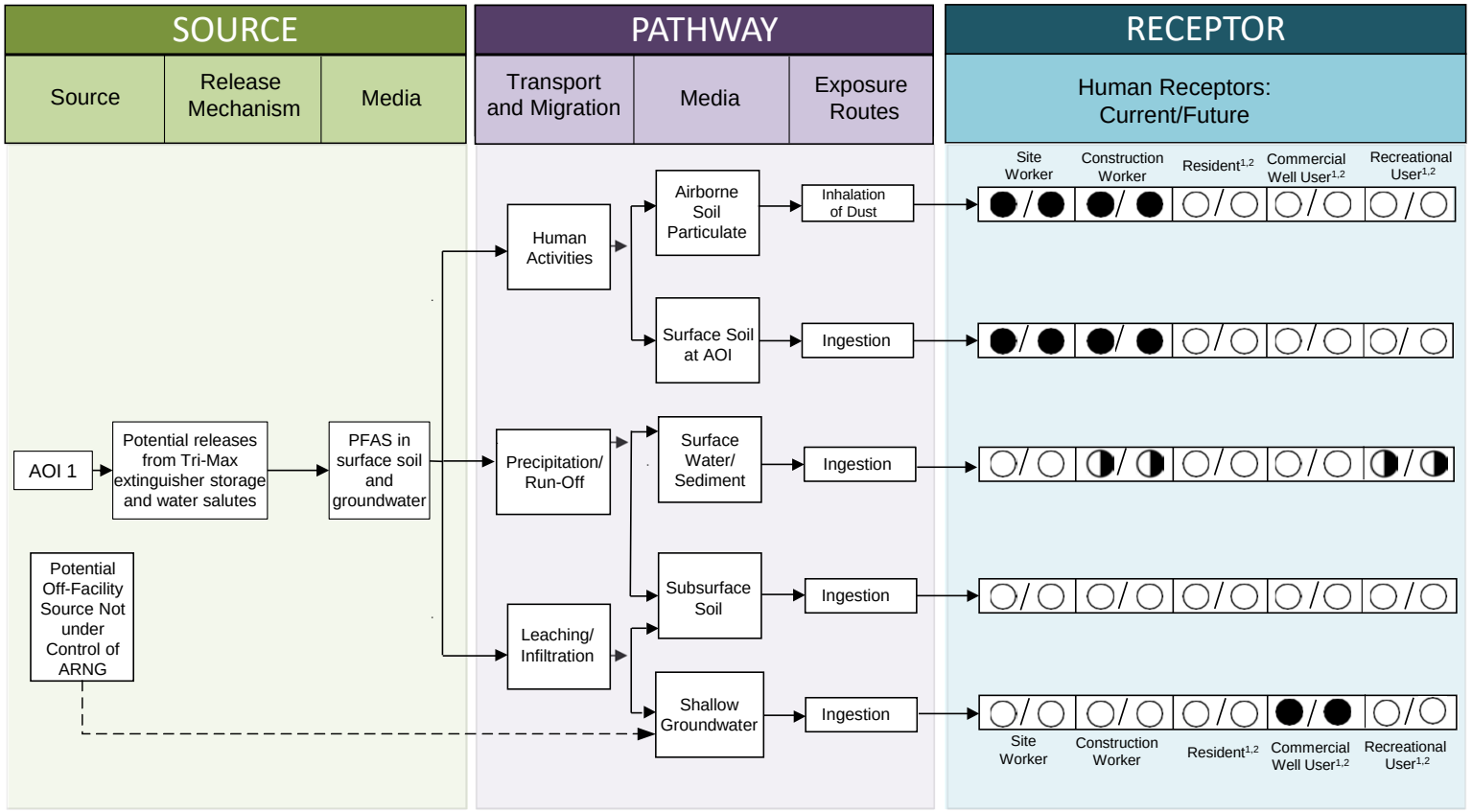
PFOS was detected in surface soil at AOI 1 above its SL. PFOA, PFNA, and PFHxS were detected in surface soil at AOI 1 below their respective SLs. Due to the presence of relevant compounds in surface soil, there is the potential for stormwater to transport PFAS-impacted soil particles to the Eagle River and expose the potential recreational user by ingestion of surface water. There is also potential for a construction worker to be exposed while completing ground maintenance at the site. The CSM for AOI 1 is presented on **Figure 7-1**.

