FINAL PRELIMINARY ASSESSMENT AND SITE INSPECTION OF PER- AND POLYFLUOROALKYL SUBSTANCES

Fort McCoy, Wisconsin

Prepared For:
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December 2020

Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

Fort McCoy, Wisconsin

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Prepared for:

U.S. Army Corps of Engineers

Contract No.: W912DR-18-D-0004

Delivery Order No.: W912DR1818F0685

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Date:

December 2020

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EXECUTIVE SUMMARY

ES-1 Background

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The objective of a PA is to identify locations that are areas of potential interest (AOPIs) based on whether there was use, storage or disposal of AFFF and/or potential PFAS containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). Where necessary, the SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred, and the PFOS, PFOA, and PFBS results in groundwater, surface water, soil, and/or sediment are compared to the 2019 Office of the Secretary of Defense (OSD) risk screening levels. Additionally, soil and groundwater samples were collected from areas between the AOPIs and the potable water supply wells to assess potential PFAS migration pathways. This report provides the PA/SI for Fort McCoy (FTMC) and was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and The National Oil and Hazardous Substances Pollution Contingency Plan.

FTMC is located in Monroe County in the southwestern quarter of Wisconsin. FTMC is a U.S. Army training support installation. The primary mission of FTMC is to provide training support services for the reserve and active components of all branches of the military services. The installation consists of 59,778 acres, occupying part of six townships in Monroe County and is roughly 14 miles long and 7 miles wide. The principal towns in Monroe County are Sparta (population 9,522) and Tomah (population 9,169), which are located 7 miles southwest and southeast of FTMC, respectively. The city of LaCrosse, Wisconsin, the nearest major city (population 51,719) is located about 35 miles to the west. The installation is divided into north and south posts by Wisconsin Highway 21, with U.S. Highway 16, Interstate 90, and two railroad lines crossing east-west on the southern portion of the installation.

ES- 2 Preliminary Assessment

Initially, PAs were conducted at installations where AFFF or other PFAS containing materials were used or stored as part of operational history (Army 2018). The following PFAS source types were evaluated during the PA: firefighting training areas, fire stations, fire response areas, fire nozzle testing areas, crash sites or landing areas, fuel spills, installation storage warehouses, hangars and/or buildings with AFFF suppression systems, metal plating operations, wastewater treatment systems, landfills, stormwater or sanitary sewer components, and remediated soil application areas. From reviewing these potential source types, ten AOPIs have been identified for this PA/SI at FTMC. Potential PFAS source types identified as a result of this PA/SI and the names of the AOPIs are summarized in **Table ES-1**, below.

Table ES-1. Summary of AOPIs Identified During the Preliminary Assessment

PFAS Source Type	AOPI Name
Firefighter training areas	Fire Training Burn Pit #1 (FTBP #1)
	Fire Training Burn Pit #2 (FTBP #2)
	Fire Training Burn Pit #3 (FTBP #3)
Fire station	Former Fire Station #2
Accidental release areas	Deluge System
	2017 AFFF Release
	1990s AFFF Release
Landfill	Former Landfill #5
Wastewater treatment system	Wastewater Treatment Plant (WWTP)

After the identification of AOPIs during the PA, and before the SI sampling, a preliminary conceptual site model (CSM) was developed for each AOPI based on information gathered during the PA. The preliminary CSMs identify potential human receptors and exposure pathways for groundwater and surface water that are known to be used, or that could realistically be used in the future, as sources of drinking water. These CSMs also identify potential soil and sediment exposure pathways for human receptors.

ES-3 Site Inspection

Based on the results of the PA at FTMC, an SI for PFAS was conducted in accordance with CERCLA. SI sampling was completed at FTMC at nine of the ten AOPIs to evaluate presence or absence of PFAS. The AOPI that was not sampled was the WWTP. The WWTP had the potential to receive water containing PFAS compounds. Sludge from treatment operations is occasionally used by local farmers as fertilizer. The off-installation locations of the sludge land application were outside of the scope of this SI. Influent and effluent samples were also not collected because they would not be representative of potential historical PFAS releases. WWTP-related sample collection may be included in a future phase of investigation.

Soil samples were collected at seven AOPIs. The presence of PFAS was identified in 29 soil samples over 16 locations at six AOPIs: the 2017 AFFF Release, FTBP #1, FTBP #3, 1990s AFFF Release, Deluge System, and Former Fire Station #2. The highest concentration observed in soil was 0.36 milligrams per kilogram (mg/kg) PFOS in the surface soil (0 to 2 feet below ground surface [bgs]) at FTBP #3. This is one of two detections of PFOS exceeding the residential OSD risk screening level for soil at FTBP #3. All other detections of PFOS, PFOA, and PFBS in soil were below OSD risk screening levels.

Groundwater samples were collected at seven AOPIs. The presence of PFAS was identified in groundwater in 26 samples over 19 locations at the seven AOPIs sampled: FTBP #1, FTBP #2, Former

Landfill #5, Deluge System, 1990s AFFF Release, 2017 AFFF Release, and Former Fire Station #2. The highest concentration observed was 260,000 nanograms per liter (ng/L) PFOS collected at 13 feet bgs from the 1990s AFFF Release. Several PFOS and PFOA exceedances of OSD risk screening levels for tap water were observed. PFBS was not detected above OSD risk screening levels in any sample. In summary, the number of groundwater exceedances per AOPI is as follows:

- 1990s AFFF Release – PFOS (4)* and PFOA (4)
- 2017 AFFF Release – PFOA (2)
- Deluge System – PFOS (3)
- Former Fire Station #2 – PFOS (4) and PFOA (2)
- 1990s AFFF Release – PFOS (4) and PFOA (4)
- Former Landfill #5 – PFOA (1)
- Former FTBP #2 – PFOS (2)

*Values in parenthesis indicate the number of OSD risk screening level exceedances per analyte in normal samples

Surface water and sediment samples were collected at four locations from Suukjak Sep Creek, downgradient of Former Landfill #5 and FTBP #1. Three additional surface water samples were collected in Silver Creek, downgradient of the Sparta – Fort McCoy Airport. There were no detections of PFOS, PFOA, or PFBS in sediment. The highest concentration in surface water was 28 ng/L PFOS in Silver Creek. All detections of PFOS, PFOA, and PFBS in surface water were below OSD risk screening levels.

The preliminary CSMs were re-evaluated and updated, if necessary, based on the SI sampling results. Following the SI sampling, eight out of the ten AOPIs with confirmed PFAS presence were considered to have potentially complete exposure pathways. For FTMC there are eight AOPIs that have potentially complete pathways for human receptors on post, and nine AOPIs have potentially complete pathways for off post human receptors. Considering the Army's primary concern is for human exposure through direct ingestion of PFAS in drinking water, the remainder of this section summarizes only the potential exposure pathways for groundwater and surface water. Eight AOPIs are upgradient of or potentially impacting groundwater wells that are used currently or could be used in the future to provide drinking water at FTMC. Due to a lack of land use controls off-installation and downgradient of FTMC, the groundwater exposure pathways for off-installation receptors are potentially complete for nine AOPIs. Surface water is not used for drinking water at Fort McCoy, however on-installation site workers and recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways are potentially complete for on-installation site workers and recreational users at eight AOPIs. Nine AOPIs have a potentially complete surface water and sediment exposure pathway for off-installation recreations users.

ES-4 Conclusions

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for remedial investigation is based on the comparison of analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels. Results from this PA/SI indicate further study in a remedial investigation for PFAS is warranted at FTMC in accordance with the October 2019 guidance provided by the OSD. **Table ES-2** below summarizes the sampling at FTMC and rationale for recommendations for further study in a remedial investigation or no action at this time.

Table ES-2. Summary of PFAS Sampling at FTMC and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels?					Recommendation	Rationale
	GW	DW	SO	SW	SE		
Former Fire Training Burn Pit #1	Y[1]	NS	N	N	N	Further study in a remedial investigation	GW exceedance of OSD risk screening levels
Former Landfill #5	Y[2]	NS	NS	N	N	Further study in a remedial investigation	GW exceedance of OSD risk screening levels
Former Fire Station #2	Y	NS	N	NS	NS	Further study in a remedial investigation	GW exceedance of OSD risk screening levels
Deluge System	Y	NS	N	NS	NS	No further investigation	Deluge system was determined not to be a source area. PFAS detections must be from a different AOPI.
1990s AFFF Release	Y	NS	N	NS	NS	Further study in a remedial investigation	GW exceedance of OSD risk screening levels
2017 AFFF Release	Y	NS	N	NS	NS	Further study in a remedial investigation	GW exceedance of OSD risk screening levels
Former Fire Training Burn Pit #2	Y[2]	NS	N	NS	NS	Further study in a remedial investigation	GW exceedance of OSD risk screening levels
Former Fire Training Burn Pit #3	Y[1]	NS	Y	NS	NS	Further study in a remedial investigation	GW and SO exceedance of OSD risk screening levels
Wastewater Treatment Plant[3]	NS	NS	NS	NS	NS	No further investigation	Sampling not representative of past conditions
Building 207	NS	NS	N	NS	NS	Further study in a remedial investigation	SO is below the OSD risk screening levels. However, a downgradient groundwater investigation is recommended due to other nearby AOPIs

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels?					Recommendation	Rationale
	GW	DW	SO	SW	SE		
Additional Sampling[4]	NS	N	NS	N	NS	Further study in a remedial investigation	Off-post surface water detections

Notes:

[1-] Exceedance observed during previous investigations conducted by FTMC

[2-] Exceedance observed during previous investigations conducted by FTMC and during the SI

[3-] The AOPI was not sampled during this SI but may be sampled during future investigations.

[4-] Sampling not associated with a particular AOPI

DW – drinking water

GW – groundwater

N – no

NS – not sampled

SE – sediment

SO – soil

SW – surface water

Y – yes

1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12,580 and is conducting the PA/SI consistent with its authority under CERCLA, 42 United States Code §§ 9600, et seq. (as amended), and the Defense Environmental Restoration Program, 10 United States Code §§ 2701, et seq. The PFAS PA/SI included two distinct efforts. The PA identified locations that are areas of potential interest (AOPIs) at Fort McCoy (FTMC) based on the use, storage or disposal of aqueous film-forming foam (AFFF) and/or potential PFAS containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). Where necessary, the SI included multi-media sampling at AOPIs to determine whether or not a release has occurred, and the PFOS, PFOA, and PFBS results in groundwater, surface water, soil, and/or sediment were compared to the 2019 Office of the Secretary of Defense (OSD) PFAS risk screening levels. This report provides the PA/SI for FTMC and was completed in accordance with CERCLA and The National Oil and Hazardous Substances Pollution Contingency Plan.

1.1 Project Background

PFAS are a class of compounds that have been used in a wide range of industrial applications and commercial products due to their unique surface tension/leveling properties. Due to industry and regulatory concerns about the potential health effects and adverse environmental impacts, there has been a reduction in the manufacture and use of PFAS worldwide. In the U.S., significant reductions in the production, importation, and use of PFOS and PFOA (two individual compounds in the PFAS class) occurred between 2001 and 2015 (Interstate Technology Regulatory Council 2017). PFBS replaced PFOS in some applications and is currently used and manufactured in the U.S.

The focus of the PA is to identify the locations at installations, which may be later categorized as AOPIs, where AFFF and/or PFAS-containing materials were used, stored, and/or disposed.

AFFF was developed in the mid-1960s in response to a need for firefighting foams better suited to extinguish Class B, fuel-based fires. AFFF formulations consist of water, an organic solvent, up to 5 percent (%) hydrocarbon surfactants, and 1 to 3% PFAS (Interstate Technology Regulatory Council 2020). AFFF concentrate is designed to be diluted with water to become a 1, 3, or 6% foam. AFFF releases at Department of Defense (DoD) facilities may have occurred during firefighter training, emergency response actions, equipment testing, or accidental releases. The military still primarily uses AFFF for Class B fires; however, the current formulation of AFFF contains significantly lower amounts of regulated PFAS (such as PFOA and PFOS), and significant operational changes have been implemented to restrict uncontrolled releases and non-essential use of PFAS-based foams. Army installations may still house AFFF, commonly stored in closed containers (e.g., 55-gallon drums, 5-gallon buckets), within designated storage buildings or at firehouses.

Potential PFAS use associated with metal plating activities may also be relevant to Army installations. During metal plating operations, a metal surface may be treated with a layer of electrochemically deposited metals in an acid bath. PFAS, specifically PFOS, have been used in metal plating operations as surface tension-reducing wetting agents to mitigate the release of aerosolized chemicals into a working environment. Hard chromium plating is one type of metal plating operation where PFAS-containing mist suppressants were commonly used. Historically, it was common for spent plating baths from metal plating operations to be disposed of in a lined or unlined pit or into a sanitary or storm sewer. Therefore, PFAS present in mist suppressants during the metal plating process could be released to the environment.

Many of the PFAS found in AFFF and metal plating operations are surfactants (which do not volatilize) and are found in a charged or ionic state at environmental pH (i.e., pH 5 to 9 standard units), including PFOS, PFOA, and PFBS, which are negatively charged. The media potentially affected by PFAS releases at Army installations are soil, groundwater, surface water, and sediment. Once within the environment, the main factor that inhibits the movement of PFAS is the presence of organic matter and organic co-constituents in soils and sediments. Generally, PFAS are mobile in the potentially affected media, and they are not known to be broken down by natural processes.

In 2016, the United States Environmental Protection Agency (USEPA) established a lifetime health advisory of 70 nanograms per liter (ng/L) in drinking water for PFOS or PFOA and for the sum of PFOS and PFOA when both are present (USEPA 2016). In November 2018, the USEPA also issued draft subchronic and chronic oral toxicity values for PFBS for public comment. The new toxicity values for PFBS are intended to update the current PFBS toxicity values that were finalized in July 2014 (USEPA 2014). USEPA expects to finalize updated toxicity assessments for PFBS in 2020.

On 15 October 2019, the OSD provided guidance on the investigation of PFOS, PFOA, and PFBS at Operation and Maintenance accounts for the National Guard-funded, Environmental Restoration Account-funded, and Base Realignment and Closure Account-funded sites (OSD 2019). The 15 October 2019 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) or soil, calculated using the USEPA's Regional Screening Level (RSL) calculator for residential and industrial/commercial worker receptor scenarios. The 2019 OSD risk screening levels are discussed further in **Section 6.6**.

1.2 PA/SI Objectives

This PA/SI was conducted consecutively because the results of the PA yielded AOPIs that necessitated continuing onto the SI phase in accordance with CERCLA. Consequently, this report provides the combined objectives of both PA and SI reports. **Section 2** provides the overview for FTMC, and **Sections 3** through **5** comprise the PA portion of this report. **Sections 6** and **7** comprise the SI portion of this report.

1.2.1 PA Objectives

During the PA, investigators collect readily available information and conduct site reconnaissance. The PA is designed to distinguish between sites that pose little or no threat to human health and the

environment and sites that require further investigation. The PA also identifies sites requiring further assessment for possible emergency response actions (USEPA 1991). This PA will evaluate and document areas, which may later be categorized as AOPIs, where PFAS-containing materials were used, stored, and/or disposed, so the Army can distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation.

1.2.2 SI Objectives

An SI is conducted when the PA determines an AOPI exists based on use, storage, or disposal of PFAS-containing materials. The main objective of the SI is to compile sufficient technically defensible and useful data to verify assumptions made during the PA and evaluate whether media (groundwater, soil, surface water, and/or sediment) associated with individual AOPIs contain detectable levels (i.e., in accordance with current DoD Environmental Laboratory Accreditation Program [ELAP] standards) of the chemical of interest. The SI is typically a limited investigation near suspected releases to evaluate if a release has occurred but is not a comprehensive survey of extent of impacts.

This SI was conducted to evaluate presence or absence of PFOS, PFOA, and PFBS at the AOPIs identified during the PA process.

Installation-specific data quality objectives (DQOs) and the sampling design and rationale are summarized in **Sections 6.1** and **6.2**.

1.3 PA/SI Process Description

For FTMC, PA/SI development followed a similar process as described in **Sections 1.3.1** through **1.3.5** below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for FTMC. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), United States Army Corps of Engineers (USACE), FTMC, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 5 May 2018, before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

Records research was conducted before the site visit to obtain electronically available documents from the installation and external sources for review. The purpose of the records research is to identify any area on the installation that may have been a location where AFFF and/or PFAS-containing materials were used, stored, and/or disposed of, as well as gather information on the physical setting and site history at FTMC.

A read-ahead package was prepared and submitted to the appropriate POCs two weeks before the site visit. The read-ahead package contained the following information:

- The Installation Management Command (IMCOM) operation order
- The Army PA Operations Security requirements package, which includes the antiterrorism/operations security review cover sheet (**Appendix C**)
- The PFAS PA kickoff call minutes
- An information paper on the PA portion of the Army's PFAS PA/SI
- Contact information for key POCs
- A list of the data sources requested and reviewed
- A list of preliminary locations identified during the kickoff call and pre-site visit records review, that may be evaluated as potential AOPIs, where additional information on those areas will be collected through personnel interviews, additional document review, and site reconnaissance.
- A list of roles for the installation POC to consider when recommending potential interviewees.

1.3.2 Preliminary Assessment Site Visit

The site visit was conducted on 24 to 25 July 2018. An in brief meeting was held to provide installation staff with the objectives of the site visit and team introductions. **Section 3** includes information regarding personnel interviewed and areas where site reconnaissance was performed during the site visit.

Personnel interviews were conducted with individuals having significant historical knowledge at FTMC. The interviews focused on confirming information discussed in historical documents, collecting information that may have not been in historical documents, corroborating other interviewees' information.

Site reconnaissance at the potential AOPIs included visual surveys that assessed the points of potential PFAS use, storage, disposal, as well as potential secondary impacts, and the migration potential from each AOPI (e.g., stormwater drains, building drains and sumps, cracks in the floor/pavement). Physical attributes of the potential AOPIs were documented, including local slope and ground and floor conditions (i.e., paved, or unpaved, visual staining), surface water bodies and surface flow, potential receptors, and the distance to the installation boundary. Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for future sampling during the SI. Photo documentation of the potential AOPIs was collected, and access limitations or advantages related to potential future sampling activities were noted.

An exit briefing was offered to installation personnel at the conclusion of the site visit to raise any items identified during the site visit, discuss any follow-up items, and review the schedule for submitting deliverables. The exit briefing was conducted on 25 July 2018 with the installation, USAEC, and USACE to discuss preliminary findings of the PA site visit.

1.3.3 Post-Site Visit

After the site visit, information collected pre-, during, and post-site visit was reviewed and corroborated by cross-referencing records and reviewing interview details and observations noted during site visit reconnaissance. A site visit trip report was completed and provided to the installation POC, applicable USAEC POCs, and USACE regional POCs following the site visit. The information collected during the

pre-site visit and site visit activities was compiled to develop the installation-specific PA portion of the PA/SI report (**Section 3**). Site data obtained during the PA were used to develop preliminary conceptual site models (CSMs) for each AOPI, which serve as the basis for developing the SI scope of work presented in an installation-specific Quality Assurance Project Plan (QAPP) Addendum.

1.3.4 Site Inspection Planning and Field Work

Following the PA, the SI process was initiated at the installation to evaluate PFAS presence or absence at each AOPI. An additional objective at FTMC was to collect soil and groundwater samples to assess potential PFAS migration pathways. First, an SI kickoff teleconference was held between the applicable POCs from the USAEC, USACE, the installation, and Arcadis.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling and the proposed sampling plan for each AOPI
- gauge regulatory involvement requirements or preferences
- confirm the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- discuss general SI deliverable and field work schedule information and logistics

Following development of the SI sampling technical approach, an SI scoping teleconference was held to obtain concurrence on the SI sampling plan from USAEC, USACE, and the installation. Discussion topics included:

- regulatory involvement requirements or preferences
- confirm the plan for IDW handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- provide an updated SI deliverable and field work schedule.

A Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP) was developed and finalized in October 2019 for the USAEC PFAS PA/SI (Arcadis 2019a). The PQAPP details general planning processes for collecting data and describes the implementation of quality assurance (QA) and quality control (QC) activities for the SI portion for Army installations nationwide. Additionally, an installation-specific QAPP Addendum was developed to define the DQOs, present the sampling design and rationale, and provide qualifications for project personnel. The QAPP Addendum was followed in conjunction with the PQAPP (Arcadis 2019a) to complete the SI scope of work. A Site Safety and Health Plan (SSHP) was also developed as an attachment to the QAPP Addendum to identify specific health and safety hazards that may be encountered at the installation during sampling. The SSHP was designed to supplement the Accident Prevention Plan (Arcadis 2018), which was developed for Army installations nationwide. The QAPP Addendum and SSHP were submitted to the installation and finalized before commencement of field work.

The DQOs, sampling design and rationale, and field methods employed for the SI are summarized from the QAPP Addendum developed for FTMC (Arcadis 2019b) in **Sections 6.1** through **6.3**.

After finalization of the QAPP Addendum and SSHP, field planning and coordination with the installation and subcontractors was completed. Once the schedule was determined, field teams mobilized to the installation to complete the scope of work defined in the QAPP Addendum.

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD ELAP-accredited for PFAS analysis in accordance with the DoD Quality Systems Manual (QSM) 5.1.1 (or later; DoD 2018). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of project screening levels (defined in **Section 6.5**). Both PA findings (**Sections 3** through **5**) as well as SI findings (**Sections 6** and **7**) are included in this PA/SI report.

2 INSTALLATION OVERVIEW

The following subsections provide general information about FTMC, including the location and layout, the installation mission(s) over time, a brief site history, current and projected land use, climate, topography, geology, hydrogeology, surface water hydrology, potable wells within a 5-mile radius of the installation, and applicable ecological receptors.