7.3.2 AOI 2

PFOS was detected in surface soil at AOI 2 above its SL. PFOA and PFHxS were detected in surface soil at AOI 2 below their respective SLs. Due to the presence of relevant compounds in surface soil, there is the potential for stormwater to transport PFAS-impacted soil particles to the Eagle River and expose the potential recreational user by ingestion of surface water. There is also potential for a construction worker to be exposed while completing ground maintenance at the site. The CSM is presented in **Figure 7-2**.

7.3.1 AOI 3

PFOS and PFHxS were detected in surface soil at AOI 3 below their respective SLs. Due to the presence of relevant compounds in surface soil, there is the potential for stormwater to transport PFAS-impacted soil particles to the Eagle River and expose the potential recreational user by ingestion of surface water. There is also potential for a construction worker to be exposed while completing ground maintenance at the site. The CSM is presented in **Figure 7-3.**



LEGEND

- Flow Chart Continues
- Incomplete Pathway
- Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of SL

Notes:

1. The resident and recreational user refers to off-site receptors.
2. Inhalation of dust for off-site receptors is highly unlikely.

Figure 7-1
Conceptual Site Model, AOI 1
HAATS

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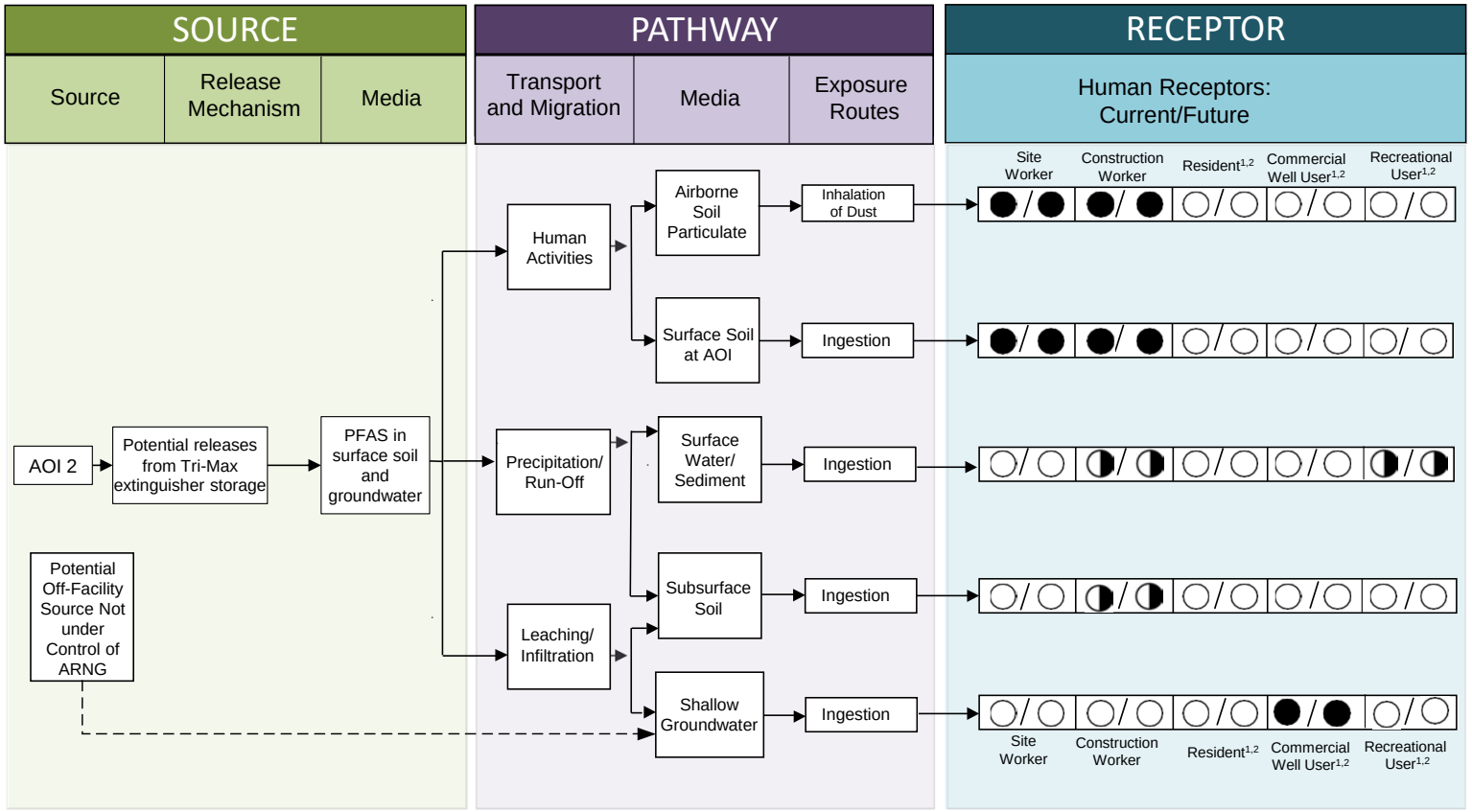

LEGEND

- Flow Chart Continues
- Incomplete Pathway
- Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of SL

Notes:

1. The resident and recreational user refers to off-site receptors.
2. Inhalation of dust for off-site receptors is highly unlikely.

Figure 7-2
Conceptual Site Model, AOI 2
HAATS

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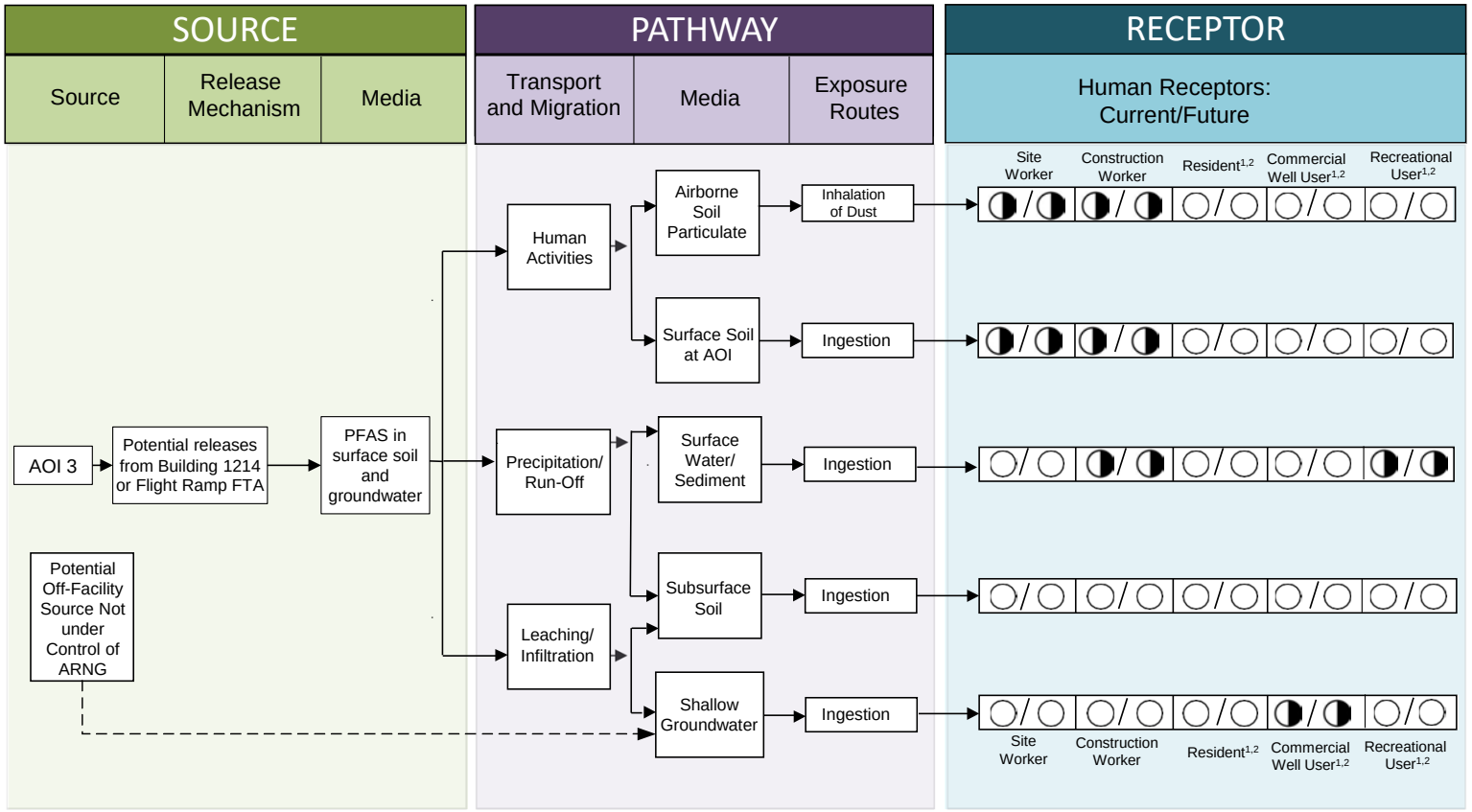

LEGEND

- Flow Chart Continues
- Incomplete Pathway
- Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of SL

Notes:

1. The resident and recreational user refers to off-site receptors.
2. Inhalation of dust for off-site receptors is highly unlikely.