2.1 Site Location

FTMC is located in Monroe County in the southwestern quarter of Wisconsin (**Figure 2-1**). The installation consists of 59,778 acres, occupying part of six townships in Monroe County and is roughly 14 miles long and 7 miles wide. The principal towns in Monroe County are Sparta (population 9,522) and Tomah (population 9,169), which are located 7 miles southwest and southeast of FTMC, respectively. The city of LaCrosse, Wisconsin, the nearest major city (population 51,719) is located about 35 miles to the west. The installation is divided into north and south post by Wisconsin Highway 21, with U.S. Highway 16, Interstate 90, and two railroad lines crossing east-west on the southern portion of the installation (FTMC 2013). AOPIs in the SI study area are located in the west central and southwest portion of FTMC, as shown on **Figure 2-2**.

2.2 Mission and Brief Site History

FTMC is a U.S. Army training support installation. The primary mission of FTMC is to provide training support services for the reserve and active components of all branches of the military services. The installation serves as a support installation for the needs of military training units and the post's tenant activities. In addition to the Garrison, DoD, Army, and state tenants perform a variety of missions on and off post (FTMC 2013). The Sparta – Fort McCoy Airport is located on the southwest corner of the installation. The Airport primarily serves military needs but is also open to the public.

2.3 Current and Projected Land Use

FTMC consists of both developed and undeveloped land. The principal developed areas are the Cantonment Area, transportation corridors, airport, housing, and water systems. These areas, with the exception of some transportation corridors, are considered "Non-Operational Areas" by the military trainers. Land uses in these areas are determined by the Real Property Planning Board. The Cantonment Area on the north post is the main developed area on post and includes the administrative center, barracks, and support buildings. A total of 113 housing units are present on post. Transportation corridors consist of airfields, a railway system and a road system. The road system consists of improved roads, tank trails and unimproved trails which often pass through largely undeveloped training areas. Recreation Areas are divided into Class I and Class II. Class 1 recreation areas are used intensively and include the Pine View Recreation and Whitetail Ridge Recreation Areas. Class II recreation areas are largely natural environments used for hunting, fishing, and trapping on undeveloped land (FTMC 2012).

The majority of land at FTMC is divided between undeveloped training and special training areas totaling 48,248 acres. Other undeveloped areas include the North Impact Area used for artillery and aircraft weapons firing, wetlands and natural areas, agricultural land, former quarries, former disposal areas and

landfills, Mound Prairie Cultural Site, experimental plots and study areas providing scientific information needed to conduct ecosystem management (FTMC 2012).

2.4 Climate

Pressure systems that move from west to east across the continent are the biggest influence on the climate of FTMC and a variety of weather can be expected for all seasons. The total mean annual precipitation is 28.04 inches, and the average season snowfall is 39.3 inches. In winter, the average daily temperature is 19.9 degrees Fahrenheit and the average in the summer is 68.4 degrees Fahrenheit. The prevailing westerly winds have an average wind speed ranging from a high of 12 miles per hour in April to a low of 7 miles per hour in August (United States Department of Agriculture 1984).

2.5 Topography

FTMC lies on the eastern edge of what is known as the Western Upland of Wisconsin, which is an area that has experienced geologic uplift. Erosion has dissected the Western Upland creating long valleys and a rugged landscape with sometimes several hundred feet of elevation change (FTMC 2012). The maximum elevation at FTMC is 1,450 feet above mean sea level (**Figure 2-3**). The topography is characterized by smooth, rolling plains to high, rugged hills. Drainage at FTMC is generally towards the southwest. There are no natural lakes at FTMC, but there are several smaller ponds and constructed lakes in the area (USACE 1982 and 283rd Engineer Detachment 1981).

2.6 Geology

Rocks and soils beneath FTMC range in age from Precambrian basement to more recent alluvial deposits. The Precambrian basement rocks consist of igneous and metamorphic rocks encountered at approximately 900 feet below ground surface (bgs). Overlying the Precambrian basement rocks are Cambrian rocks. The Cambrian rocks are primarily sandstone with occasional siltstone and shale layers. These strata include the Elk Mound Group, the Tunnel City Group-Franconia Formation and the Trempealeau Group. All of the water supply wells at FTMC are completed in the Elk Mound Group. Ordovician rocks overlie the Cambrian strata and are present only on the highest ridges. This upper bedrock unit consists of hard limestones and dolomites which are part of the Prairie du Chien Group. The unconsolidated alluvial deposits consist of sand with some silt, clay, and gravel ranging in thickness from 0 to 100 feet (SEC Donohue 1994).

2.7 Hydrogeology

The two main aquifers of the region are the Sandstone Aquifer and the Unconsolidated Aquifer, part of the Elk Mound Group. The primary aquifer of the region is the Sandstone Aquifer which produces large supplies of water. This aquifer is approximately 400 feet thick and flow is typically towards the La Crosse River to the southwest. The Sandstone Aquifer is hydraulically connected to the overlying Unconsolidated Aquifer. The Unconsolidated Aquifer ranges from 1 to 80 feet thick and flow is also generally to the southwest. Depth to groundwater in both aquifers is typically 10 to 20 feet bgs (SEC Donohue 1994).

2.8 Surface Water Hydrology

Surface waters at FTMC consist of 261 acres of ponds, flowages, and streams. Wetlands occupy an additional 4,800 acres. The La Crosse River and its tributaries drain most of FTMC. The main tributaries draining to the La Crosse River from FTMC include Silver, Tarr, and Suukjak Sep Creeks. The remainder of the surface water at FTMC is found in man-made lakes, ponds, reservoirs, and wetland areas. Surface water at FTMC and nearby areas is not used as a source of drinking water.

2.9 Relevant Utility Infrastructure

The FTMC wastewater management system consists of sanitary sewer lines and a few stormwater lines. The sanitary lines eventually lead to the Fort McCoy wastewater treatment plant (WWTP) and the stormwater lines discharge to various surface water bodies, retention ponds, and groundwater discharge. There are generally no combined stormwater and sanitary sewer lines at Fort McCoy. However, occasionally buildings are discovered with downspouts connected to the sanitary sewer lines. AOPIs near the Sparta – Fort McCoy Airport are all in close proximity to these structures and have potential for PFAS migration through the system. Additional utilities (communication, gas, water, electric) are in the proximity of all AOPIs, which could create a preferential pathway for PFAS migration.

2.10 Potable Water Supply and Drinking Water Receptors

Potable wells at FTMC are screened in the Sandstone Aquifer. This is the principal aquifer of the region and is used extensively by FTMC for all industrial and drinking water needs. Nine wells at FTMC are currently used for drinking water. Ten additional wells provide water at FTMC but are not used for drinking water. An additional five on-installation production wells supply non-potable water to FTMC. Water use ranges from 0.5 to 1.5 million gallons per day. FTMC is located in the La Crosse River basin, which is known for good groundwater quality with no evidence of contamination or potential health problems. The water is pumped from wells, treated, disinfected, and sent to a reservoir. All potable wells used for drinking water at FTMC are tested for PFAS at least every three years. Samples collected in 2016, 2017, and 2019 had no detections of PFAS compounds in FTMC drinking water.

A portion of the drinking water at FTMC is supplied through three potable drinking water wells located at the Sparta – Fort McCoy Airport in close proximity to several AOPIs. One of these wells is a sand point well (6082W) that does not obtain water from the deeper sandstone aquifer. Two of those wells are owned by the City of Sparta but are located on FTMC property (6081W and 6082W). Due to the proximity to several AOPIs, these potable drinking water wells are potentially vulnerable to impacts from PFAS-containing groundwater. Additionally, one drinking water well used to supply water to latrines in the training range is located on the installation in the downgradient direction of Former Landfill #5 and Fire Training Burn Pit (FTBP) #1. Well construction details for these wells is provided in **Table 2-1**. Potential drinking water receptors off-installation include residents of the City of Sparta, which is located approximately 4 miles southeast of the Sparta-Fort McCoy Airport, and obtain their drinking water from six water supply wells. Numerous other private drinking water wells are found on residential properties surrounding the installation and within 5 miles of all AOPIs. **Figure 2-4** shows the location of all potable drinking water wells in relation to the AOPIs and installation boundary. Several off-installation potable

wells were identified using an Environmental Data Resources, Inc. (EDR) report. The EDR report is provided as **Appendix E**.

2.11 Ecological Receptors

Due to the availability of adequate toxicity data, the Army focused the PA/SI on human receptors. The PA team collected information on ecological receptors that was available in the installation documents reviewed during the PA process. The following information is provided for future reference should the Army decide to evaluate exposure pathways relevant to the ecological receptors.

Ecological receptors include sensitive environments (e.g., wetlands and Natural Areas) and threatened and endangered species. At FTMC there are approximately 4,400 acres of wetlands. The water table has risen in some lower areas due to anthropogenic features such as roads and railroads, which have caused the boundaries of some wetlands to expand. There are three Natural Areas which were established because of their uniqueness and rare plant species. As of March 2012, one federally endangered species, 14 state endangered species, and 21 state threatened species have been documented at FTMC. In addition, three species found at FTMC are classified as Army Species at Risk (FTMC 2012).

2.12 Previous PFAS Investigations

PFAS sampling has been conducted at several locations at FTMC, including the FTBPs #1, #2, and #3 and Former Landfill #5. PFAS sampling of existing monitoring wells at FTBP #1 occurred in September and December 2016, and August 2017. FTBP #2 and FTBP #3 were sampled for PFAS in September and October of 2016. The activities consisted of groundwater sampling from existing monitoring wells at FTBP #3 and direct-push technology (DPT) groundwater grab sampling at FTBP #2. Groundwater sampling for PFAS at existing monitoring wells at Former Landfill #5 was performed in October 2018. Detections of PFOS, PFOA, and PFBS in groundwater were observed at the FTBP #1, FTBP #2, FTBP #3, and the Former Landfill #5. Several groundwater exceedances of OSD risk screening levels were also observed.

In response to the third Unregulated Contaminant Monitoring Rule, PFAS samples were collected from the FTMC North Post Water Plant in February and August of 2013. All PFAS compounds analyzed were below detection limits for each sampling event. In response to IMCOM Operations Order 16-088, 19 potable wells were sampled for PFAS from 2016 to 2019. The results were below detection limits at all wells. One additional potable well (SW-5031) has come online since the previous sampling and is scheduled to be sampled for PFAS in 2021. PFOS, PFOA, and PFBS analytical data for all previous PFAS investigations at FTMC is provided in **Table 2-2**.

3 SUMMARY OF PA ACTIVITIES

The following three principal sources of information were used to develop this PA:

1. Records review
2. Personnel interviews
3. Site reconnaissance.

These sources of data, along with their relative application to this PA, are discussed below. The specific findings of records review, personnel interviews, and site reconnaissance relevant to PFAS at FTMC are described in **Section 4**.

3.1 Records Review

The records reviewed included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. Additionally, an EDR report generated for FTMC was reviewed to obtain off-post water supply well information. A list of the documents reviewed is provided in **Appendix F**.

3.2 Personnel Interviews

Interviews were conducted during the site visit. If a previously identified interviewee was not available during the site visit, attempts were made to complete the interview via telephone before or following the site visit or by contacting an alternate interviewee identified by the installation POC.

The list of roles for the installation personnel interviewed during the PA process for FTMC is presented below (affiliation is with FTMC unless otherwise noted).

- Airport Manager
- Environmental Chief (Directorate of Public Works)
- Training Division Chief
- Range Scheduler
- Range Control Specialist
- Range Safety Specialist
- Spill Response, Emergency Medical Services Awareness Personnel (Directorate of Public Works)
- Chief of Engineering (Directorate of Public Works)
- Chief or Assistant Chief of Operations and Maintenance (Directorate of Public Works)
- Wastewater Treatment Plant Operator and Chief Water Systems Operator (Directorate of Public Works)

- Fire Chief
- Assistant Fire Chief
- Lead Fire Inspector
- Forestry Personnel (Directorate of Public Works)
- Pesticide Application Manager (Directorate of Public Works)
- Environmental Protection Specialist and IRP Manager (Directorate of Public Works)
- Compliance Branch Manager (Directorate of Public Works)

The compiled interview logs are provided in **Appendix G**.

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at nine of the potential AOPIs identified during the records review process, the installation in-brief meeting, and during the installation personnel interviews. Under some circumstances, the team may not have conducted site reconnaissance at an AOPI identified in the read-ahead package due to additional information obtained during personnel interviews or if access to the site was restricted. However, the area still may have been classified as an area not retained for further investigation or an AOPI based on other information collected (e.g., records reviewed, personnel interviews, internet searches) as described in **Sections 5.1** and **5.2**, respectively. A photo log from the site reconnaissance is provided in **Appendix H**; photos were used to assist in verification of qualitative data collected in the field. The site reconnaissance logs are provided in **Appendix I**.

Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for future sampling.

Table 3-1. Site Reconnaissance Areas

Site Identifier	Description and Relevance
Wells	
Sparta Potable Well	This well is a sand-point well roughly 1,000 feet downgradient of the FTBP #2 and FTBP #3 plume. The well is screened from 37 to 41 feet and supplies water to the Sparta-Fort McCoy Airport Hangar. Other potable water wells in the area are bedrock wells while this well is found in the upper sand unit. This well was sampled for PFAS in 2016 and 2019 with results below detection limits.
Fire Related Areas	
FTMC Fire Station	Current fire station where trucks are housed. No history of firefighting foam use at this facility.
Former Fire Station #1 and Former Fire Station #2*	Former Fire Station #1 was a smaller building that is not believed to have stored or used AFFF. Former Fire Station #2 was located near the Sparta-Fort McCoy

Site Identifier	Description and Relevance
	Airport Hangar. Trucks potentially carrying AFFF were stored here. Nozzle testing and fire extinguisher testing possibly also occurred here.
FTBP #1*	This burn pit is closed and is currently a parking lot with a 2.5-foot-thick gravel cap. Soil was excavated in 1983 and 2006, with soil being placed in Landfill #5 in 1983 and taken offsite in 2006. PFAS presence in groundwater was confirmed during sampling events in 2016 and 2017, but the downgradient edge of the PFAS plume was not defined. The Suukjak Sep creek flows roughly 1,000 feet downgradient from the PFAS plume.
FTBP #2* and FTBP #3*	FTBP #2 AFFF use ceased in 1992. FTBP #2 was excavated in 1982 and 1994. The 1982 excavated soils were placed in Landfill #5. The 1994 excavated soils were disposed of offsite. FTBP #3 was constructed in 1994 and lined with concrete. FTBP #2 is roughly 500 feet downgradient (north-northwest) of FTBP #3. AFFF use at FTBP #3 started in 1995 and was terminated in 2017. A recent groundwater sampling investigation found concentrations of PFAS in shallow groundwater.
Aviation Areas	
Deluge System/Hangar*	The deluge system consists of a 300,000-gallon water tank connected to a 500-gallon AFFF tank located in the Sparta-Fort McCoy Airport Hangar. The system remains in operation but is only used in the event of an airplane/hangar fire. The most recent accidental release/spill was documented on 16 May 2017 which included a 20,000-gallon AFFF-foam water mixture release at that hangar. No other releases have been documented.
Waste Management Facilities	
Former Landfill #5*	This landfill is no longer operational. The landfill is known to contain AFFF contaminated soil from FTBP #1 and FTBP #2. Nearby monitoring wells were sampled in October 2018 and indicated the presence of PFAS compounds.
WWTP*	Sludge from the WWTP facility is given to local farmers and spread throughout their fields.

* indicates the area has been further identified as an AOPI. Please note, this summary is not all-inclusive of all AOPIs at FTMC, as site reconnaissance visits were not performed at each preliminary AOPI.

4 SUMMARY OF SOURCE AREAS RESEARCHED

A summary of the observations made, and data collected through records reviews (**Appendix F**), installation personnel interviews (**Appendix G**), and site reconnaissance (**Appendix I**) during the PA process for FTMC is presented below.

4.1 AFFF Use and Storage at FTMC

During the PA, eight areas of AFFF use and AFFF storage were identified at FTMC as follows:

- The 2017 AFFF Release occurred when a fire suppression system valve failed in the Sparta – Fort McCoy Airport Hangar. This resulted in approximately 20,000 gallons of an AFFF foam-water mixture being released inside and outside of the Hangar.
- The Deluge System is located on the southeast portion of the airport property. Originally, it was believed that annual maintenance performed on the system included flushing AFFF from the lines, potentially causing releases to the ground surface. However, recent conversations with installation personnel indicated that it is unlikely that AFFF has been stored here, and that the underground tank connected to the Deluge System only stores water.
- The 1990s AFFF Release occurred on the tarmac to the southeast of the Sparta – Fort McCoy Airport Hangar in the early 1990s. The nature and extent of the release are not known.
- Building 207 is the waste management building where waste is temporarily stored before being taken offsite for disposal. AFFF was periodically stored here before being removed for disposal.
- Former Landfill #5 is located just to the north of FTBP #1 and is known to have received soil containing AFFF. PFAS analyses in groundwater were initially conducted at Former Landfill #5 in 2018, and results confirmed the presence of PFAS.
- The WWTP has the potential to have received water containing PFAS compounds. Sludge from treatment operations is occasionally used by local farmers as fertilizer. The WWTP was identified as an AOPI; however, the off-installation locations of the sludge land application were outside of the scope of this SI. Influent and effluent samples were not collected because they would not be representative of potential historical PFAS releases. WWTP-related sample collection may be included in a future phase of investigation

During the PA, six areas classified as firefighting training areas or fire stations were identified at FTMC. Two of those areas were considered areas not retained for further investigation sampling was not performed as part of the SI. Those non-AOPIs are the Current Fire Station and Former Fire Station #1. The Current Fire Station did not house AFFF and all training activities occurred at the FTBPs. Former Fire Station #1 was abandoned in 1997 and prior to that did not store AFFF. Fire training also did not occur here. The remaining four areas were identified as AOPIs due to confirmed or suspected releases of AFFF and were included for sampling in the SI.

- FTBP #1 was located in the center of the installation, southwest of Former Landfill #5 where it operated until 1987. AFFF use was confirmed for training activities; 2016 and 2017 groundwater sampling confirmed the presence of PFAS.

- FTBP #2 operated from 1982 to 1992 and is located at the Sparta-Fort McCoy Airport adjacent to the north-south runway. Groundwater data collected in 2016 confirmed the presence of PFAS.
- FTBP #3 is located just to the southeast of FTBP #2. It began operations in 1995 and continues to operate using water to extinguish jet fuel fires. AFFF use at FTBP #3 ceased in 2017. Groundwater data collected in 2016 confirmed the presence of PFAS.
- Former Fire Station #2 was located at the airport to the south of the current east-west runway. Possible nozzle testing and other training could have occurred here.

4.2 Metal Plating Operations

According to installation personnel and records review, metal plating did not occur at FTMC.

4.3 Other Potential PFAS Sources at FTMC

The September 2018 Army guidance indicates the mechanisms for potential use, storage, and disposal of PFAS include AFFF, metal plating, WWTPs (and associated biosolids) and landfills (Army 2018). Other potential PFAS sources were also considered. These potential sources include installation storage warehouses, pesticide use, prescribed burn areas, automobile maintenance shops, photo-processing facilities, laundry/water-proofing facilities, car washes, stormwater or sanitary sewer components, or remediated soil application areas. It was noted during a discussion with a USAEC Pest Management Consultant that the larger group of pesticides are generally not of PFAS concern. Specifically, products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. The USAEC Pest Management Consultant has records of pesticides used and stored at IMCOM installations, including FTMC, and did not identify FTMC as an installation ever containing PFAS-containing pesticides/insecticides.

Further discussion regarding areas not retained for further investigation is presented in **Section 5.1**.

4.4 Readily Identifiable Off-Post PFAS Sources

An exhaustive search to identify all potential off-post PFAS sources (i.e., not related to operations at FTMC) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the installation that were identified during the records search and site visit are described below. These areas are included to identify other potential sources of PFAS in the vicinity of the installation and to demonstrate uncertainty surrounding any future off-installation impacts.

There are four fire stations within 5 miles of the installation boundary. The La Grange Township Fire Station is located approximately 2 miles off the eastern property boundary, the Sparta Area Fire District is located approximately 2.5 miles off the southwest property boundary, and the Tomah City Fire Station and Tomah North Side Fire Station are located approximately 4 miles off the eastern property boundary. Regional groundwater flow is to the west, so potentially upgradient sources include the La Grange Township Fire Station, Tomah City Fire Station, and Tomah North Side Fire Station.

5 SUMMARY AND DISCUSSION OF PA RESULTS

The areas evaluated for potential PFAS use, storage and/or disposal at FTMC were further refined during the PA process and identified either as an area not retained for further investigation or as an AOPI. In accordance with the established process for the PA/SI, six have been identified as areas not retained for further investigation and 10 have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

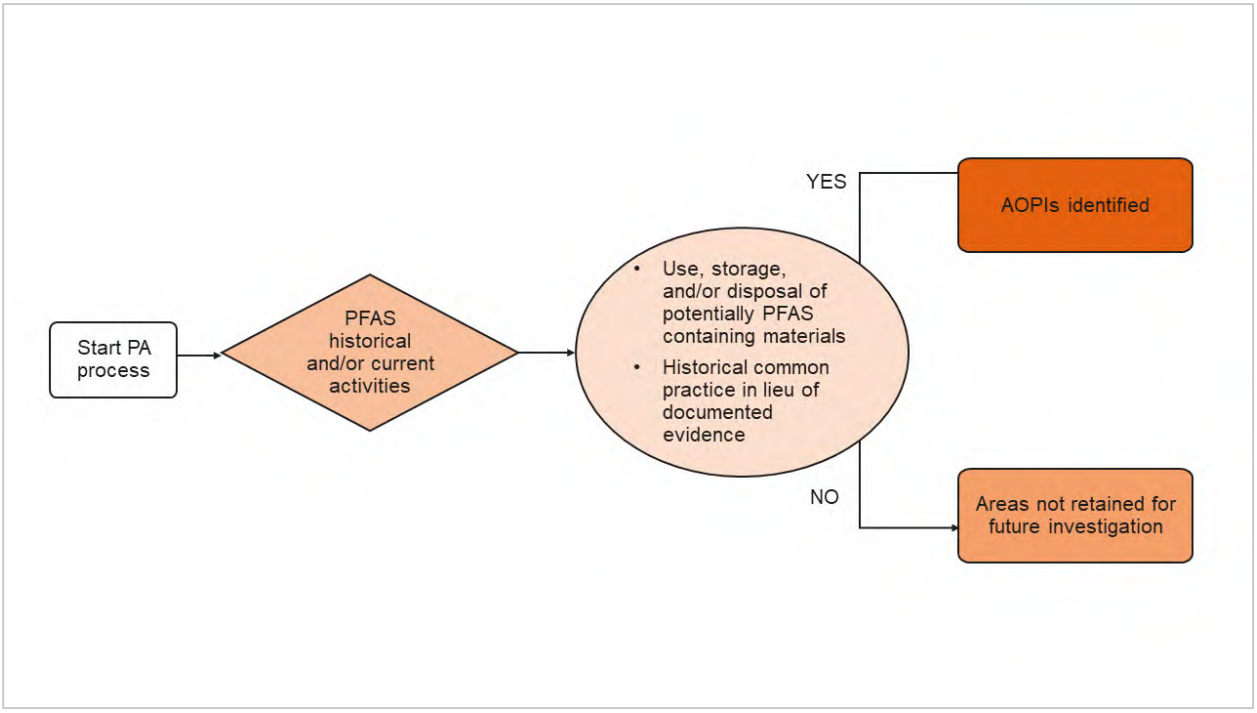

Figure 5-1: AOPI Decision Flowchart

The areas not retained for further investigation are presented in **Section 5.1**. The areas retained as AOPIs are presented in **Section 5.2**.

Three of the AOPIs overlap with FTMC IRP sites and/or Headquarters Army Environmental System (HQAES) sites (**Figure 5-2** and **5-3**). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within each AOPI subsection presented below. At the time of this PA, three of the FTMC IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figure 2-2**. Aerial photographs of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-2** and **5-3** and include active monitoring wells in the vicinity of each AOPI.

Data limitations for this PA/SI at FTMC are presented in **Section 8**.

5.1 Areas Not Retained for Further Investigation

Through the evaluation of information obtained during records review, personnel interviews, and/or site reconnaissance, the areas described below were categorized as areas not retained for further investigation. These areas were previously identified as potential PFAS sources (e.g., non-AFFF fire incidents, auto maintenance, pesticide use or storage) at FTMC. However, following site research conducted for this PA, PFAS use, storage, and/or disposal was not suspected at these areas. These areas are not retained for further investigation at this time but may be re-evaluated at a later date if additional information is collected and/or updated Army guidance is issued.

A brief site history for areas not retained for further investigation and the rationale for eliminating the areas as AOPIs is presented in **Table 5-1**, below.

Table 5-1. Installation Areas Not Retained for Further Investigation

Area Description	Dates of Operation	Relevant Site History	Rationale
Drinking Water Wells	Currently in use	Have been tested for PFAS and confirmed that PFAS are not detected in drinking water.	Verified that PFAS are not detected at the drinking water wells.
Fire Station #1	Pre-1997	Former fire station. This station did not house crash trucks and fire training activities did not occur here.	AFFF was not used or stored here.
Prescribed Burn Locations	Currently in use	Prescribed burns have been occurring on FTMC property for a number of years.	It is unlikely that foam containing AFFF was used to contain these fires.
FTMC Range	Currently in use	Various military training operations are conducted here.	It is unlikely the training operations had utilized AFFF.
Current Fire Station	Currently in use	Location of current fire department employees and equipment.	Interviews confirmed that all training activities took place at the FTBPs. AFFF is not stored here.
Pesticide Disposal Site	1940s to 1965	Former pesticide disposal site. Waste was removed in 1997, but some residual pesticide concentrations remain.	There is no evidence of PFAS impacts from pesticide use at FTMC.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section.

5.2.1 Former Landfill #5 (HQAES #55425.1004)

The Former Landfill #5 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to receiving AFFF containing soil from FTBP #1 and FTBP #2. Groundwater sampling in 2018 confirmed the presence of PFAS in downgradient monitoring wells.

Former Landfill #5 was used from 1965 to 1989. Soil contaminated with petroleum, oil, and lubricants was also disposed of here. Other wastes and debris stockpiled and disposed of at the landfill include scrap lumber, creosote-treated lumber, animal carcasses, coal slag, asbestos, concertina wire, porcelain fixtures, dead trees, brush, and roofing material. The landfill was capped in 1991. Groundwater monitoring for petroleum, oil and lubricants, and volatile organic compounds is ongoing as part of continuing obligations at the Former Landfill #5. Current and expected future land use for this AOPI is industrial/commercial.

5.2.2 Fire Training Burn Pit #1 (HQAES # 55425.1009)

The FTBP #1 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF use during fire training activities. Groundwater sampling performed in 2016 and 2017 confirmed the presence of PFAS in groundwater.

In 1983, a portion of contaminated soil was removed from the pit and placed in Former Landfill #5. Following soil removal, the pit was lined with plastic, with two feet of clay placed on top of the plastic and a 1-foot thick clay berm installed around the pit. After installation of the plastic liner and the clay, the pit was used until at least 1987 when it was graded flat. The pit has not been used since the late 1980s. Remediation of the soil was conducted utilizing in-situ microbial degradation. In 2006, the remaining contaminated soil (60 cubic yards) was excavated and disposed of at a licensed landfill, and the area of the former pit was capped with 2.5 feet of gravel. Monitoring for chlorinated constituents ceased in 2013 and final Wisconsin Department of Natural Resources closure approval, with regard to chlorinated solvents, was issued in 2018. Currently, there is a gravel cap present over the former pit and extending over the entire storage yard. Current and expected future land use for this AOPI is industrial/commercial.

5.2.3 Fire Training Burn Pit #2 (HQAES # 55425.1010)

The FTBP #2 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF use during fire training activities. Groundwater sampling performed in 2016 confirmed the presence of PFAS in groundwater.

FTBP #2 was used until 1992. FTBP #2 was excavated in 1982 and soil was placed at Former Landfill #5. Another remedial excavation occurred in 1994, with the soil being taken offsite for disposal. The site is located within the boundaries of the Sparta – Fort McCoy Airport and is now closed. Volatile organic compounds were the constituent of concern. Current and expected future land use for this AOPI is industrial/commercial.

5.2.4 Fire Training Burn Pit #3

The FTBP #3 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF use during fire training activities. Groundwater sampling performed in 2016 confirmed the presence of PFAS in groundwater.

Activities at FTBP #3 began in 1995 and are ongoing. AFFF use at FTBP #3 ceased in 2017. The site is located within the boundaries of the Sparta – Fort McCoy Airport. Current and expected land use for this AOPI is industrial/commercial.

5.2.5 Former Fire Station #2

The Former Fire Station #2 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to potential AFFF use and storage. The activities and operational dates at this AOPI are unknown. Possible activities include nozzle testing and AFFF storage. Current and expected land use for this AOPI is industrial/commercial.

5.2.6 2017 AFFF Release

The 2017 AFFF Release is identified as an AOPI following records research, personnel interviews, and site reconnaissance. In 2017, approximately 20,000 gallons of an AFFF foam mixture was released due to a failed valve on the deluge system. Current and expected land use for this AOPI is industrial/commercial.

5.2.7 Deluge System

The Deluge System is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to potential releases of AFFF. Originally it was indicated that annual maintenance is performed on the Deluge System which involves flushing of AFFF containing lines with possible discharge outside of the building. However, recent conversations with installation personnel indicated that it is unlikely that AFFF has been stored here and any maintenance would have been performed at the Sparta – Fort McCoy Airport Hangar. A 300,000 gallon underground water tank is present at the Deluge System and is connected to the airport hangar AFFF suppression system, but the AFFF does not enter the Deluge System. The Deluge System remains classified as an AOPI to distinguish sampling locations but is no longer considered a source area and will not be recommended for further investigation. Current and expected land use for this AOPI is industrial/commercial.

5.2.8 1990s AFFF Release

The 1990s AFFF Release is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to a potential release of AFFF. Installation personnel had recollection of a small AFFF release in the early 1990s on the tarmac to the southeast of the Sparta – Fort McCoy Airport Hangar. Current and expected land use for this AOPI is industrial/commercial.

5.2.9 Building 207

Building 207 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to a potential release of AFFF from storage. Building 207 is the waste management building where waste is temporarily stored before offsite disposal. This facility has occasionally housed foam containing AFFF. This location was reclassified from an area not retained for future investigation to an AOPI following the PA to capture any locations where AFFF was stored. Current and expected land use for this AOPI is industrial/commercial.

5.2.10 Wastewater Treatment Plant

The WWTP is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to a potential release of AFFF into sewer lines. Sludge from treatment operations is occasionally used by local farmers as fertilizer. Current and expected land use for this AOPI is industrial/commercial.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at FTMC, an SI for PFAS was conducted in accordance with CERCLA. SI sampling was completed at FTMC at nine of the 10 AOPIs to evaluate presence or absence of PFAS and assess potential PFAS migration pathways. As such, an installation-specific QAPP Addendum (Arcadis 2019b) was developed to supplement the general information provided in the PQAPP (Arcadis 2019a) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, surface water and sediment pathways as potentially complete, which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The original SI scope of work was completed in October 2019 through the collection of field data and analytical samples, with a supplemental SI investigation in August 2020.

The SI field work was completed in accordance with the standard operating procedures (SOPs), technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2019b) and PQAPP (Arcadis 2019a). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at FTMC. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.3**. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

As identified during the DQO process and outlined in the site-specific QAPP Addendum (Arcadis 2019b), the objective of the SI is to evaluate whether there has been a release to the environment from any of the AOPIs identified in the PA. This SI evaluated groundwater, potable water, soil, surface water, and sediment for PFOS, PFOA, PFBS presence or absence at each of the sampled AOPIs. Additionally, soil and groundwater samples were collected from areas between the AOPIs and the potable water supply wells to assess potential PFAS migration pathways.

6.2 Sampling Design and Rationale

The rationale for sampling at each AOPI is illustrated on **Figure 6-1** below.

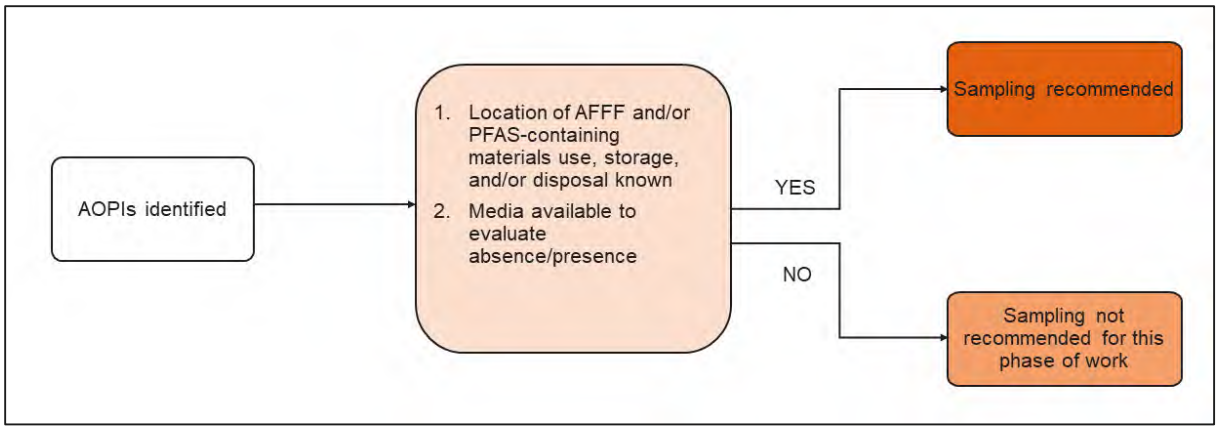

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at FTMC is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2019b). Groundwater and soil samples were collected from nine AOPIs. Potable water supply well and surface water sampling was conducted near the Sparta – Fort McCoy Airport and sediment sampling was conducted near two AOPIs. Forty-one surface/subsurface soil samples were collected from 23 locations at nine AOPIs. Twenty-nine vertical aquifer profiling (VAP)/DPT grab groundwater samples were collected from 19 locations at eight AOPIs. Groundwater and soil were sampled to identify PFAS presence, type (of the 18 selected PFAS constituents as listed in Worksheet #15 of the QAPP Addendum (Arcadis, 2019a), including PFOS, PFOA, and PFBS), and concentrations, as well as total organic carbon (TOC), pH, and grain size for soil samples. Potable water was sampled to identify PFAS presence, type (of 14 selected constituents as listed in Worksheet #15 of the QAPP Addendum [Arcadis, 2019a], including PFOS, PFOA, and PFBS), and concentrations. Surface water and sediment samples were collected from seven locations in close proximity to nine AOPIs. Surface water and sediment samples were sampled to identify PFAS presence, type (of the 18 selected PFAS constituents as listed in Worksheet #15 of the QAPP Addendum (Arcadis, 2019a), including PFOS, PFOA, and PFBS), and concentrations. The targeted sampling areas are believed to have the potential for the greatest PFAS concentrations closest to known or suspected releases of AFFF.

Approximate sampling depths, and constituents analyzed for each sampling location and medium are included in **Table 6-1**. The original SI scope was completed from September to October 2019 and consisted of DPT groundwater grab, soil, surface water, and sediment sampling. A remobilization occurred in August 2020 and consisted of only soil sampling.

6.3 Sampling Methods and Procedures

Environmental data were collected and analyzed in accordance with the PQAPP (Arcadis 2019a), the SOPs and TGIs included as Appendix A to the PQAPP, the QA/QC requirements identified in Worksheet #20 of the PQAPP, the approved scope and sampling methods outlined in the site-specific QAPP Addendum (Arcadis 2019b), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP. The sampling methods described in the SOPs and TGIs establish equipment requirements, procedures for preparing equipment and containers before sampling, sampling procedures under various conditions, and procedures for storing samples to ensure that sample contamination does

not occur during collection, and transport. In general, sampling techniques used for PFAS site characterization were consistent with conventional sampling techniques used in the environmental industry, but special considerations were made regarding PFAS-containing materials and equipment and cross-contamination potential.

The sampling methods employed during the SI are detailed in the PQAPP (Arcadis 2019a) and QAPP Addendum (Arcadis 2019b). The subsections below provide a summary of the field methods and procedures utilized to complete the SI scope of work. Field notes and field forms (i.e., soil boring logs, groundwater purging logs, and sample collection logs) documenting the SI sampling activities are included in **Appendix J** and **Appendix K**, respectively. Photographs of the sampling activities are included in **Appendix L**.

6.3.1 Field Methods

At eight AOPIs, boreholes were advanced using DPT for VAP. The drill casing was advanced using a top-down sampling method to minimize cross-contamination at depth. Soil and groundwater grab samples were collected in accordance with the TGI for VAP (P-14 in Appendix A to the PQAPP [Arcadis 2019a]). Surface soil samples at these borings were collected using hand-auger methods and subsurface soil samples were collected in PFAS-free acetate liners. Grab groundwater samples were collected using a peristaltic pump with PFAS-free disposable high-density polyethylene tubing through a stainless-steel screen and packer assembly. In addition, groundwater samples were collected from active production wells in accordance with the TGI for Potable Water Sampling (Attachment 4 of the QAPP Addendum [Arcadis 2019b]). Surface water samples were collected using direct-fill methods just below the water surface. Sediment samples were collected from the upper 10 centimeters using a decontaminated Lexan tube and were decanted before bottling for laboratory analysis.

Decontamination procedures for non-dedicated equipment used during sampling are described in **Section 6.3.4**.

6.3.2 Quality Assurance/Quality Control

Worksheet #20 of the PQAPP and QAPP Addendum provide QA/QC requirements for field duplicates, matrix spike/matrix spike duplicates, equipment blanks (EBs), source blanks for water used in the initial decontamination step for drill tooling, and field blanks for laboratory-supplied water used in the final decontamination step.

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2019b), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFAS only. EBs were collected for media sampled for PFAS at a frequency of one per piece of relevant equipment for each sampling event, as specified in the QAPP Addendum (Arcadis 2019b). The decontaminated reusable equipment from which EBs were collected include tubing, screen-point samplers, drill casing and cutting shoes, hand augers, water-level meters, acetate liners, and stainless-steel trowels as applicable to the sampled media. Source blanks were collected from the water used to pressure-wash drill tooling. Analytical results for QA/QC samples are discussed in **Section 7.10**.

6.3.3 Dedicated Equipment Background

Dedicated equipment background samples were not collected during the FTMC SI.

6.3.4 Field Change Reports

In some cases, clarifications to the established scope of work may be needed but do not necessarily constitute a non-conformance from the sampling plans described in the QAPP Addendum. Minor modifications from and clarifications for the procedures and scope of work detailed in the QAPP Addendum and PQAPP and that did not affect DQOs are documented in Field Change Reports included as **Appendix M** and summarized below:

- Drill rig refusal was encountered at 10 feet bgs at FTMC-FTBP-2-2 and the proposed soil and groundwater samples were unable to be collected. This was discussed with installation personnel and agreed that it was best not to sample at this location. Nearby location FTMC-FTBP-2-1 was deemed sufficient to evaluate absence/presence at this AOPI. The loss of this sample indicates that the 100% DQO was not met. However, decisions regarding future investigations at this AOPI are still able to be made based on the analytical data.
- At the request of FTMC, additional surface water sampling was performed at three locations along Silver Creek. These samples were not outlined in the site specific QAPP Addendum (Arcadis 2019b). In September 2019, the Wisconsin Department of Natural Resources collected surface water samples for PFAS from Silver Creek, downstream of FTMC and reported detections of PFAS compounds. The three additional surface water samples were collected at specific locations in relation to the nearby AOPIs at the Sparta - Fort McCoy Airport to better understand the source of those earlier detections.

6.3.5 Decontamination

Non-dedicated reusable sampling equipment (e.g., stainless-steel trowels, hand augers, drill cutting shoes and casing, screen-point samplers, water-level meters) that came into direct contact with sampling media was decontaminated before first use, between sampling locations/intervals, and before demobilization in accordance with P-09, TGI - Groundwater and Soil Sampling Equipment Decontamination (Arcadis 2019b; Appendix A).

6.3.6 Investigation-Derived Waste

IDW, including soil cuttings, excess sediment, groundwater, surface water, decontamination fluids were placed on the ground at the point of collection. Equipment IDW such as personal protective equipment and groundwater sampling disposable supplies was disposed of in an on-installation garbage receptacle.

6.4 Data Analysis

The subsections below summarize the laboratory analytical methods and the methodology used to evaluate data collected during the SI through data verification and usability assessments (as completed by a project chemist, independent of the project team).

6.4.1 Laboratory Analytical Methods

Analytical samples collected during the SI were submitted to Eurofins Lancaster Laboratories Environmental, an ELAP-accredited laboratory for PFAS analysis. Laboratory analyses associated with the SI were completed in accordance with Worksheets #12.1 through #12.5 in the PQAPP (Arcadis 2019a). Eighteen PFAS-related compounds (listed in **Table 6-2** below) were analyzed for in groundwater, soil, surface water, and sediment samples using a PFAS analytical method that is ELAP-accredited and compliant with QSM 5.1.1, Table B-15 (DoD 2018). Potable water samples were analyzed for 14 PFAS compounds (listed in **Table 6-2** below except for the noted constituents) according to USEPA Method 537, in accordance with Worksheet #15 of the FTMC QAPP Addendum (Arcadis 2019b). Copies of laboratory analytical reports generated during the SI are included as attachments to the Data Usability Summary Report (DUSR) in **Appendix N**.

Table 6-2. PFAS Compounds Analyzed in Groundwater, Soil, Surface Water, Sediment and Potable Water

Chemical Name	Chemical Abbreviation
6:2 Fluorotelomer sulfonate*	6:2 FTSA*
8:2 Fluorotelomer sulfonate*	8:2 FTSA*
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA
Perfluorobutanesulfonic acid	PFBS
Perfluorobutanoic acid*	PFBA*
Perfluorodecanoic acid	PFDA
Perfluorododecanoic acid	PFDoA
Perfluoroheptanoic acid	PFHpA
Perfluorohexanesulfonic acid	PFHxS
Perfluorohexanoic acid	PFHxA
Perfluorononanoic acid	PFNA
Perfluorooctane sulfonate	PFOS
Perfluorooctanoic acid	PFOA
Perfluoropentanoic acid*	PFPeA*
Perfluorotetradecanoic acid	PFTA
Perfluorotridecanoic acid	PFTrDA
Perfluoroundecanoic acid	PFUnA

* indicates PFAS constituents which are not analyzed for potable water samples.

Additionally, the following general chemistry and physical characteristic analyses were completed for select soil and sediment samples in accordance with Worksheet #18 of the QAPP Addendum (Arcadis 2019b) by the analytical method noted:

- TOC by Solid Waste Test Method 846 9060A
- Grain size analysis by American Society for Testing and Materials D422-63
- pH by Solid Waste Test Method 846 9045D.