Figure 7-3
Conceptual Site Model, AOI 3
HAATS

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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 at the Facility were conducted over two field events: from 13 to 14 April 2022, and from 7 June to 14 July 2022. The SI field activities included soil and groundwater sampling. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA/Wood, 2022), except as previously noted in **Section 5.9**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA/Wood, 2022), samples were collected and analyzed for 24 compounds by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows.

- Twenty-seven (27) soil samples from 11 locations (soil borings locations);
- Nine (9) grab groundwater samples from 11 temporary well locations;
- Fifty-one (51) QA/QC samples.

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

8.2 OUTCOME

Based on the results of this SI, further evaluation is warranted for AOIs 1 and 2. Further evaluation is not warranted for AOI 3 (see **Table 8-1**). Based on the CSMs developed and revised based on the SI findings, there is potential for exposure to site workers and construction workers that could contact constituents in surface soil at the AOIs via incidental ingestion and inhalation of dust, and there is a potential for exposure to construction workers at AOI 2 that may contact constituents in sub-surface soil. Additionally, groundwater, which exceeded SLs at AOI 1, AOI 2, and in upgradient temporary monitoring wells, may flow towards nearby off-Facility water wells.

Sample analytical concentrations collected during the SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. The following bullets summarize the SI results relative to the SLs:

At AOI 1:

- PFOS was detected in surface soil at concentrations exceeding the SL. PFOS was detected in surface soil at four of the five AOI 1 sample locations and exceeded the SL at three locations with a maximum concentration of 38 µg/kg. PFHxS, PFNA, and PFOA were detected in surface soil at concentrations below their respective SLs. PFHxS, PFOA, PFOS, PFBS, and PFNA were not detected in any of the shallow or the deep subsurface soil samples.

- PFOA was detected in groundwater at one of the three AOI 1 sample locations and exceeded the SL with a concentration of 8 ng/L. PFBS and PFHxS were detected in groundwater at concentrations below their respective SLs.

- Relevant compounds were detected in temporary monitoring wells located upgradient of AOI 1, suggesting a potential upgradient source. PFOS exceeded its SL at one of the three groundwater sample locations, and PFOA exceeded its SL at two of the three groundwater sample locations. PFBS, PFHxS, and PFNA were detected at concentrations below their respective SLs at one or more of the three upgradient wells.

- Based on exceedances of the SLs in surface soil and groundwater, further evaluation of AOI 1 is warranted in the RI.

At AOI 2:

- PFOS was detected in surface soil at concentrations exceeding the SL. PFOS was detected in surface soil at both AOI 2 sample locations and exceeded the SL at one location with a maximum concentration of 22 µg/kg. PFOA and PFHxS were detected in surface soil at concentrations below their respective SLs. PFOS and PFHxS were also detected in shallow subsurface soil at concentrations below their respective SLs.

- PFOA and PFHxS were detected in groundwater at concentrations exceeding their respective SLs. PFOA was detected in groundwater at one of the two AOI 2 sample locations and exceeded the SL with a concentration of 6.1 ng/L. PFHxS was detected in groundwater at both of the AOI 2 sample locations and exceeded the SL at one location with a concentration of 63 ng/L. PFBS and PFOS were detected in groundwater at concentrations below their respective SLs.

- Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 2 is warranted.

At AOI 3:

- PFOS and PFHxS were detected in surface soil at concentrations below their respective SLs. PFOA, PFNA, and PFBS were not detected in the surface soil samples. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in the shallow subsurface soil sample.

- PFHxS and PFBS were detected in groundwater at concentrations below their respective SLs.

- Therefore, further evaluation at AOI 3 is not warranted.

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	Parking Apron/Taxiway	●	●	●	Proceed to RI
2	HAZMAT Storage Area	●	●	NA	Proceed to RI
3	Building 1214	○	◐	NA	No further action

Legend:

● = Detected; exceedance of screening levels

◐ = Detected; no exceedance of screening levels

○ = Not detected

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