These data are collected as they may be useful in future fate and transport studies.

6.4.2 Data Validation

All analytical data generated during the SI were verified and validated in accordance with the data verification procedures described in Worksheets #34 through #36 of the PQAPP (Arcadis 2019a). Each laboratory data package/sample delivery group underwent Stage 3 data validation in accordance with DoD QSM 5.1.1 (DoD 2018). Additionally, 10% of the data underwent Stage 4 data validation. Copies of the data validation reports for each sample delivery group are included as attachments to the DUSR in **Appendix N**.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at FTMC. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix N**), was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD Data Validation Procedure for Per-and Polyfluoroalkyl Substances Analysis by QSM Table B-15 (DoD 2020), that reviewed precision, accuracy, completeness, representativeness, comparability, and sensitivity. A statement of overall data usability is included in the DUSR. The SI was limited in scope to presence or absence of PFAS, and limited sampling to areas of AFFF use or areas that may have received PFAS-contaminated material. Therefore, the 5-step DQO process described in Worksheet #37 of the PQAPP (Arcadis 2019a) was not appropriate and was not performed.

Based on the final data usability assessment, the environmental data collected at FTMC during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSR and its associated data validation reports (**Appendix N**), and as indicated in the full analytical tables (**Appendix O**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019a) and FTMC QAPP Addendum (Arcadis 2019b). Data qualifiers applied to laboratory analytical results for samples collected during the SI at FTMC are provided in the data tables, data validation reports, and the Data Usability Summary Table located at the end of DUSR. Qualifiers for data shown on figures are defined in the notes of figures:

6.5 Project Screening Levels

The laboratory limit of detection (LOD) is defined as “the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence” (DoD 2017). The laboratory analyte-, sample-, and batch-specific LODs are used as the project screening

levels (PSLs) to evaluate the presence or absence of the PFAS constituents analyzed for during this SI. Since the PSLs are equivalent to the LODs, PSLs vary slightly depending on the sample- and batch-specific LODs reported by the laboratory for each analyte. For this SI, the presence/absence of PFAS constituents was evaluated as follows:

- If PFAS are not detected at concentrations greater than the PSLs, PFAS are not present and the release of PFAS to the sampled media is unlikely.
- If PFAS are detected at concentrations greater than or equal to the PSLs, PFAS are present, and the release of PFAS to the sampled media is likely.

The lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias is known as the limit of quantitation (LOQ; DoD 2017). Concentrations detected between the LOD and LOQ, therefore, are considered estimates and are qualified as such on laboratory analytical reports. Instrument-specific detection limits (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence; DoD 2017), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports included in the DUSR (**Appendix N**).

While PSLs (i.e., the LODs) are used to identify presence or absence of PFAS at the AOPIs sampled during the SI, the analytical data are compared to 2019 OSD risk screening levels (**Appendix A**) to make recommendations for future investigations as described in **Section 6.6**.

6.6 2019 Office of the Secretary of Defense Risk Screening Levels

On 15 October 2019, the OSD provided guidance on the investigation of PFOS, PFOA, and PFBS at Operation and Maintenance accounts for the National Guard-funded, Environmental Restoration Account-funded, and Base Realignment and Closure Account-funded sites (OSD 2019; **Appendix A**). The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) and soil, calculated using the USEPA's RSL calculator for residential and industrial/commercial worker receptor scenarios as shown in **Table 6-3**.

Table 6-3 OSD Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil Using USEPA's RSL Calculator

Chemical	Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario Screening Levels Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) [1,2]	Soil (mg/kg or ppm) [1,2]	Soil (mg/kg or ppm) [1,2]
	HQ= 0.1	HQ= 0.1	HQ= 0.1
PFOS	40	0.13	1.6
PFOA	40	0.13	1.6
PFBS	40,000	130	1,600

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October 15 (**Appendix A**).
2. All soil and sediment data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet below ground surface), regardless of the current and projected land use of the AOPI. Soil samples collected from greater than two feet but less than 15 feet below ground surface will be compared to the Industrial/Commercial risk screening levels only, and soil samples collected from greater than fifteen feet below ground surface will not be compared to either risk screening level.

HQ = hazard quotient
mg/kg = milligram per kilogram
ng/L = nanograms per liter
ppm = parts per million
ppt = parts per trillion

The OSD residential tap water risk screening levels will be used to compare all groundwater and surface water data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at FTMC are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil concentrations. If only one PFAS constituent was detected (i.e., PFOS, PFOA, PFBS, or other), the risk screening level based on a noncancer HQ of 1 will be used and the risk screening levels shown in **Table 6-3** will increase by a factor of 10. If more than one PFAS constituent was detected (i.e., PFOS, PFOA, PFBS, or other), the risk screening level based on a noncancer HQ of 0.1 will be used (**Table 6-3**). The data from the SI sampling event are compared to the relevant risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further investigation is recommended in **Section 9**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at FTMC (field duplicate results are provided in the associated tables). Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2019b) and as noted in **Table 6-1**. The sample results discussion below focuses on the PFOS, PFOA, and PFBS analytical results due to these constituents' relevance to the OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to the screening criteria described above.

Tables 7-1 through **7-5** provide a summary of the groundwater, potable water, soil, surface water, and sediment analytical results for PFOS, PFOA, and PFBS only. **Appendix O** includes the full suite of analytical results for these media, as well as for the QA/QC samples. **Figures 7-1** through **7-3** show the PFOS, PFOA, and PFBS analytical results for groundwater, potable water, soil, surface water and sediment. Non-detected results are reported as less than the LOQ. PFAS concentrations detected between the LOD and LOQ are estimated, as indicated with a J laboratory qualifier, and will be interpreted as presence. Samples assigned a D qualifier were analyzed at dilution. Detected concentrations of PFAS greater than the LODs (i.e., PFAS are present) are bolded in summary tables and on figures for the sampled media in accordance with the methodology described in **Section 6.5**. Detections of PFOS, PFOA, and/or PFBS greater than the applicable OSD risk screening levels are highlighted in summary tables and on figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.4**) are presented on the analytical tables. Groundwater and surface water data collected during the SI are reported in ng/L, or parts per trillion, and soil and sediment data are reported in mg/kg, or parts per million.

Field parameters measured for groundwater during low-flow purging and sample collection and for surface water during sample collection are provided on the field forms in **Appendix K**. Soil and sediment lithological descriptions are provided on the field forms in **Appendix K**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was generally first encountered at depths of approximately 8 to 25 feet bgs during the SI.

7.1 Former Fire Training Burn Pit #1

The subsections below summarize the groundwater, soil, surface water, and sediment PFOS, PFOA, and PFBS analytical results associated with the FTBP #1.

7.1.1 Groundwater

Groundwater sampling was completed at two borings downgradient of the potential release area of the FTBP #1 AOPI prior to permanent well installation at each location (**Figure 7-1**). Prior to well installation, multi-interval VAP groundwater grab samples were collected at both borings from first-encountered groundwater and from the 30-foot bgs interval. PFOS, PFOA, and PFBS were detected above the LOD in two samples (**Table 7-1**). Samples were not collected from the monitoring wells after installation. The highest concentrations detected in groundwater at the FTBP #1 were in FTBP1-1 from the 30-foot bgs interval (35 ng/L for PFOS, 3.7 ng/L for PFOA, and 1.3 J ng/L for PFBS). At FTBP1-2, PFOS was detected at a concentration of 2.0 ng/L in the 30-foot bgs interval and PFOA and PFBS were not detected

above the LOD. There were no exceedances of OSD risk screening levels in groundwater at the FTBP #1 found during the SI. Groundwater exceedances of OSD risk screening levels were observed in previous investigations as discussion in **Section 2.12**.

7.1.2 Soil

Four soil samples were collected at two soil borings within the FTBP #1 AOPI boundary (**Figure 7-2**). At each soil boring, one shallow soil sample below the gravel cap and one subsurface soil sample were collected. All four soil samples had detections of PFOS and PFOA above the LOD. PFBS was not detected above the LOD in any soil samples (**Table 7-2**). At FTBP1-1, detections of PFOS were 0.085 J mg/kg (0 to 4 feet bgs) and 0.068 D mg/kg (12-feet bgs) and detections of PFOA were 0.00066 J mg/kg (0 to 4-feet bgs) and 0.0056 mg/kg (12-feet bgs). At FTBP1-2, detections of PFOS were 0.077 mg/kg (0 to 3 feet bgs) and 0.11 D mg/kg (12-feet bgs) and detections of PFOA were 0.0012 mg/kg (0 to 3-feet bgs) and 0.016 mg/kg (12-feet bgs). There were no exceedances of OSD risk screening levels in soil at the Former FTBP #1.

7.1.3 Surface Water and Sediment

One surface water sample and one sediment sample were collected at a single location from Suukjak Sep Creek, downgradient of the potential release area of FTBP #1 (**Figure 7-1**). The surface water sample, FTBP1-1, had concentrations of PFOS (2.0 ng/L) and PFOA (1.1 J ng/L) above the LOD. The sediment sample, FTBP1-1, had no detections of PFOS, PFOA, or PFBS above the LOD. There were no exceedances of OSD risk screening levels in surface water or sediment at the Former FTBP #1.

7.2 Former Landfill #5

The subsections below summarize the groundwater, surface water, and sediment PFOS, PFOA, and PFBS analytical results associated with Former Landfill #5. Soil samples were not collected at Former Landfill #5 due to restrictions preventing digging through the landfill cap.

7.2.1 Groundwater

Groundwater sampling was completed at three borings downgradient of the Former Landfill #5 prior to permanent well installation at each location (**Figure 7-1**). Prior to well installation, multi-interval VAP groundwater grab samples were collected at each boring from the first-encountered groundwater and from the 30-foot bgs interval. Groundwater samples were not collected from the monitoring wells after installation. PFOS, PFOA, and/or PFBS in groundwater samples at the Former Landfill #5 were detected above the LOD in five samples (**Table 7-1**).

At first-encountered groundwater at FL5-1 (22-feet bgs), there were no detections above the LOD. The greatest concentration and only exceedance of an OSD risk screening level was 62 ng/L for PFOA found at 22-feet bgs from FL5-2. Concentrations above the LOD were also observed at the following:

- FL5-1 at 30-feet bgs (1.3 J ng/L PFOS and 1.7 J PFOA)
- FL5-2 at 22-feet bgs (4.8 ng/L PFOS and 0.93 J ng/L PFBS)

- FL5-2 at 30-feet bgs (8.2 ng/L PFOS, 13 ng/L PFOA, and 1.2 J ng/L PFBS)
- FL5-3 at 23-feet bgs (1.4 J ng/L PFOS and 1.0 J ng/L PFOA)
- FL5-3 at 30-feet bgs (15 ng/L PFOS, 26 ng/L PFOA, and 1.1 J ng/L PFBS).

7.2.2 Surface Water and Sediment

Three surface water samples and three sediment samples were collected at three locations from Suukjak Sep Creek, downgradient of the Former Landfill #5 (**Figure 7-1**). PFOS was detected above the LOD in all three surface water samples. PFOA and PFBS were not detected above the LOD in any surface water sample. Concentrations of PFOS were detected at 1.9 ng/L at FL5-1, 2.0 ng/L at FL5-2, and 0.91 J ng/L at FL5-3. No detections of PFOS, PFOA, or PFBS were observed in any sediment samples. There were no exceedances of OSD risk screening levels in surface water or sediment at the Former Landfill #5.

7.3 Building 207

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Building 207 (**Figure 7-1**).

7.3.1 Soil

Four shallow soil samples were collected from locations surrounding Building 207 (**Figure 7-1**). No detections of PFOA or PFBS were observed above the LOD or OSD risk screening levels. PFOS was detected in samples FTMC-B207-3 and FTMC-B207-1 below OSD risk screening levels at concentrations of 0.0008 mg/kg and 0.00043 J mg/kg, respectively **(Table 7-2)**.

7.4 Former Fire Station #2

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Former Fire Station #2. Former Fire Station #2 is in close proximity to three drinking water wells as discussed in Section 2.10.

7.4.1 Groundwater

Groundwater sampling was completed at three borings within the suspected release area at the Former Fire Station #2 (**Figure 7-2**). Multi-interval VAP (first encountered groundwater and 30-foot bgs) groundwater samples were collected at one boring positioned in the center of the potential release area. Grab samples were collected at first-encountered groundwater only at two of the borings. All four groundwater samples had detections of PFOS above OSD risk screening levels. FFS2-2 (8-feet bgs) and FFS2-3 (8-feet bgs) had PFOA detections above risk screening levels (**Table 7-1**).

The greatest concentrations detected were in the first-encountered groundwater at FFS2-2 (12,000 D ng/L PFOS, 650 ng/L PFOA, and 60 ng/L PFBS at 8-feet bgs). At FFS2-1 (10-feet bgs), concentrations of 630 D ng/L for PFOS, 11 B ng/L for PFOA, and 11 J ng/L for PFBS were observed. Concentrations at FFS2-3 observed at the first-encountered groundwater (8-feet bgs) were 9,700 D ng/L PFOS, 80 B ng/L

PFOA, and 41 D ng/L PFBS and decreased in the 30-foot interval (760 ng/L PFOS, 38 B ng/L PFOA and 21 ng/L PFBS).

7.4.2 Soil

Six soil samples were collected from three soil borings at the Former Fire Station #2 AOPI (**Figure 7-2**). At each soil boring, one shallow soil sample (0 to 2-feet bgs) and one subsurface soil sample were collected. Five soil samples had detections of PFOS above the LOD. All six soil samples had detections of PFOA above the LOD. PFBS was not detected above the LOD in any soil samples (**Table 7-2**).

The only detection of PFOS, PFOA, or PFBS at FFS2-1 was a PFOS detection of 0.00047 J mg/kg at the surface (0 to 2-feet bgs). At FFS2-2, PFOS was again the only detected compound of the three with concentrations of 0.01 mg/kg in the shallow soil (0 to 2-feet bgs) and 0.11 D mg/kg in the subsurface (5-feet bgs). Similarity at FFS2-3, PFOS was the only detected compound of the three with concentrations of 0.0018 mg/kg in the shallow soil (0 to 2-feet bgs) and 0.015 mg/kg in the subsurface (5-feet bgs). There were no exceedances of OSD risk screening levels in soil at the Former Fire Station #2.

7.5 Deluge System

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Deluge System.

7.5.1 Groundwater

Groundwater sampling was completed at three borings within the suspected release area at the Deluge System (**Figure 7-2**). Multi-interval VAP (first encountered groundwater and 30-foot bgs) groundwater samples were collected at one boring positioned in the center of the potential release area. Grab samples were collected at first-encountered groundwater at two of the borings. Three groundwater samples (DLG-2 [11-feet bgs], DLG-3 [13-feet bgs], and DLG-3 [30-feet bgs]) had detections of PFOS above OSD risk screening levels (**Table 7-1**).

The greatest concentration detected was in the first-encountered groundwater at DLG-2 (530 D ng/L PFOS at 11-feet bgs). Other OSD risk screening level exceedances were found at DLG-3 (410 D ng/L PFOS at 13-feet bgs and 72 ng/L PFOS at 30-feet bgs). Overall, there were PFOS, PFOA, and PFBS present above the LOD in all Deluge System groundwater samples.

7.5.2 Soil

Six soil samples were collected from three soil borings at the Deluge System (**Figure 7-2**). At each soil boring, one shallow soil sample (0 to 2-feet bgs) and one subsurface soil sample were collected. One soil sample had a detection of PFOS above the LOD (0.0006 mg/kg at DLG-1 [0 to 2-feet bgs]). No other soil samples contained PFOS, PFOA, or PFBS above the LOD (**Table 7-2**). There were no exceedances of OSD risk screening levels in soil at the Deluge System. Recent communications with installation personnel indicate that it is unlikely that AFFF was stored here, as is evident by the lack of soil detections. It is believed that PFAS presence in water samples here is from the upgradient 1990s AFFF Release and/or FTBP #3.

7.6 1990s AFFF Release

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the 1990s AFFF release (**Figure 7-2**). The 1990s AFFF Release is in close proximity to three drinking water wells as discussed in Section 2.10.

7.6.1 Groundwater

Groundwater sampling was completed at three borings within the suspected release area of the 1990s AFFF Release (**Figure 7-2**). Multi-interval VAP groundwater samples were collected at one boring positioned in the center of the potential release area. Grab samples were collected at first-encountered groundwater at two of the borings. All four groundwater samples had detections of PFOS and PFOA above OSD risk screening levels (**Table 7-1**). PFBS was also detected above the LOD in all four groundwater samples.

The greatest concentrations detected were in the first-encountered groundwater at 1990R-1 (260,000 D ng/L PFOS, 2,700 J ng/L PFOA, and 510 ng/L PFBS at 13-feet bgs). Concentrations detected at the first-encountered groundwater at 1990R-2 were 1,500 D ng/L PFOS, 130 ng/L PFOA, and 31 ng/L PFBS at 11-feet bgs. Concentrations at 1990R-3 at the first-encountered groundwater were 760 D ng/L PFOS, 320 D ng/L PFOA, and 16 ng/L PFBS at 13-feet bgs and 8,900 D ng/L PFOS, 130 D ng/L PFOS, and 71 ng/L PFBS in the 26.5-foot bgs interval.

7.6.2 Soil

Six soil samples were collected at three soil borings within the suspected release area of the 1990s AFFF Release (**Figure 7-2**). At each soil boring, one shallow soil sample (0 to 2-feet bgs) and one subsurface soil sample were collected. PFOS was detected above the LOD in four soil samples. PFOA and PFBS were not detected above the LOD in any soil samples (**Table 7-2**). There were no exceedances of OSD risk screening levels in soil at the 1990s AFFF Release.

The highest concentration of PFOS detected at the 1990s AFFF Release was 0.015 mg/kg in the surface sample (0 to 2-feet bgs) at 1990R-1. PFOS detections were observed in the subsurface at 1990R-1 (0.0011 mg/kg at 7-feet bgs), in the surface (0 to 2-feet bgs) at 1990R-2 (0.0063 mg/kg), and in the subsurface at 1990R-3 (0.0016 mg/kg at 8.5-feet bgs).

7.7 2017 AFFF Release

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the 2017 AFFF Release. The 2017 AFFF Release is in close proximity to three drinking water wells as discussed in Section 2.10.

7.7.1 Groundwater

Groundwater sampling was completed at three borings within the 2017 AFFF Release AOPI boundary (**Figure 7-2**). Multi-interval VAP groundwater samples were collected at one boring positioned in the center of the release area. Grab samples were collected at first-encountered groundwater at two of the

borings. Two groundwater samples (2017R-1 [14-feet bgs] and 2017R-3 [15-feet bgs]) had detections of PFOA above OSD risk screening levels (**Table 7-1**).

The highest concentrations detected were in the first-encountered groundwater at 2017R-1 (18 J ng/L PFOS, 1800 D ng/L PFOA, and 89 ng/L PFBS at 14-feet bgs). There were no detections of PFOS at 2017R-2 but PFOA and PFBS were detected above the LOD at 1.1 J ng/L and 10 ng/L, respectively. Concentrations at 2017R-3 observed at the first-encountered groundwater were 11 ng/L PFOS, 150 ng/L PFOA, and 48 ng/L PFBS at 15-feet bgs and were 19 ng/L PFOS, 31 ng/L PFOS, and 18 ng/L PFBS in the 30-foot bgs interval.

7.7.2 Soil

Six soil samples were collected at three soil borings within the 2017 AFFF Release AOPI boundary (**Figure 7-2**). At each soil boring, one shallow soil sample (0 to 2-feet bgs) and one subsurface soil sample were collected. PFOS was detected above the LOD in three soil samples. PFOA and PFBS were not detected above the LOD in any soil samples (**Table 7-2**). There were no exceedances of OSD risk screening levels in soil at the 2017 AFFF Release.

The highest concentration of PFOS detected at the 2017 AFFF Release was 0.026 mg/kg at 2017R-3 in the surface sample (0 to 2-feet bgs). PFOS detections were also observed in the 2017R-1 surface sample (0.0027 mg/kg at 0 to 2-feet bgs) and subsurface sample (0.0008 mg/kg at 11-feet bgs).

7.8 Former Fire Training Burn Pit #2

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with FTBP #2. FTBP #2 is in close proximity to three drinking water wells as discussed in Section 2.10.

7.8.1 Groundwater

Groundwater sampling was completed at two borings for the FTBP #2 AOPI (**Figure 7-2**). VAP groundwater samples were collected from two depth intervals at one boring positioned downgradient of the suspected release area. One grab sample was collected at first-encountered groundwater near the northern edge of the FTBP #2 boundary. All three groundwater samples had detections above the LOD for PFOS and PFOA (**Table 7-2**). Two groundwater samples (FTBP2-1 [10.5-feet bgs] and FTBP2-3 [30-feet bgs]) had detections above OSD risk screening levels for PFOS. PFBS was detected above the LOD in two groundwater samples.

The greatest concentration detected was in the first-encountered groundwater at FTBP2-1 (200 D ng/L for PFOS). Also, at FTBP-2-1 concentrations of 16 ng/L PFOA, and 5.5 ng/L PFBS at 10.5-feet bgs were observed. Concentrations at FTBP2-3 at the first-encountered groundwater (10-feet bgs) were 13 ng/L PFOS and 4.6 ng/L PFOA. PFBS was not detected in the first-encountered groundwater at FTBP2-3. At the 30-foot interval of FTBP2-3 concentrations of 47 ng/L PFOS, 1.7 J ng/L PFOA, and 1.4 J ng/L PFBS were observed.

7.8.2 Soil

One soil sample was collected from one soil boring on the northern boundary of the FTBP #2 AOPI (**Figure 7-2**). No detections of PFOS, PFOA, or PFBS were observed above the LOD or OSD risk screening levels **(Table 7-2)**.

7.9 Fire Training Burn Pit #3

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with FTBP #3 (**Figure 7-2**). FTBP #3 is in close proximity to three drinking water wells as discussed in Section 2.10.

7.9.1 Soil

Eight soil samples were collected at four soil borings within the suspected release area of the FTBP #3 (**Figure 7-2**). At each soil boring, one shallow soil sample (0 to 2-feet bgs) and one subsurface soil sample were collected. PFOS and PFOA were detected above the LOD in all eight soil samples. PFBS was not detected above the LOD in any soil samples (**Table 7-2**). There were two exceedances of OSD residential risk screening levels in shallow soil at FTBP #3. There were no other exceedances of OSD risk screening levels in soil at the FTBP #3.

The highest concentration of PFOS detected at the FTBP #3 was 0.36 D mg/kg at FTBP3-2 in the surface sample (0 to 2-feet bgs). The other exceedance of residential OSD risk screening levels was 0.28 D mg/kg (FTBP3-1 at 0 to 2-feet bgs. PFOS concentrations observed in the other nine samples were 0.084 D mg/kg (FTMC-FTBP3-4 at 0 to 2-feet bgs), 0.17 mg/kg (FTMC-FTBP3-4 at 6-feet bgs), 0.099 mg/kg (FTBP3-1 at 6-feet bgs), 0.043 mg/kg (FTBP3-2 at 6-feet bgs), 0.13 D mg/kg (FTBP3-3 at 0 to 2-feet bgs), 0.0017 mg/kg (FTBP3-3 at 7-feet bgs), and 0.17 D mg/kg (FTBP3-4 at 6-feet bgs).

The highest concentration of PFOA detected was in the subsurface sample of FTBP3-2 (0.0034 mg/kg at 6 feet bgs). PFOA concentrations observed in the other seven samples were 0.00072 mg/kg (FTBP3-1 at 0 to 2-feet bgs), 0.0028 mg/kg (FTBP3-1 at 6-feet bgs), 0.0021 mg/kg (FTBP3-2 at 0 to 2-feet bgs), 0.00051 J mg/kg (FTBP3-3 at 0 to 2-feet bgs), 0.00061 J mg/kg (FTBP3-3 at 7-feet bgs), 0.00045 J mg/kg (FTBP3-4 at 0 to 2-feet bgs), and 0.0006 J mg/kg (FTBP3-4 at 6-feet bgs).

7.10 Supplemental SI Sampling

The subsections below summarize the drinking water and surface water PFOS, PFOA, and PFBS analytical results associated with the Sparta - Fort McCoy Airport potable wells (**Figure 7-2** and **7-3**) and Silver Creek. These samples were collected in October 2018 to supplement the AOPI sampling effort at the request of FTMC.

7.10.1 Drinking Water

Three drinking water samples were collected from three different wells within the Sparta - Fort McCoy Airport (**Figure 7-2**). There were no detections of PFOS, PFOA, or PFBS above the LOD in any potable well samples (**Table 7-5**). Other PFAS compounds were also not detected above the LOD at any potable well sample; the full suite of analytical results is included in **Appendix O**.

7.10.2 Surface Water

Three surface water samples were collected from the Silver Creek, downgradient of the Sparta – Fort McCoy Airport to the east, north, and northwest (**Figure 7-3**). PFOS was detected above the LOD in all three samples. PFOA and PFBS were detected above the LOD in two samples. The highest concentration was observed at SC-3 (28 ng/L PFOS) along the northwest boundary of the airport and the furthest downgradient of the three. PFOA and PFBS were also detected here at 3.7 ng/L and 1.8 ng/L, respectively. SC-1 is located the furthest upstream, towards the east of the airfield and had the lowest concentration of 2.2 ng/L for PFOS and no detections of PFOA or PFBS. Observed concentrations of PFAS at SC-2 were 26 ng/L for PFOS, 1.0 J ng/L for PFOA, and 1.7 J for PFBS. There were no exceedances of OSD risk screening levels in surface water.

7.11 TOC, pH, and Grain Size

In addition to sampling soil for PFAS, each soil sample was analyzed for TOC, pH, moisture content, and grain size data (except at Building 207, where only one of the four was analyzed for these parameters) as they may be useful in future fate and transport studies. The TOC in the soil samples ranged from 273 to 26,700 mg/kg. The TOC at this installation was lower than typical organic content in soil (topsoil: 5,000 to 30,000 mg/kg, desert: less than 5,000 mg/kg, organic: greater than 120,000 mg/kg). The combined percentage of fines in soils at FTMC ranged from 0.53 to 25.5% with an average of 6.04%. PFAS tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The percent moisture of the soil, which was 6.84%, was typical for sandy soil (0-10%). The pH of the soil was slightly alkaline (7 to 9). Based on the geochemical data obtained during the SI at FTMC, PFAS may be relatively more mobile than in soils with more fines and greater TOC content.

7.12 QA/QC Samples

The full analytical results for QA/QC samples collected during the SI are included in **Appendix O**. PFOS, PFOA, PFBS were not detected greater than the LOD in any of the QA/QC samples collected during the SI work.

7.13 Conceptual Site Models

The preliminary CSMs presented in the QAPP Addendum (Arcadis 2019b) were re-evaluated and updated, if necessary, based on the SI sampling results. The CSMs presented on **Figures 7-4** through **7-7** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure. CSMs for the WWTP and Building 207 were created following the SI sampling and were not displayed in the QAPP Addendum (Arcadis 2019b).

Based on the historical use of AFFF at the AOPIs, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, discharge/recharge between groundwater and surface water, and adsorption/desorption between surface water and sediment. Generic categories of potential human

receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

Human exposure pathways are shown as “complete, “potentially complete”, or “incomplete” on the CSM figures. A complete exposure pathway consists of a constituent source and release mechanism, a transport or retention medium, an exposure point where human contact with the contaminated medium could occur, and an exposure route at the exposure point. If any of these elements is missing, the exposure pathway is incomplete. Pathways are “potentially complete” where data are insufficient to conclude the pathway is either “complete” or “incomplete”. References in this section to PFAS detected or not detected in sampled environmental media are specific to PFOS, PFOA, and PFBS as they are the focus of the Army’s PFAS PA/SIs.

The following parameters were used to evaluate if an AOPI source area had a potentially complete groundwater exposure pathway:

- AOPIs located upgradient or in the vicinity of drinking water sources and that have the potential to influence groundwater associated with these potable sources were considered to have a potentially complete groundwater exposure pathway for on-post drinking water receptors.
- AOPIs located outside the vicinity or downgradient of on-post potable sources (drinking water wells) were considered to have an incomplete groundwater exposure pathway for on-post receptors due to Army land controls which prevent any intrusive work without directorate of public works approval per the Master Plan and the dig permitting process.
- AOPIs that have the potential to influence groundwater that flows off post were considered to have a potentially complete exposure pathway for off-post receptors.

A portion of the drinking water at FTMC is supplied through three potable water wells located at the Sparta – Fort McCoy Airport in close proximity to several AOPIs. Two of those wells are owned by the City of Sparta but are located on FTMC property. Due to the proximity of several AOPIs, there is a potential for impacts to these potable water wells. One drinking water well that is currently used only to supply water to latrines in the training range is located on-site in the downgradient direction of Former Landfill #5 and FTBP #1. Potential drinking water receptors off-installation include the City of Sparta which is located approximately 4 miles southeast of the Sparta-Fort McCoy Airport and obtains their drinking water from six water supply wells located outside the installation boundary. Numerous other private drinking water wells are found on residential properties surrounding the installation and within 5 miles of all AOPIs. **Figure 2-4** shows the location of all potable water wells in relation to the AOPIs and installation boundary. Several off-installation potable water wells were identified using an EDR report. The EDR report is provided as **Appendix E**.

CSMs were developed for each individual AOPI and were combined where source media, potential migration pathways and exposure media, and human exposure pathway determinations are congruent. The following exposure pathway determinations apply to all CSMs:

- Groundwater originating at all AOPIs could flow off-post through the installation's western boundary. Therefore, the groundwater exposure pathway for off-installation receptors is potentially complete.

Additional exposure pathway descriptions for each CSM are listed below by figure.

Figure 7-4 shows the CSM for Former Landfill #5 where excavated soil from FTBP #1 and FTBP #2 was placed.

- Former Landfill #5 is capped; therefore, on-installation receptors (i.e., site workers, residents, and recreational users) and off-installation receptors are not expected to contact constituents in soil via incidental ingestion, dermal contact or inhalation (dust). Therefore, the soil exposure pathways for these receptors are incomplete.
- PFAS were detected in groundwater, and the Former Landfill #5 is upgradient of and could possibly affect one drinking water well that is currently used to supply water to latrines in the training range. Due to the potential future use of this well for drinking water, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete. Residents are not likely to use this well for drinking water and recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathways for on-installation residents and recreational users are incomplete.
- Surface water bodies on-post are not used for drinking water. On-installation residents are not likely to contact surface water and sediment; therefore, the exposure pathways for this receptor are incomplete. However, on-installation site workers and recreational users could contact constituents in Suukjak Sep Creek through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on-installation site workers and recreational users are considered to be potentially complete.
- Surface water bodies flow off-post through Silver Creek which is not used for drinking water. Therefore, the surface water exposure pathway (via drinking water ingestion and dermal contact) for off-installation drinking water receptors is incomplete. However, off-post recreational users could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways off-installation recreational users are potentially complete.

Figure 7-5 shows the CSM for Former Fire Station #2, 2017 AFFF Release, 1990s AFFF Release, Fire Training Burn Pit #2, and Fire Training Burn Pit #3 where AFFF use was confirmed or suspected. A 1982 excavation at FTBP #2 resulted soil containing AFFF being placed in Former Landfill #5. Another excavation occurred at FTBP #2 in 1994, with the material being taken offsite for disposal. However, the extent of AFFF impacts in shallow soil at FTBP #2 is unknown and the excavations could have left some soil containing AFFF in place.

- PFAS were detected in soil at these AOPIs; therefore, site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is complete. These AOPIs are not likely to

be accessed by on-installation residents and recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.

- The AOPIs are upgradient and in close proximity to three drinking water wells used to supply water to a portion of FTMC and the Sparta – Fort McCoy Airport. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete. These wells do not supply drinking water to residences located at FTMC; therefore, the groundwater exposure pathway for on-installation residents is incomplete. Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- Surface water bodies on-post are not used for drinking water. On-installation residents are not likely to contact surface water and sediment; therefore, the exposure pathways for this receptor are incomplete. However, on-installation site workers and recreational users could contact constituents in Silver Creek through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on-installation site workers and recreational users are potentially complete.
- Surface water bodies flow off-post through Silver Creek which is not used for drinking water. Therefore, the surface water exposure pathway (via drinking water ingestion and dermal contact) for off-installation drinking water receptors is incomplete. However, off-post recreational users could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways off-installation recreational users are potentially complete.

Figure 7-6 shows the CSM for Fire Training Burn Pit #1 where AFFF was used and Building 207 where AFFF was stored.

- FTBP #1 was excavated in 1983 with soil containing AFFF being placed in Former Landfill #5. Another excavation occurred in 2006 with the soil being taken offsite for disposal. There is a gravel cap present over the former pit and extending over the entire storage yard. Building 207 also has a gravel cap surrounding the building. On-installation receptors (i.e., site workers, residents, and recreational users) and off-installation receptors are not expected to contact constituents in soil via incidental ingestion, dermal contact or inhalation (dust). The soil exposure pathways for these receptors are incomplete.
- The AOPI is potentially upgradient of one drinking water well that is currently used to supply water to latrines in the training range. Due to the potential future use of this well for drinking water, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete. Residents are not likely to use this well for drinking water and recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathways for on-installation residents and recreational users are incomplete.
- Surface water bodies on-post are not used for drinking water. On-installation residents are not likely to contact surface water and sediment; therefore, the exposure pathways for this receptor are incomplete. However, on-installation site workers and recreational users could contact constituents in Suukjak Sep Creek through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on-installation site workers and recreational users are considered to be potentially complete.

- Surface water bodies flow off-post through Suukjak Sep Creek which is not used for drinking water. Therefore, the surface water exposure pathway (via drinking water ingestion and dermal contact) for off-installation drinking water receptors is incomplete. However, off-post recreational users could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways off-installation recreational users are potentially complete.

Figure 7-7 shows the CSM for the WWTP due to potential releases of AFFF into sewer lines. Sludge from treatment operations is occasionally used by local farmers off-installation.

- PFAS were not sampled in soil at the WWTP since there have been no known releases on the installation. Therefore, the soil exposure pathways for on-installation receptors are incomplete. Sludge from the WWTP has been spread off-installation by local farmers. Therefore, the soil exposure pathway for off-installation receptors is potentially complete.
- PFAS were not sampled in groundwater at the WWTP since there have been no known releases on the installation. Therefore, the groundwater exposure pathways for on-installation receptors are incomplete. However, the potential for PFAS in off-installation groundwater exists. Therefore, the groundwater exposure pathway for off-installation receptors is potentially complete.
- Surface water bodies are not used for drinking water on- or off-post. Therefore, the surface water exposure pathway (via drinking water ingestion and dermal contact) for drinking water receptors is incomplete. However, recreational users both on- and off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for recreational users both on- and off-post are potentially complete.

It might be noted these CSM figures differ from those presented in the QAPP Addendum for the following reasons:

- The soil exposure pathways for the Former Landfill #5 and FTBP #1 AOPIs were changed from potentially complete to incomplete for on-installation site workers after determining that the cap or gravel layer will prevent contact with constituents in the soil.
- The groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers was changed from incomplete to potentially complete in the CSM figures for Former Landfill #5 and FTBP #1 because additional information was obtained that indicates a drinking water well used to supply water to latrines in the training range is located approximately 1.5 miles downgradient of these two AOPIs. Although the well is not currently used to supply drinking water, the groundwater exposure pathway is potentially complete to consider the potential future use of this well for drinking water.
- Building 207 has been added as an AOPI since the QAPP Addendum was written.
- The Deluge System was previously included on the CSM with the AOPIs on Figure 7-5, however it has since been removed from the CSM. The Deluge System remains classified as an AOPI but is no longer viewed as a source area since it has been determined that AFFF was likely not stored or used here.

8 DATA LIMITATIONS AT FTMC

Data collected during the PA (**Section 3**, **Section 4**, **Section 5**) and SI (**Section 6 and Section 7**) were sufficient to draw the conclusions summarized in **Section 9**. The data limitations relevant to the development of this PA/SI for PFAS at FTMC are discussed below.

Records reviewed during the PA process were limited in information regarding AFFF use; procurement records of AFFF, and documentation of AFFF used during crash responses or fire training activities were not available. Anecdotal accounts of AFFF use (and therefore likely PFAS use) were limited to available installation personnel, whose knowledge of AFFF use may have been restricted by their time spent at the installation or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS) use.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to what is contained in the EDR well search results. The EDR well search report (**Appendix E**) was referenced when identifying potential off-post drinking water receptors.

The searches for ecological receptors and off-post PFAS sources were not exhaustive and were limited to easily identifiable and readily available information evaluated during the relevant documents research, installation personnel interviews, and site reconnaissance.

The CSMs considered potential exposures of on-installation receptors to PFAS in groundwater based on the proximity of AOPIs to existing, operational wells used to supply drinking water at FTMC. The potential for new potable well installation is improbable considering the Army implements controls which prevent intrusive work without directorate of public works approval per the installation's master plan and the dig permitting process. However, the directorate of public works does occasionally install new potable wells to continue to meet changing mission requirements. Also, these Army controls do not prevent future consumption of drinking water for land if it is no longer controlled by the Army. Additionally, the CSMs do not include ecological receptors and exposure pathways. The potential for ecological exposures to PFAS may be evaluated at a future date if those pathways warrant further consideration.

Finally, the available PFAS analytical data is limited to on-post drinking water well sources, limited groundwater investigations, and the activities performed during this SI. The limited sampling scope of the SI focused on identifying presence or absence of PFAS at the AOPIs. SI sampling at locations at or in close proximity of the AOPIs and potable water wells did not delineate the extent of PFAS impacts or identify the primary migration pathways for the chemicals.

For those AOPIs that warrant further study in a remedial investigation based on the information included within this PA/SI report, a more comprehensive PFAS evaluation may be conducted during a remedial investigation.

9 CONCLUSIONS AND RECOMMENDATIONS

The objective of this PA/SI was to evaluate potential PFAS releases at FTMC. The Army's PFAS PA/SI focused on identifying the locations of potential releases through the use, storage, and disposal of PFAS containing materials per the Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018).

Although there is currently no federal maximum contaminant level for drinking water defined for any PFAS, OSD provided residential risk screening levels for PFOS, PFOA, and PFBS in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, and PFBS in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFAS use, storage, and disposal at FTMC. Following the evaluation, ten AOPIs were identified, which comprised AFFF use and storage and wastewater treatment system PFAS source types.

Currently, there are 19 potable wells on the FTMC property providing drinking water to various parts of the installation. Three of these potable drinking wells are located at the Sparta-Fort McCoy Airport in close proximity to several AOPIs. One drinking water well used to supply water to latrines in the training range is located downgradient of three AOPIs and supplies potable water to less than 25 workers. PFAS have not been detected in these wells. The City of Sparta is located approximately 4 miles southeast of the Sparta-Fort McCoy Airport and obtains their drinking water from six water supply wells. Numerous other private drinking water wells are found on residential properties surrounding the installation and within 5 miles of all AOPIs. In summary, soil exposure pathways for on-installation site workers are potentially complete at seven AOPIs. There are eight AOPIs at which the groundwater exposure pathways for on-post receptors are potentially complete. These AOPIs are upgradient of or potentially impacting groundwater wells that are used to provide drinking water at FTMC. Due to a lack of land use controls off-installation and downgradient of FTMC, the groundwater exposure pathways for off-installation receptors are potentially complete for nine AOPIs. Surface water is not used for drinking water at FTMC, however recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways are potentially complete for eight AOPIs.

Before the SI sampling, a preliminary CSM was developed for each AOPI based on an assessment of existing records, personnel interviews, and site reconnaissance. The preliminary CSMs identified potential human receptors and exposure pathways for groundwater that is known to be used, or could realistically be used in the future, as a source of drinking water and identified potential surface water, soil, and sediment exposure pathways.

Nine AOPIs were sampled during the SI at FTMC to further evaluate PFAS-related releases and identify presence or absence of PFAS. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019a) and the FTMC QAPP Addendum (Arcadis 2019b).

PFOS and/or PFOA concentrations above OSD risk screening levels were observed in groundwater at 1990s AFFF Release, 2017 AFFF Release, Deluge System, Former Fire Station #2, Former Landfill #5, and Former FTBP #2. There were no PFBS concentrations in groundwater observed above OSD risk screening levels. PFOS concentrations above OSD risk screening levels were observed in soil at FTBP #3. There were no PFOA or PFBS exceedances of OSD risk screening levels in soil. There were no

PFOS, PFOA, or PFBS exceedances of OSD risk screening levels in sediment or surface water. There were no lifetime health advisory exceedances of PFOS or PFOA in potable water. The following details the maximum PFOS, PFOA, and PFBS concentrations per medium in each area that was sampled during this SI.

- 1990s AFFF Release:
    - Groundwater (ng/L) – PFBS (510), PFOS (**260,000 D**), PFOA (**2,700 J**)
    - Soil (mg/kg) – PFBS (not detected [ND]), PFOS (0.015), PFOA (ND)
- 2017 AFFF Release:
    - Groundwater (ng/L) – PFBS (89), PFOS (19), PFOA (**1,800 D**)
    - Soil (mg/kg) – PFBS (ND), PFOS (0.026), PFOA (ND)
- Deluge System:
    - Groundwater (ng/L) – PFBS (46), PFOS (**530 D**), PFOA (18)
    - Soil (mg/kg) – PFBS (ND), PFOS (0.0006), PFOA (ND)
- Former Fire Station #2
    - Groundwater (ng/L) – PFBS (60), PFOS (**12,000 D**), PFOA (**650**)
    - Soil (mg/kg) – PFBS (ND), PFOS (0.11 D), PFOA (ND)
- Former Landfill #5
    - Groundwater (ng/L) – PFBS (1.2 J), PFOS (15), PFOA (**62**)
    - Sediment (mg/kg) – PFBS (ND), PFOS (ND), PFOA (ND)
    - Surface water (ng/L) – PFBS (ND), PFOS (2.0), PFOA (ND)
- FTBP #1
    - Groundwater (ng/L) – PFBS (1.3 J), PFOS (35), PFOA (3.7)
    - Soil (mg/kg) – PFBS (ND), PFOS (0.11 D), PFOA (0.016)
    - Sediment (mg/kg) – PFBS (ND), PFOS (ND), PFOA (ND)
    - Surface water (ng/L) – PFBS (ND), PFOS (2.0), PFOA (1.1 J)
- FTBP #2
    - Groundwater (ng/L) – PFBS (5.5), PFOS (**200 D**), PFOA (16)
    - Soil (mg/kg) – PFBS (ND), PFOS (ND), PFOA (ND)
- FTBP #3
    - Soil (mg/kg) – PFBS (ND), PFOS (**0.36 D**), PFOA (0.0034)
- Sparta – Fort McCoy Airport (not an AOPI)
    - Drinking water (ng/L) – PFBS (ND), PFOS (ND), PFOA (ND)
    - Surface water (ng/L) – PFBS (1.8), PFOS (26), PFOA (3.7)

The preliminary CSMs prepared for the PA were re-evaluated and updated, if necessary, as part of the SI. Following the SI sampling, nine out of the ten AOPIs with confirmed PFAS presence were considered to have potentially complete exposure pathways. Based on the historical use of AFFF at the AOPIs, affected media were likely to consist of soil, groundwater, surface water, and sediment. Release and

transport mechanisms include dissolution/desorption from soil to groundwater, runoff associated with surface water or stormwater, groundwater discharge to surface water, and adsorption/desorption between surface water and sediment. Human exposure pathways were determined to be “potentially complete” or “incomplete”; exposure pathways are only “complete” when the presence of PFAS in the exposure medium has been confirmed and there is no barrier to receptor exposure. For FTMC there are eight AOPIs that have potentially complete pathways for human receptors on post, and nine AOPIs have potentially complete pathways for off post human receptors. Considering the Army’s primary concern is for human exposure through direct ingestion of PFAS in drinking water, the remainder of this section summarizes only the potential exposure pathways for groundwater and surface water. Eight AOPIs are upgradient of or potentially impacting groundwater wells that are used currently or could be used in the future to provide drinking water at FTMC. Due to a lack of land use controls off-installation and downgradient of FTMC, the groundwater exposure pathways for off-installation receptors are also potentially complete for nine AOPIs. Surface water is not used for drinking water at Fort McCoy, however on-installation site workers and recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways are potentially complete for on-installation site workers and recreational users at eight AOPIs. Nine AOPIs have a potentially complete surface water and sediment exposure pathway for off-installation recreations users.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for remedial investigation is based on the comparison of analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-3**). Results from this PA/SI indicate further study in a remedial investigation for PFAS is warranted at FTMC in accordance with the October 2019 guidance provided by the OSD. **Table 9-1** below summarizes the sampling at FTMC and rationale for recommendations for future study in remedial investigations or no action at this time.

Table 9-1 Summary of PFAS Sampling at FTMC and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels?					Recommendation	Rationale
	GW	DW	SO	SW	SE		
Former Fire Training Burn Pit #1	Y[1]	NS	N	N	N	Further study in remedial investigation	GW exceedance of OSD risk screening levels
Former Landfill #5	Y[2]	NS	NS	N	N	Further study in remedial investigation	GW exceedance of OSD risk screening levels
Former Fire Station #2	Y	NS	N	NS	NS	Further study in remedial investigation	GW exceedance of OSD risk screening levels
Deluge System	Y	NS	N	NS	NS	No further investigation	Deluge system was determined not to be a source area. PFAS detections must be from a different AOPI.

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels?					Recommendation	Rationale
	GW	DW	SO	SW	SE		
1990s AFFF Release	Y	NS	N	NS	NS	Further study in remedial investigation	GW exceedance of OSD risk screening levels
2017 AFFF Release	Y	NS	N	NS	NS	Further study in remedial investigation	GW exceedance of OSD risk screening levels
Former Fire Training Burn Pit #2	Y[2]	NS	N	NS	NS	Further study in remedial investigation	GW exceedance of OSD risk screening levels
Former Fire Training Burn Pit #3	Y[1]	NS	Y	NS	NS	Further study in remedial investigation	GW and SO exceedance of OSD risk screening levels
Wastewater Treatment Plant[3]	NS	NS	NS	NS	NS	No action at this time	Sampling not representative of past conditions
Building 207	NS	NS	N	NS	NS	Further study in remedial investigation	SO is below the OSD risk screening levels. However, a downgradient groundwater investigation is recommended due to other nearby AOPIs
Additional Sampling[4]	NS	N	NS	N	NS	Further study in remedial investigation	Off-post surface water detections

Notes:

[1-] Exceedance observed during previous investigations conducted by Fort McCoy

[2-] Exceedance observed during previous investigations conducted by Fort McCoy and during the SI

[3-] The AOPI was not sampled during this SI but may be sampled during future investigations.

[4-] Sampling not associated with a particular AOPI

GW – groundwater

N – no

NS – not sampled

SE – sediment

SO – soil

SW – surface water

Y – yes

Based on the data collected during the PA and the PFAS analytical data collected in September and October 2019 and August 2020 during the SI, in accordance with the guidance provided by the OSD in October 2019, further study in a remedial investigation is recommended at FTMC at this time. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

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ACRONYMS

%	percent
6:2 FTSA	6:2 fluorotelomer sulfonate
8:2 FTSA	8:2 fluorotelomer sulfonate
AFFF	aqueous film-forming foam
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
DQO	data quality objective
DUSR	Data Usability Summary Report
DW	drinking water
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FTBP	Fire Training Burn Pit
FTMC	Fort McCoy
GIS	geographic information system
GW	groundwater
HQ	hazard quotient
HQAES	Headquarters Army Environmental System
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army or Reserve installation
IRP	Installation Restoration Program
LOD	limit of detection

LOQ	limit of quantitation
mg/kg	milligrams per kilogram (parts per million)
ND	not detected
ng/L	nanograms per liter (parts per trillion)
NS	not sampled
OSD	Office of the Secretary of Defense
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPA	perfluoropentanoic acid
PFTA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnA	perfluoroundecanoic acid
POC	point of contact
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
PSL	project screening level
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual

RSL	Regional Screening Level
SE	sediment
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SW	surface water
TGI	technical guidance instruction
TOC	total organic carbon
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
VAP	vertical aquifer profiling
WWTP	wastewater treatment plant

TABLES

Table 2-1 - Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

ARCADIS Design & Consultancy for natural and built assets

Well ID	Total Well Depth (ft bgs)	Well Diameter (inches)	Top of Screen Depth (ft bgs)	Completion Date
On-Post Production Wells[1]				
SW-5024	202	15	103	12/20/2011
SW-5025	204	15	101	6/24/2016
SW-5027	217	16	62	6/16/2015
SW-5028	220	16	62.5	6/16/2015
SW-5029	202	16	83	12/28/2015
SW-5030	250	16	100	5/7/2018
SW-5026	109	16	63	4/23/2014
SW-5031	262	16	102	9/4/2018
SW-5020[2]	110	6	165	3/20/1981
RANGE 2	151.3	6	78.5	5/23/1997
RANGE 31	140	6	82	2/28/2008
RANGE 32	150.3	6	73.5	5/27/1997
Range 34 (New)	140	10	100	11/1/2018
RANGE 36	140	6	81	2/27/2008
Range 18	160	6	101	11/9/2012
Range 101	162	6	80	11/8/2012
CACTF	80	6	60	5/1/2011
W6070[3]	65	6	34	4/4/1993
8069 [3]	-	6	-	-
SW-6065[3]	120	8	30	1975
Wetland Well[3]	52	6	20	3/16/2009
8059 [3]	230	10	62	12/28/1999
6082W[2,4]	41	-	-	12/15/1987
6081W[2,4]	80	-	-	3/28/1977

Notes:

1. Production wells shown are those that were active as of a March 24, 2020 USAEC PFAS Site Inspection sampling event.
2. Production well that was sampled during the September - October 2019 USAEC PFAS Site Inspection sampling event.
3. Non-potable well.
4. Well construction details for these wells are not confirmed. The information listed is the assumed well construction based on boring logs from wells in the same position, but with alternate names.

Acronyms:

bgs - below ground surface
ft - feet
ID - identification
'-' - not available

Table 2-2 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

		Location	UCMR3 FTMC Water Plant		Potable Well SW-5020		Potable Well SW-5021 [1]		Potable Well SW-5024		Potable Well SW-5025		Potable Well SW-5026		Potable Well SW-5027		Potable Well SW-5028	
		Sample ID	100441Q	101988P	958672	Well 20	958673		958674		958675		958676		958677		958678	
		Sample Date	2/5/2013	8/6/2013	11/9/2016	8/28/2019	11/9/2016	8/28/2019	11/9/2016	8/28/2019	11/9/2016	8/28/2019	11/9/2016	8/28/2019	11/9/2016	8/28/2019	11/9/2016	8/28/2019
Units	OSD risk screening level	LHA	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	70	<20	<20	<2.3	<2.0	<2.3	<1.8	<2.3	<1.8	<2.3	<1.8	<2.3	<1.8	<2.3	<1.8	<2.3	<1.7
Perfluorobutanesulfonic acid (PFBS)	40,000	--	<90	<90	<11	<2.0	<11	<1.8	<11	<1.8	<11	<1.8	<11	<1.8	<11	<1.8	<11	<1.7
Perfluorooctane sulfonate (PFOS)	40	70	<40	<40	<3.8	<2.0	<3.8	<1.8	<3.8	<1.8	<3.8	<1.8	<3.8	<1.8	<3.8	<1.8	<3.8	<1.7

Notes:
1. Well has been abandoned
Bold - Detected result above the level of detection
Shaded - Value exceeds OSD screening level

Acronyms:
'-' - not available
FTBP - fire training burn pit
FTMC - Fort McCoy
ID - identification
J - estimated result
LHA - US EPA lifetime health advisory
ND - not detected
ng/L - nanograms per liter
NS - not sampled
OSD - Office of the Secretary of Defense
UCMR3 - Unregulated Contaminant Monitoring Regulation

Table 2-2 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

			Location	Potable Well SW-5029		Potable Well SW-5030	Potable Well 6082W		Potable Well 6081W		FTBP #1								
			Sample ID	958679				Sparta Air N		Sparta Air S	P-133A			OW-133B			P-134A		
			Sample Date	11/9/2016	8/28/2019	8/28/2019	12/15/2016	8/28/2019	12/15/2016	8/28/2019	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017
	Units	OSD risk screening level	LHA	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)		40	70	<2.3	<1.9	<1.8	ND	<2.0	ND	<1.8	**2.6**	**4.9**	**3.8**	**9.6**	**8.6**	**1**	<0.62	<0.73	<0.68
Perfluorobutanesulfonic acid (PFBS)		40,000	--	<11	<1.9	<1.8	ND	<2.0	ND	<1.8	**12**	-	**9.4**	**1.4 J**	-	**3.9**	<0.76	-	<0.83
Perfluorooctane sulfonate (PFOS)		40	70	<3.8	<1.9	<1.8	ND	<2.0	ND	<1.8	**5.5**	**4.8**	**2.9**	**44**	**85**	**43**	**1.1**	**5.3**	<1.2

Notes:
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ND - not detected
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Table 2-2 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

Location			FTBP #1													
Sample ID			OW-134			OW-137			OW-141			P-308A			OW-308		
Sample Date			09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017
Units	OSD risk screening level	LHA	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	70	**1.9**	**2**	**5.5**	**13**	**5.8**	**12**	<0.64	**32**	**2.5**	**6.3**	**2.7**	**2.1**	**4**	**40**	**18**
Perfluorobutanesulfonic acid (PFBS)	40,000	--	**2.4**	-	**2.8**	**2.7**	-	**5.6**	**1.2 J**	-	**1.9**	**3.4**	-	**3.8**	**1.7 J**	-	**5.3**
Perfluorooctane sulfonate (PFOS)	40	70	**220**	**150**	**95**	**190**	**130**	**230**	**3.1**	**380**	**21**	**7.7**	**1.9**	**11**	**160**	**6000**	**790**

Notes:
1. Well has been abandoned
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FTMC - Fort McCoy
ID - identification
J - estimated result
LHA - US EPA lifetime health advisory
ND - not detected
ng/L - nanograms per liter
NS - not sampled
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Table 2-2 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

Location			FTBP #1												FTBP #2				
Sample ID			OW-117			OW-136B			OW-142			OW-145			B-1	B-2	B-3	B-4	B-5
Sample Date			09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	09/2016	12/2016	08/2017	10/2016	10/2016	10/2016	10/2016	10/2016
Units	OSD risk screening level	LHA	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	70	**510**	**920**	**9.3**	**44**	**67**	NS	NS	NS	**6.9**	**150**	**25**	**150**	**5.5**	**14**	**300**	**17**	**3400**
Perfluorobutanesulfonic acid (PFBS)	40,000	--	**240**	-	**1.6 J**	**10**	-	NS	NS	NS	**1.0 J**	**1.4 J**	-	**3.1**	**3.7**	**4.1**	**230**	**2.5**	**120**
Perfluorooctane sulfonate (PFOS)	40	70	**23000**	**31000**	**220**	**1400**	**1900**	NS	NS	NS	**19**	**29**	**36**	**140**	**24**	**81**	**62000**	**810**	**69000**

Notes:
1. Well has been abandoned
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FTMC - Fort McCoy
ID - identification
J - estimated result
LHA - US EPA lifetime health advisory
ND - not detected
ng/L - nanograms per liter
NS - not sampled
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Table 2-2 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

Location			FTBP #2						FTBP #3				Landfill #5					
Sample ID			B-6	B-7	B-8	B-9	B-10	B-11	MW-1R	MW-2R	MW-3R	MW-4R	MW-1	MW-2A	MW-2B	MW-2C	MW-3	MW-5
Sample Date			10/2016	10/2016	10/2016	10/2016	10/2016	10/2016	9/6/2016	9/6/2016	9/6/2016	9/6/2016	10/30/2018	10/31/2019	10/31/2019	10/31/2019	10/30/2018	10/30/2018
Units	OSD risk screening level	LHA	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	70	**2.4**	**5.1**	<0.78	**4.6**	**1.4**	**3.6**	**480**	**720**	**510**	**650**	**41**	**38**	<0.79	<0.79	<0.76	<0.78
Perfluorobutanesulfonic acid (PFBS)	40,000	--	<0.9	**1.5**	**1**	<0.89	<0.91	**1**	**35**	**380**	**1200**	**250**	**2**	**1.7 J**	<0.18	<0.19	**0.29 J**	<0.18
Perfluorooctane sulfonate (PFOS)	40	70	**3.7**	**140**	**1.9**	**32**	**3.4**	**29**	**6800**	**67000**	**2100**	**120000**	**110**	**6.6**	**0.62 J**	<0.50	<0.48	**4.9**

Notes:
1. Well has been abandoned
Bold - Detected result above the level of detection
Shaded - Value exceeds OSD screening level

Acronyms:
'-' - not available
FTBP - fire training burn pit
FTMC - Fort McCoy
ID - identification
J - estimated result
LHA - US EPA lifetime health advisory
ND - not detected
ng/L - nanograms per liter
NS - not sampled
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Table 2-2 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

Location			Landfill #5					Range							
Sample ID			MW-7A	MW-7B	MW-8A	MW-8B	MW-9	Range 2	Range 32	Range 34	Range 31	Range 36	Range 18	Range 101	CACTF
Sample Date			10/31/2018	10/31/2018	10/30/2018	10/30/2018	10/30/2018	9/14/2017	9/14/2017	9/14/2017	9/14/2017	9/14/2017	9/14/2017	9/14/2017	9/14/2017
Units	OSD risk screening level	LHA	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	70	**46**	<0.79	**130**	**2.2**	**3.5**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorobutanesulfonic acid (PFBS)	40,000	--	**2.7**	<0.19	**1.4 J**	**0.20 J**	**1.8**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Perfluorooctane sulfonate (PFOS)	40	70	**65**	<0.50	**5.6**	**1.6 J**	**2.9**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Notes:
1. Well has been abandoned
Bold - Detected result above the level of detection
Shaded - Value exceeds OSD screening level

Acronyms:
'-' - not available
FTBP - fire training burn pit
FTMC - Fort McCoy
ID - identification
J - estimated result
LHA - US EPA lifetime health advisory
ND - not detected
ng/L - nanograms per liter
NS - not sampled
OSD - Office of the Secretary of Defense
UCMR3 - Unregulated Contaminant Monitoring Regulation

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

AOPI	Matrix	Sample ID	Depth Interval	Sample Method	Analytes[2]
FTBP #1	SE	FTMC-FTBP1-1-SE	0-10 centimeters	Grab	PFAS[3]
	SW	FTMC-FTBP1-1-SW	N/A	Grab	PFAS[3]
	SO	FTMC-FTBP1-1-SO-4	2-4 ft bgs	Hand Auger	PFAS[3], TOC, grain size, pH
		FTMC-FTBP1-1-SO-12	10-12 ft bgs	DPT	
		FTMC-FTBP1-2-SO-3	1-3 ft bgs	Hand Auger	
		FTMC-FTBP1-2-SO-12	10-12 ft bgs	DPT	
	GW	FTMC-FTBP1-1-GW-25	25 ft bgs	VAP	PFAS[3]
		FTMC-FTBP1-1-GW-30	30 ft bgs		PFAS[3]
		FTMC-FTBP1-2-GW-22	22 ft bgs		
		FTMC-FTBP1-2-GW-30	30 ft bgs		
Former Landfill #5	GW	FTMC-FL5-1-GW-22	22 ft bgs	VAP	PFAS[3]
		FTMC-FL5-1-GW-30	30 ft bgs		
		FTMC-FL5-2-GW-22	22 ft bgs		
		FTMC-FL5-2-GW-30	30 ft bgs		
		FTMC-FL5-3-GW-23	23 ft bgs		
		FTMC-FL5-3-GW-30	30 ft bgs		
	SE	FTMC-FL5-1-SE	0-10 centimeters	Grab	PFAS[3]
		FTMC-FL5-2-SE	0-10 centimeters		
		FTMC-FL5-3-SE	0-10 centimeters		
	SW	FTMC-FL5-1-SW	N/A	Grab	PFAS[3]
		FTMC-FL5-2-SW	N/A		
		FTMC-FL5-3-SW	N/A		
FTBP #2	SO	FTMC-FTBP2-1-SO-10	8-10 ft bgs	Grab	PFAS[3], TOC, grain size, pH
	GW	FTMC-FTBP2-1-GW-10.5	10.5 ft bgs	VAP	PFAS[3]
		FTMC-FTBP2-3-GW-10	10 ft bgs		
		FTMC-FTBP2-3-GW-30	30 ft bgs		
FTBP #3	SO	FTMC-FTBP3-1-SO-2	0-2 ft bgs	Hand Auger	PFAS[3], TOC, grain size, pH
		FTMC-FTBP3-1-SO-6	4-6 ft bgs	DPT	
		FTMC-FTBP3-2-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-FTBP3-2-SO-6	4-6 ft bgs	DPT	
		FTMC-FTBP3-3-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-FTBP3-3-SO-7	4-6 ft bgs	DPT	
		FTMC-FTBP3-4-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-FTBP3-4-SO-6	4-6 ft bgs	DPT	

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

AOPI	Matrix	Sample ID	Depth Interval	Sample Method	Analytes[2]
Former Fire Station #2	SO	FTMC-FFS2-1-SO-2	0-2 ft bgs	Hand Auger	PFAS[3], TOC, grain size, pH
		FTMC-FFS2-1-SO-6	4-6 ft bgs	DPT	
		FTMC-FFS2-2-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-FFS2-2-SO-5	3-5 ft bgs	DPT	
		FTMC-FFS2-3-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-FFS2-3-SO-5	3-5 ft bgs	DPT	
	GW	FTMC-FFS2-1-GW-10	10 ft bgs	VAP	PFAS[3]
		FTMC-FFS2-2-GW-8	8 ft bgs		
		FTMC-FFS2-3-GW-8	8 ft bgs		
		FTMC-FFS2-3-GW-30	30 ft bgs		
2017 AFFF Release	SO	FTMC-2017R-1-SO-2	0-2 ft bgs	Hand Auger	PFAS[3], TOC, grain size, pH
		FTMC-2017R-1-SO-11	9-11 ft bgs	DPT	
		FTMC-2017R-2-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-2017R-2-SO-10.5	9-11 ft bgs	DPT	
		FTMC-2017R-3-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-2017R-3-SO-11	9-11 ft bgs	DPT	
	GW	FTMC-2017R-1-GW-14	14 ft bgs	VAP	PFAS[3]
		FTMC-2017R-2-GW-14	14 ft bgs		
		FTMC-2017R-3-GW-15	15 ft bgs		
		FTMC-2017R-3-GW-30	30 ft bgs		
Deluge System	SO	FTMC-DLG-1-SO-2	0-2 ft bgs	Hand Auger	PFAS[3], TOC, grain size, pH
		FTMC-DLG-1-SO-7.5	5.5-7.5 ft bgs	DPT	
		FTMC-DLG-2-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-DLG-2-SO-7.5	5.5-7.5 ft bgs	DPT	
		FTMC-DLG-3-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-DLG-3-SO-10	8-10 ft bgs	DPT	
	GW	FTMC-DLG-1-GW-11	11 ft bgs	VAP	PFAS[3]
		FTMC-DLG-2-GW-11	11 ft bgs		
		FTMC-DLG-3-GW-13	13 ft bgs		
		FTMC-DLG-3-GW-30	30 ft bgs		
1990s AFFF Release	SO	FTMC-1990R-1-SO-2	0-2 ft bgs	Hand Auger	PFAS[3], TOC, grain size, pH
		FTMC-1990R-1-SO-7	5-7 ft bgs	DPT	
		FTMC-1990R-2-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-1990R-2-SO-9	7-9 ft bgs	DPT	
		FTMC-1990R-3-SO-2	0-2 ft bgs	Hand Auger	
		FTMC-1990R-3-SO-8.5	6.5-8.5 ft bgs	DPT	
	GW	FTMC-1990R-1-GW-13	13 ft bgs	VAP	PFAS[3]
		FTMC-1990R-2-GW-11	11 ft bgs		
		FTMC-1990R-3-GW-13	13 ft bgs		
		FTMC-1990R-3-GW-30	30 ft bgs		
Potable Wells	DW	FTMC-6082W-DW	Unconsolidated Sand[1]	Grab	PFAS[4]
		FTMC-6081W-DW	Sandstone Bedrock[1]	Grab	
		FTMC-SW5020-DW	Sandstone Bedrock[1]	Grab	

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

AOPI	Matrix	Sample ID	Depth Interval	Sample Method	Analytes[2]
Silver Creek Samples	SW	FTMC-SC-1-SW	N/A	N/A	PFAS[3]
		FTMC-SC-2-SW	N/A		
		FTMC-SC-3-SW	N/A		

Notes:

1. Depth units are reported in ft bgs unless otherwise noted. Sampling depth noted for existing monitoring wells indicates the depth at approximately the center of the saturated screened interval. In production wells, the groundwater sample is not derived from the center of the saturated screened interval; therefore, the assumed hydrostratigraphic unit in which the production wells are screened is shown instead.

2. In addition to laboratory analytes, field parameters were measured for groundwater samples and include temperature, pH, conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. Lithologic descriptions were logged continuously at soil boring locations, and for sediment sampling locations. Field parameters and lithological descriptions are shown on field sampling forms included in **Appendix J**.

3. The PFAS analyte group includes PFOS, PFOA, PFBS and 15 other PFAS constituents.
4. The PFAS analyte group includes PFOS, PFOA, PFBS and 11 other constituents.

Acronyms:
AOPI - Area of Potential Interest
DPT - Direct Push Technology
DW - drinking water
ft bgs - feet below ground surface
FTBP - fire training burn pit
FTMC - Fort McCoy
GW - groundwater
ID - identification
N/A - not available or not applicable
PFAS - per- and polyfluoroalkyl substances
PFBS - perfluorobutanesulfonic acid
PFOA - perfluorooctanoic acid
PFOS - perfluorooctane sulfonate
SE - sediment
SO - soil
SW - surface water
TOC - total organic carbon
VAP (DPT) - vertical aquifer profile, completed via direct push drill methods

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

					Analyte	PFOS (ng/l)		PFOA (ng/l)		PFBS (ng/L)	
					OSD Tapwater RiskScreening Level, HQ=0.1	40		40		40000	
					OSD Tapwater RiskScreening Level, HQ=1.0	400		400		400000	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
1990's AFFF Release	Groundwater Grab	FTMC-1990R-1	FTMC-1990R-1-GW-13	10/07/2019	N	**260000**	D	**2700**	J	**510**	
		FTMC-1990R-2	FTMC-1990R-2-GW-11	10/07/2019	N	**1500**	D	**130**		**31**	
		FTMC-1990R-3	FTMC-1990R-3-GW-13	10/07/2019	N	**760**	D	**320**	D	**16**	
			FTMC-1990R-3-GW-26.5	10/07/2019	N	**8900**	D	**130**	D	**71**	
2017 AFFF Release	Groundwater Grab	FTMC-2017R-1	FTMC-2017R-1-GW-14	10/09/2019	N	**18**	J	**1800**	D	**89**	
		FTMC-2017R-2	FTMC-2017R-2-GW-14	10/09/2019	N	1.8	U	**1.1**	J	**10**	
		FTMC-2017R-3	FTMC-2017R-3-GW-15	10/08/2019	N	**11**		**150**		**48**	
			FTMC-2017R-3-GW-30	10/08/2019	N	**19**		**31**		**18**	
Deluge System	Groundwater Grab	FTMC-DLG-1	FTMC-DLG-1-GW-11	10/08/2019	N	**4.0**		**11**	B	**1.4**	J
		FTMC-DLG-2	FTMC-DLG-2-GW-11	10/08/2019	N	**530**	D	**14**	B	**2.0**	
		FTMC-DLG-3	FTMC-DLG-3-GW-13	10/07/2019	N	**410**	D	**18**		**1.9**	
			FTMC-DLG-3-GW-30	10/07/2019	N	**72**		**4.2**	J	**46**	
Former Fire Station #2	Groundwater Grab	FTMC-FFS2-1	FTMC-FFS2-1-GW-10	10/09/2019	N	**630**	D	**11**	B	**11**	J
		FTMC-FFS2-2	FTMC-FFS2-2-GW-8	10/09/2019	N	**12000**	D	**650**		**60**	
		FTMC-FFS2-3	FTMC-FFS2-3-GW-8	10/09/2019	N	**9700**	D	**80**	B	**41**	D
			FTMC-FFS2-3-GW-30	10/09/2019	N	**760**	D	**38**	B	**21**	
Former Landfill #5	Groundwater Grab	FTMC-FL5-1	DUP02-GW-100219FD / FTMC-FL5-1-GW-22	10/02/2019	FD	**0.98**	J	1.8	U	1.8	U
			FTMC-FL5-1-GW-22	10/02/2019	N	1.9	U	1.9	UJ	1.9	U
			FTMC-FL5-1-GW-30	10/02/2019	N	**1.3**	J	**1.7**	J	1.9	U
		FTMC-FL5-2	FTMC-FL5-2-GW-22	10/02/2019	N	**4.8**		**62**		**0.93**	J
			FTMC-FL5-2-GW-30	10/02/2019	N	**8.2**		**13**		**1.2**	J
		FTMC-FL5-3	FTMC-FL5-3-GW-23	10/03/2019	N	**1.4**	J	**1.0**	J	1.8	U
			FTMC-FL5-3-GW-30	10/03/2019	N	**15**		**26**		**1.1**	J
Former Fire Training Burn Pit #1	Groundwater Grab	FTMC-FTBP1-1	DUP03-GW-100419FD / FTMC-FTBP1-1-GW-25	10/04/2019	FD	1.8	U	1.8	U	1.8	U
			FTMC-FTBP1-1-GW-25	10/04/2019	N	1.8	U	1.8	U	1.8	U
			FTMC-FTBP1-1-GW-30	10/04/2019	N	**35**		**3.7**		**1.3**	J
Former Fire Training Burn Pit #2	Groundwater Grab	FTMC-FTBP1-2	FTMC-FTBP1-2-GW-22	10/03/2019	N	1.8	U	1.8	U	1.8	U
			FTMC-FTBP1-2-GW-30	10/03/2019	N	**2.0**		1.8	U	1.8	U
		FTMC-FTBP2-1	FTMC-FTBP2-1-GW-10.5	10/08/2019	N	**200**	D	**16**		**5.5**	
Former Fire Training Burn Pit #3	Groundwater Grab	FTMC-FTBP2-3	FTMC-FTBP2-3-GW-10	10/08/2019	N	**13**		**4.6**		1.8	U
			FTMC-FTBP2-3-GW-30	10/08/2019	N	**47**		**1.7**	J	**1.4**	J

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2019 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.). In the presence of only one PFAS, a hazard quotient (HQ) = 1.0 is used; in the presence of multiple PFAS, a HQ = 0.1 is used.

Acronyms/Abbreviations:
-- = not applicable
AFFF = aqueous film forming foam
AOPI = Area of Potential Interest
FD = field duplicate sample
FTMC = Fort McCoy
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
B	The analyte was detected in the blank and associated project sample.
D	The analyte was analyzed at dilution.
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

Table 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

			Analyte		PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
			OSD Industrial/Commercial Risk Screening Level, HQ=0.1		1.6		1.6		1600	
			OSD Industrial/Commercial Risk Screening Level, HQ=1.0		16		16		16000	
			OSD Residential RiskScreening Levels, HQ=0.1		0.13		0.13		130	
			OSD Residential RiskScreening Levels, HQ=1.0		1.3		1.3		1300	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
1990s AFFF Release	Soil	FTMC-1990R-1	FTMC-1990R-1-SO-2	10/07/2019	N	**0.015**		0.0006	U	0.002	U
			FTMC-1990R-1-SO-7	10/07/2019	N	**0.0011**		0.00062	UJ	0.0021	U
		FTMC-1990R-2	FTMC-1990R-2-SO-2	10/07/2019	N	**0.0063**		0.00058	U	0.0019	U
			FTMC-1990R-2-SO-9	10/07/2019	N	0.00073	U	0.00073	U	0.0024	U
		FTMC-1990R-3	FTMC-1990R-3-SO-2	10/07/2019	N	0.00061	U	0.00061	UJ	0.002	U
			FTMC-1990R-3-SO-8.5	10/07/2019	N	**0.0016**		0.0006	U	0.002	U
2017 AFFF Release	Soil	FTMC-2017R-1	FTMC-2017R-1-SO-2	10/09/2019	N	**0.0027**		0.001	UB	0.0021	U
			FTMC-2017R-1-SO-11	10/09/2019	N	**0.0008**		0.0011	UB	0.002	U
		FTMC-2017R-2	FTMC-2017R-2-SO-2	10/09/2019	N	0.00059	U	0.00098	UB	0.002	U
			FTMC-2017R-2-SO-10.5	10/09/2019	N	0.00062	U	0.00062	UB	0.0021	U
		FTMC-2017R-3	FTMC-2017R-3-SO-2	10/08/2019	N	**0.026**		0.0044	UB	0.0021	U
			FTMC-2017R-3-SO-11	10/08/2019	N	0.00057	U	0.001	UB	0.0019	U
Building 207	Soil	FTMC-B207-1	DUP08-SO-081920 / FTMC-B207-1-SO-2	08/19/2020	FD	**0.00021**	J	0.00063	U	0.0021	U
			FTMC-B207-1-SO-2	08/19/2020	N	**0.00043**	J	0.0006	U	0.002	U
		FTMC-B207-2	FTMC-B207-2-SO-2	08/19/2020	N	0.00056	U	0.00056	U	0.0019	U
		FTMC-B207-3	FTMC-B207-3-SO-2	08/19/2020	N	**0.0008**		0.00063	U	0.0021	U
		FTMC-B207-4	FTMC-B207-4-SO-2	08/19/2020	N	0.00069	U	0.00069	U	0.0023	U
Deluge System	Soil	FTMC-DLG-1	FTMC-DLG-1-SO-2	10/08/2019	N	**0.0006**		0.0006	U	0.002	U
			FTMC-DLG-1-SO-7.5	10/08/2019	N	0.00063	U	0.00063	U	0.0021	U
		FTMC-DLG-2	FTMC-DLG-2-SO-2	10/08/2019	N	0.00057	U	0.00057	U	0.0019	U
			FTMC-DLG-2-SO-7.5	10/08/2019	N	0.00059	U	0.00059	UJ	0.002	U
		FTMC-DLG-3	FTMC-DLG-3-SO-2	10/07/2019	N	0.00058	U	0.00058	U	0.0019	U
			FTMC-DLG-3-SO-10	10/07/2019	N	0.00064	U	0.00064	U	0.0021	U
Former Fire Station #2	Soil	FTMC-FFS2-1	DUP05-SO-100819FD / FTMC-FFS2-1-SO-6LR	10/08/2019	FD	0.00063	U	0.00063	U	0.0021	U
			FTMC-FFS2-1-SO-2	10/09/2019	N	**0.00047**	J	0.0006	UB	0.002	U
			FTMC-FFS2-1-SO-6	10/09/2019	N	0.00065	U	0.00065	UB	0.0022	U
		FTMC-FFS2-2	FTMC-FFS2-2-SO-2	10/09/2019	N	**0.01**		0.00059	UB	0.002	U
			FTMC-FFS2-2-SO-5	10/09/2019	N	**0.11**	D	0.001	UB	0.0022	U
		FTMC-FFS2-3	FTMC-FFS2-3-SO-2	10/09/2019	N	**0.0018**		0.0006	UB	0.002	U
			FTMC-FFS2-3-SO-5	10/09/2019	N	**0.015**		0.00069	UB	0.0023	U
Former Fire Training Burn Pit #1	Soil	FTMC-FTBP1-1	DUP01-SO-100119FD / FTMC-FTBP1-1-SO-4	10/01/2019	FD	**0.1**		**0.00065**	J	0.0023	U
			FTMC-FTBP1-1-SO-4	10/01/2019	N	**0.085**	J	**0.00066**	J	0.0023	U
			FTMC-FTBP1-1-SO-12	10/01/2019	N	**0.068**	D	**0.0056**		0.002	U
		FTMC-FTBP1-2	FTMC-FTBP1-2-SO-3	10/01/2019	N	**0.077**		**0.0012**		0.0021	U
			FTMC-FTBP1-2-SO-12	10/01/2019	N	**0.11**	D	**0.016**		0.002	U

Table 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

Analyte					PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
OSD Industrial/Commercial Risk Screening Level, HQ=0.1					1.6		1.6		1600	
OSD Industrial/Commercial Risk Screening Level, HQ=1.0					16		16		16000	
OSD Residential RiskScreening Levels, HQ=0.1					0.13		0.13		130	
OSD Residential RiskScreening Levels, HQ=1.0					1.3		1.3		1300	
Associated AOPI	**Location Type**	**Location**	**Sample ID / Parent Sample ID**	**Sample Date**	**Sample Type**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Former Fire Training Burn Pit #2	Soil	FTMC-FTBP2-1	FTMC-FTBP2-1-SO-10	10/08/2019	N	0.00064	U	0.00064	U	0.0021	U
Former Fire Training Burn Pit #3	Soil	FTMC-FTBP3-1	DUP04-SO-100419FD / FTMC-FTBP3-1-SO-2	10/04/2019	FD	**0.24**	D	**0.00061**	J	0.0021	U
			FTMC-FTBP3-1-SO-2	10/04/2019	N	**0.28**	D	**0.00072**		0.002	U
			FTMC-FTBP3-1-SO-6	10/04/2019	N	**0.099**		**0.0028**		0.0023	U
		FTMC-FTBP3-2	FTMC-FTBP3-2-SO-2	10/04/2019	N	**0.36**	D	**0.0021**		0.0019	U
			FTMC-FTBP3-2-SO-6	10/04/2019	N	**0.043**		**0.0034**		0.0019	U
		FTMC-FTBP3-3	FTMC-FTBP3-3-SO-2	10/04/2019	N	**0.13**	D	**0.00051**	J	0.0019	U
			FTMC-FTBP3-3-SO-7	10/04/2019	N	**0.0017**		**0.00061**	J	0.0021	U
		FTMC-FTBP3-4	FTMC-FTBP3-4-SO-2	10/04/2019	N	**0.084**	D	**0.00045**	J	0.0021	U
			FTMC-FTBP3-4-SO-6	10/04/2019	N	**0.17**	D	**0.0006**	J	0.002	U

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2019 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.). In the presence of only one PFAS, a hazard quotient (HQ) = 1.0 is used; in the presence of multiple PFAS, a HQ = 0.1 is used.
3. Grey shaded values indicate the result was detected greater than the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.
4. All soil data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet below ground surface), regardless of the current and projected land use of the AOPI. Soil samples collected from greater than two feet but less than 15 feet below ground surface will be compared to the Industrial/Commercial risk screening levels only, and soil samples collected from greater than fifteen feet below ground surface will not be compared to either risk screening level.

Acronyms/Abbreviations:

AFFF = aqueous film forming foam
AOPI = Area of Potential Interest
FD = field duplicate sample
FTMC = Fort McCoy
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Qualifier	Description
D	The analyte was analyzed at dilution.
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UB	The analyte is considered nondetect at the listed value due to associated blank contamination.
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

Table 7-3 - Surface Water PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

			Analyte		PFOS (ng/l)		PFOA (ng/l)		PFBS (ng/L)	
			OSD Tapwater RiskScreening Level, HQ=0.1		40		40		40000	
			OSD Tapwater RiskScreening Level, HQ=1.0		400		400		400000	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
--	Surface Water	FTMC-SC-1	FTMC-SC-1-SW	10/10/2019	N	**2.2**		1.7	U	1.7	U
		FTMC-SC-2	FTMC-SC-2-SW	10/10/2019	N	**26**		**1.0**	J	**1.7**	J
		FTMC-SC-3	FTMC-SC-3-SW	10/10/2019	N	**28**		**3.7**		**1.8**	
Former Landfill #5	Surface Water	FTMC-FL5-1	FTMC-FL5-1-SW	10/10/2019	N	**1.9**		1.7	U	1.7	U
		FTMC-FL5-2	FTMC-FL5-2-SW	10/09/2019	N	**2.0**		1.8	U	1.8	U
		FTMC-FL5-3	FTMC-FL5-3-SW	10/09/2019	N	**0.91**	J	1.8	U	1.8	U
Former Fire Training Burn Pit #1	Surface Water	FTMC-FTBP1-1	DUP06-SW-101019FD / FTMC-FTBP1-1-SW	10/10/2019	FD	**1.8**		**1.1**	J	1.7	U
			FTMC-FTBP1-1-SW	10/10/2019	N	**2.0**		**1.1**	J	1.7	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2019 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.). In the presence of only one PFAS, a hazard quotient (HQ) = 1.0 is used; in the presence of multiple PFAS, a HQ = 0.1 is used.

Acronyms/Abbreviations:
-- = not applicable
AOPI = Area of Potential Interest
FD = field duplicate sample
FTMC = Fort McCoy
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

Table 7-4 -Sediment PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

					Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
					OSD Industrial/Commercial Risk Screening Level, HQ=0.1	1.6		1.6		1600	
					OSD Industrial/Commercial Risk Screening Level, HQ=1.0	16		16		16000	
					OSD Residential RiskScreening Levels, HQ=0.1	0.13		0.13		130	
					OSD Residential RiskScreening Levels, HQ=1.0	1.3		1.3		1300	
Associated AOPI	**Location Type**	**Location**	**Sample ID / Parent Sample ID**	**Sample Date**	**Sample Type**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Former Landfill #5	Sediment	FTMC-FL5-1	DUP07-SE-101019FD / FTMC-FL5-1-SE	10/10/2019	FD	0.00076	U	0.00076	U	0.0025	U
			FTMC-FL5-1-SE	10/10/2019	N	0.00078	U	0.00078	U	0.0026	U
		FTMC-FL5-2	FTMC-FL5-2-SE	10/09/2019	N	0.0008	U	0.0008	U	0.0027	U
		FTMC-FL5-3	FTMC-FL5-3-SE	10/09/2019	N	0.00075	U	0.00075	U	0.0025	U
Former Fire Training Burn Pit #1	Sediment	FTMC-FTBP1-1	FTMC-FTBP1-1-SE	10/10/2019	N	0.00073	U	0.00073	UB	0.0024	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2019 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.). In the presence of only one PFAS, a hazard quotient (HQ) = 1.0 is used; in the presence of multiple PFAS, a HQ = 0.1 is used.
3. Grey shaded values indicate the result was detected greater than the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.
4. All sediment data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet below ground surface), regardless of the current and projected land use of the AOPI. Soil samples collected from greater than two feet but less than 15 feet below ground surface will be compared to the Industrial/Commercial risk screening levels only, and soil samples collected from greater than fifteen feet below ground surface will not be compared to either risk screening level.

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
FD = field duplicate sample
FTMC = Fort McCoy
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Qualifier	Description
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UB	The analyte is considered nondetect at the listed value due to associated blank contamination.

Table 7-5 -Potable Water PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, Wisconsin

			Analyte			PFOS (ng/l)		PFOA (ng/l)		PFBS (ng/L)	
			HAL			70		70		70	
			OSD Tapwater RiskScreening Level, HQ=0.1			40		40		40000	
			OSD Tapwater RiskScreening Level, HQ=1.0			400		400		400000	
Associated AOPI	**Location Type**	**Location**	**Sample ID / Parent Sample ID**	**Sample Date**	**Sample Type**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
--	Drinking Water	FTMC-6081W	FTMC-6081W-DW	10/10/2019	N	1.8	U	1.8	U	1.8	U
--	Drinking Water	FTMC-6082W	DUP08-DW-101019FD / FTMC-6082W-DW	10/10/2019	FD	1.8	U	1.8	U	1.8	U
			FTMC-6082W-DW	10/10/2019	N	1.8	U	1.8	U	1.8	U
--	Drinking Water	FTMC-SW5020	FTMC-SW5020-DW	10/10/2019	N	1.9	U	1.9	U	1.9	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2019 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.). In the presence of only one PFAS, a hazard quotient (HQ) = 1.0 is used; in the presence of multiple PFAS, a HQ = 0.1 is used.

Acronyms/Abbreviations:
-- = not applicable
AOPI = Area of Potential Interest
FD = field duplicate sample
FTMC = Fort McCoy
HAL = United States Environmental Protection Agency Health Advisory Level
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

FIGURES

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

Figure 2-1
Installation Location

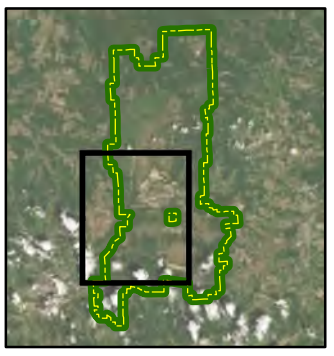
Note:
Groundwater and surface water flow directions are as provided in the Final Operational Range Assessment Program Report for Fort McCoy (Arcadis, 2009).

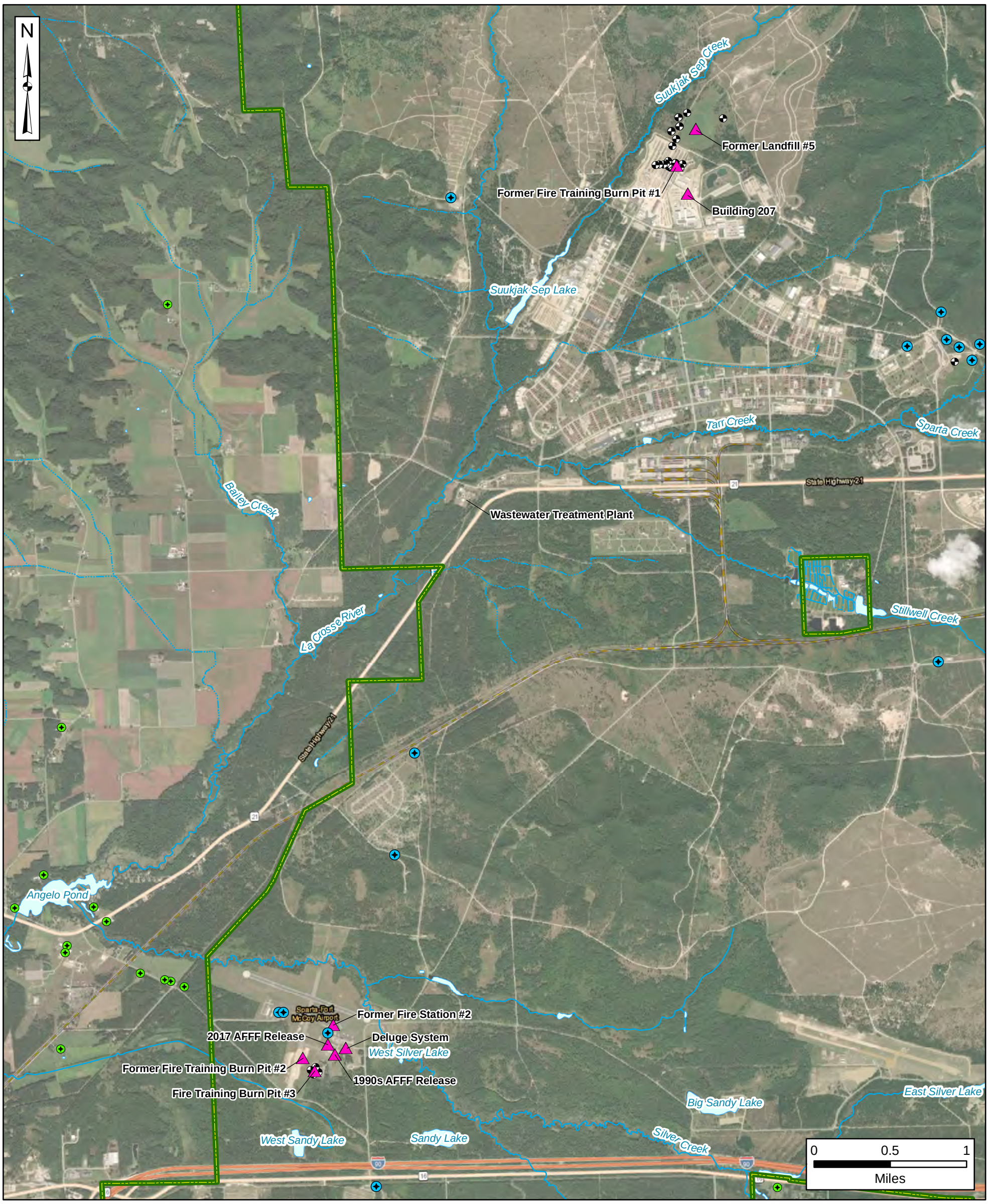
Data Sources:
AEC, ARID-GEO, 2005
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

Figure 2-2
Site Layout





- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Water Body
- On-Post Potable Well (Active)
- Monitoring Well
- Residence with Potable Well

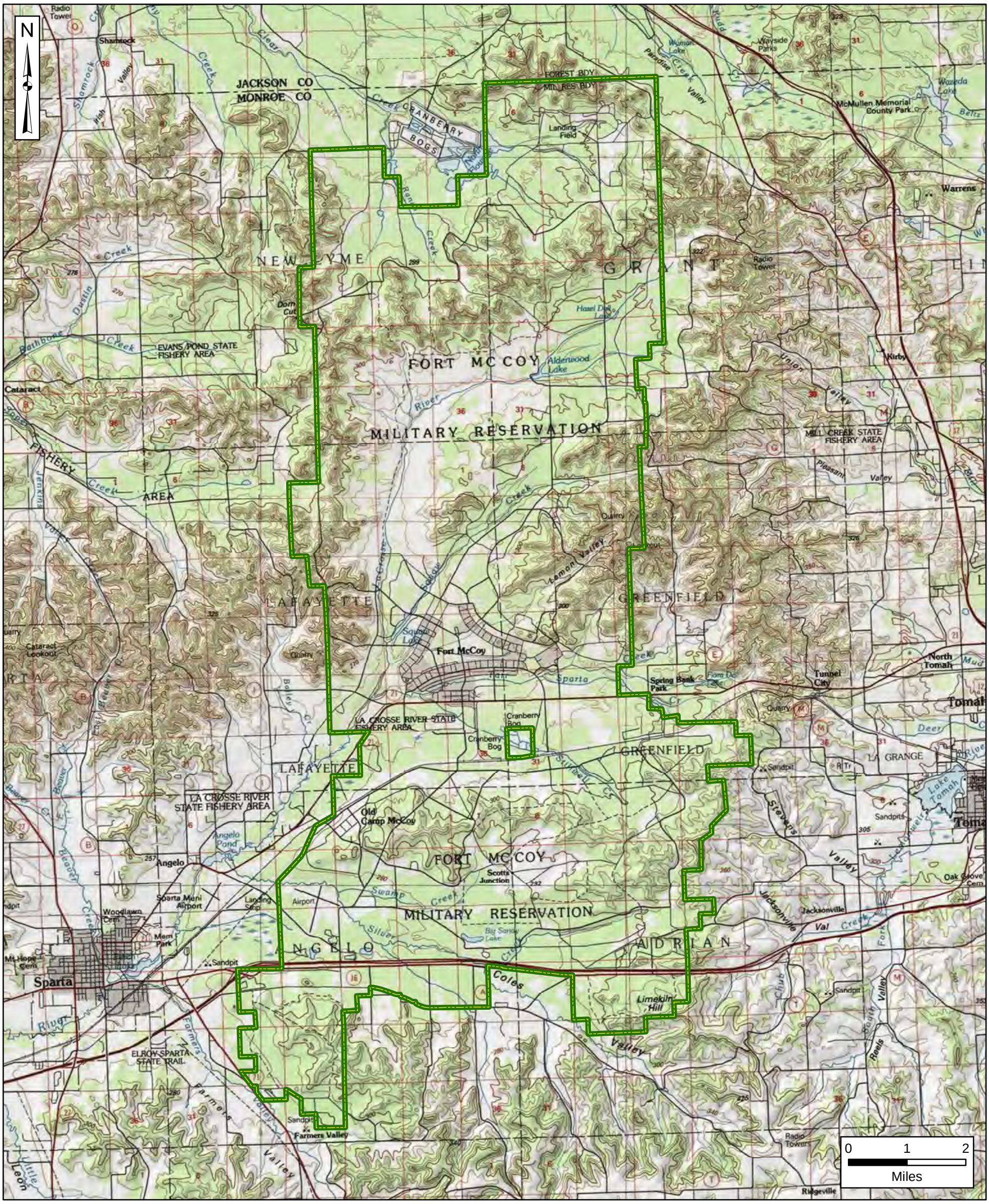
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Sources:
AEC, ARID-GEO, 2005
Fort McCoy, Well Data, 2019
EDR Well Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

Figure 2-3
Topographic Map



Installation Boundary

Contour interval = 20 feet

Data Sources:
AEC, ARID-GEO, 2005
USGS, Topo Map

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

Figure 2-4
Potable Supply Wells

N

Shamrock Creek
Stony Creek
Clear Creek
10 Reservoir
North Flowage
Wyman Creek
Rudd Creek
Wazeda Lake
Dustin Creek
Ranch Creek
Range 18
Range 34
Range 31
Range 36
Range 32
Rathbone Creek
La Crosse River
Soper Creek
Suukjak Sep Creek
Mill Creek
Range 2
Mud Creek
SW-5030
SW-5025
SW-5027
SW-5024
SW-5028
SW-5029
Sparta Creek
Tarr Creek
Bailey Creek
Deer Creek
East Beaver Creek
Stillwell Creek
CACTF
Lake Tomah
SW-5026
SW-5031
Beaver Creek
6081W
6082W
SW-5020
Silver Creek
Chub Creek
South Fork Lemonweir River
CORTLAND ACRES
Range 101
Farmers Valley Creek

0 1 2
Miles

Installation Boundary
River/Stream (Perennial)
Stream (Intermittent)
Canal/Ditch
Water Body
Groundwater Flow Direction

On-Post Potable Well (Active)
Public Water Supply System Well
Residence with Potable Well

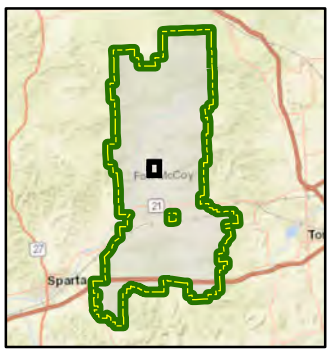
Note:
Groundwater flow directions are as provided in the Final Operational Range Assessment Program Report for Fort McCoy (Arcadis, 2009).

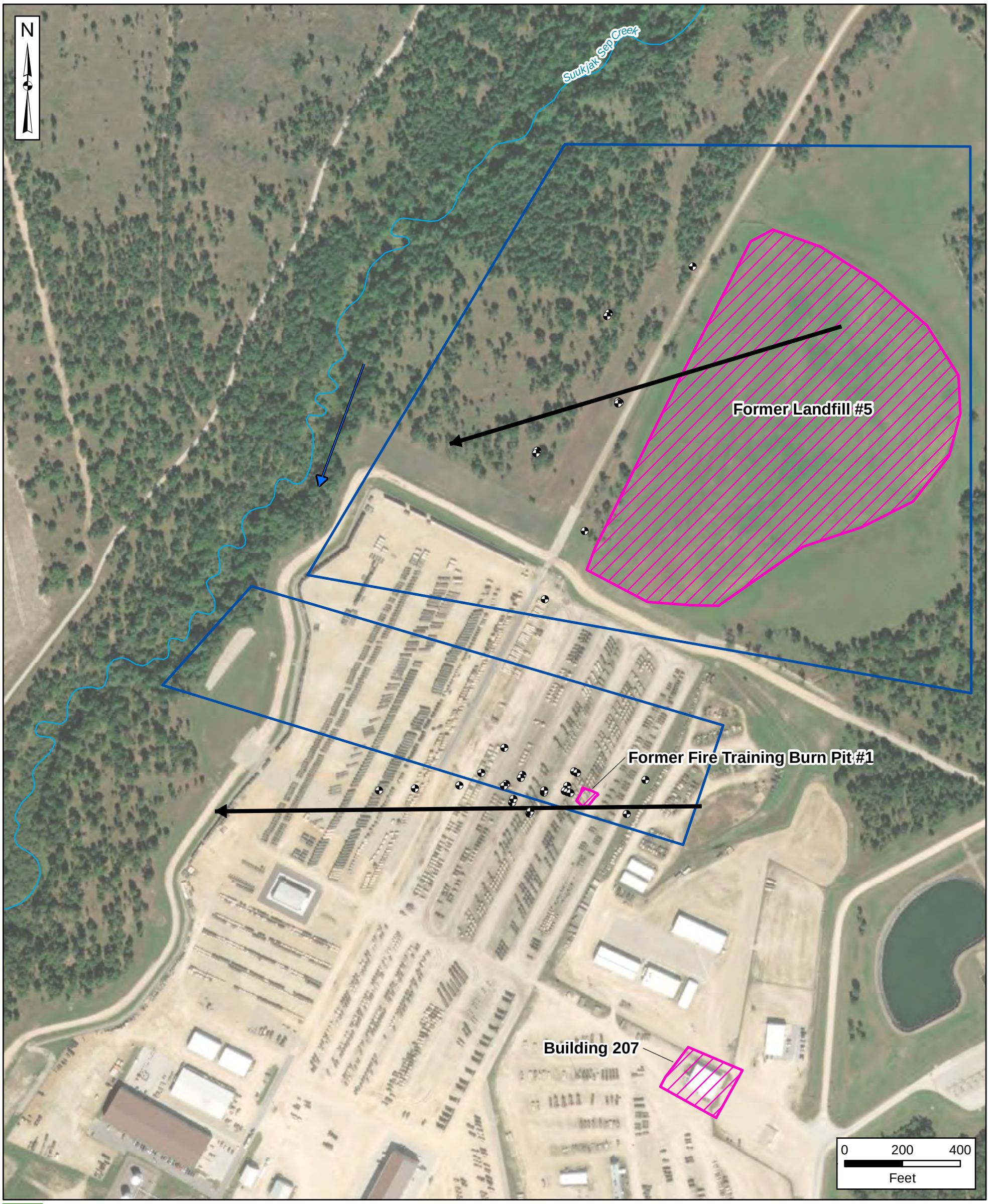
Data Sources:
AEC, ARID-GEO, 2005
Fort McCoy, Well Data, 2019
EDR Well Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

Figure 5-2
Aerial Photograph of Building 207, Former Fire Training Burn Pit #1, and Former Landfill #5





Installation Boundary
AOPI
AFFF Release Area
IRP Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Groundwater Flow Direction
Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
IRP = installation restoration program

Data Sources:
AEC, ARID-GEO, 2005
Fort McCoy, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

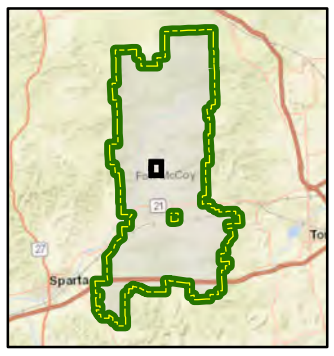


Figure 7-1
PFOS, PFOA, PFBS Sampling Results from Building 207, Former Fire Training Burn Pit #1, and Former Landfill #5

N

Suukjak Sep Creek

FTMC-FL5-3-SW	
PFOS	**0.91 J**
PFOA	<1.8
PFBS	<1.8
FTMC-FL5-3-SE	
PFOS	<0.00075
PFOA	<0.00075
PFBS	<0.0025

FTMC-FL5-2-SW	
PFOS	**2**
PFOA	<1.8
PFBS	<1.8
FTMC-FL5-2-SE	
PFOS	<0.0008
PFOA	<0.0008
PFBS	<0.0027

Depth	FTMC-FL5-3	
23 ft	PFOS	**1.4 J**
	PFOA	**1.0 J**
	PFBS	<1.8
30 ft	PFOS	**15**
	PFOA	**26**
	PFBS	**1.1 J**

Former Landfill #5

FTMC-FL5-1-SW	
PFOS	**1.9**
PFOA	<1.7
PFBS	<1.7
FTMC-FL5-1-SE	
PFOS	<0.00078
PFOA	<0.00078
PFBS	<0.0026

Depth	FTMC-FL5-2	
22 ft	PFOS	**4.8**
	PFOA	**62**
	PFBS	**0.93 J**
30 ft	PFOS	**8.2**
	PFOA	**13**
	PFBS	**1.2 J**

Depth	FTMC-FL5-1	
22 ft	PFOS	<1.9
	PFOA	<1.9
	PFBS	<1.9
30 ft	PFOS	**1.3 J**
	PFOA	**1.7 J**
	PFBS	<1.9

Depth	FTMC-FTBP1-2	
3 ft	PFOS	**0.077**
	PFOA	**0.0012**
	PFBS	<0.0021
12 ft	PFOS	**0.11 D**
	PFOA	**0.016**
	PFBS	<0.002

FTMC-FTBP1-1-SW	
PFOS	**2**
PFOA	**1.1 J**
PFBS	<1.7
FTMC-FTBP1-1-SE	
PFOS	<0.00073
PFOA	<0.00073
PFBS	<0.0024

Depth	FTMC-FTBP1-2	
22 ft	PFOS	<1.8
	PFOA	<1.8
	PFBS	<1.8
30 ft	PFOS	**2**
	PFOA	<1.8
	PFBS	<1.8

Depth	FTMC-FTBP1-1	
4 ft	PFOS	**0.085 J**
	PFOA	**0.00066 J**
	PFBS	<0.0018
12 ft	PFOS	**0.068 D**
	PFOA	**0.0056**
	PFBS	<0.002

Depth	FTMC-FTBP1-1	
25 ft	PFOS	<1.8
	PFOA	<1.8
	PFBS	<1.8
30 ft	PFOS	**35**
	PFOA	**3.7**
	PFBS	**1.3 J**

Former Fire Training Burn Pit #1

Depth	FTMC-B207-2	
2 ft	PFOS	<0.00056
	PFOA	<0.00056
	PFBS	<0.0019

Depth	FTMC-B207-3	
2 ft	PFOS	**0.0008**
	PFOA	<0.00063
	PFBS	<0.0021

Building 207

Depth	FTMC-B207-4	
2 ft	PFOS	<0.00069
	PFOA	<0.00069
	PFBS	<0.0023

Depth	FTMC-B207-1	
2 ft	PFOS	**0.00043 J**
	PFOA	<0.0006
	PFBS	<0.002

0 200 400
Feet

Notes:
1. Gray data boxes show soil sampling results, blue data boxes show groundwater sampling results, and orange data boxes show surface water and sediment sampling results.
2. Bold = detected result above the level of detection.
3. Shaded = value exceeds applicable OSD screening level.
4. Groundwater and surface water results are reported in nanograms per liter (ng/L). Soil and sediment results are reported in milligrams per kilogram (mg/kg).
5. Former Landfill #5 and Former Fire Training Burn Pit #1 samples were collected in October 2019. Building 207 samples were collected in August 2020.

Qualifiers:
D = The analyte was analyzed at dilution.
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Surface Water Flow Direction
- Groundwater Flow Direction
- Monitoring Well

Sampling Locations

- Surface Water / Sediment
- Soil (surface)
- Soil (surface / water table)
- VAP (water table / 30 feet) / Permanent Monitoring Well

AOPI = area of potential interest
ft = feet
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
VAP = vertical aquifer profiling

Data Sources:
AEC, ARID-GEO, 2005
Fort McCoy, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

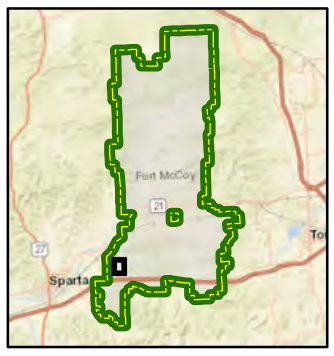


Figure 7-2
PFOS, PFOA, PFBS Sampling Results from the Former Fire Station #2, 2017 AFFF Release, Deluge System, 1990s AFFF Release, Fire Training Burn Pit #2, and Fire Training Burn Pit #3

FTMC-6082W-DW	
PFOS	<1.8
PFOA	<1.8
PFBS	<1.8

FTMC-6081W-DW	
PFOS	<1.8
PFOA	<1.8
PFBS	<1.8

Depth	FTMC-FFS2-1	
10 ft	PFOS	630 D
	PFOA	11 B
	PFBS	11 J

Depth	FTMC-FFS2-1	
2 ft	PFOS	0.00047 J
	PFOA	<0.0006
	PFBS	<0.002
6 ft	PFOS	<0.00065
	PFOA	<0.00065
	PFBS	<0.0022

Depth	FTMC-FFS2-3	
8 ft	PFOS	9700 D
	PFOA	80 B
	PFBS	41 D
30 ft	PFOS	760 D
	PFOA	38 B
	PFBS	21

Depth	FTMC-FFS2-3	
2 ft	PFOS	0.0018
	PFOA	<0.0006
	PFBS	<0.002
5 ft	PFOS	0.015
	PFOA	<0.00069
	PFBS	<0.0023

Former Fire Station #2

Depth	FTMC-FFS2-2	
2 ft	PFOS	0.01
	PFOA	<0.00059
	PFBS	<0.002
5 ft	PFOS	0.11 D
	PFOA	<0.001
	PFBS	<0.0022

Depth	FTMC-FFS2-2	
8 ft	PFOS	12000 D
	PFOA	650
	PFBS	60

Depth	FTMC-FTBP2-3	
10 ft	PFOS	13
	PFOA	4.6
	PFBS	<1.8
30 ft	PFOS	47
	PFOA	1.7 J
	PFBS	1.4 J

Depth	FTMC-2017R-1	
14 ft	PFOS	18 J
	PFOA	1800 D
	PFBS	89

Depth	FTMC-2017R-1	
2 ft	PFOS	0.0027
	PFOA	<0.001
	PFBS	<0.0021
11 ft	PFOS	0.0008
	PFOA	<0.0011
	PFBS	<0.002

FTMC-SW5020-DW	
PFOS	<1.9
PFOA	<1.9
PBFS	<1.9

Depth	FTMC-DLG-1	
2 ft	PFOS	0.0006
	PFOA	<0.0006
	PFBS	<0.002
7.5 ft	PFOS	<0.00063
	PFOA	<0.00063
	PFBS	<0.0021

Depth	FTMC-DLG-1	
11 ft	PFOS	4
	PFOA	11 B
	PFBS	1.4 J

2017 AFFF Release

Depth	FTMC-2017R-3	
15 ft	PFOS	11
	PFOA	150
	PFBS	48
30 ft	PFOS	19
	PFOA	31
	PFBS	18

Depth	FTMC-2017R-3	
2 ft	PFOS	0.026
	PFOA	<0.0044
	PFBS	<0.0021
11 ft	PFOS	<0.00057
	PFOA	<0.001
	PFBS	<0.0019

Depth	FTMC-2017R-2	
14 ft	PFOS	<1.8
	PFOA	1.1 J
	PFBS	10

Depth	FTMC-2017R-2	
2 ft	PFOS	<0.00059
	PFOA	<0.00098
	PFBS	<0.002
10.5 ft	PFOS	<0.00062
	PFOA	<0.00062
	PFBS	<0.0021

Depth	FTMC-DLG-3	
2 ft	PFOS	<0.00058
	PFOA	<0.00058
	PFBS	<0.0019
10 ft	PFOS	<0.00064
	PFOA	<0.00064
	PFBS	<0.0021

Depth	FTMC-DLG-3	
13 ft	PFOS	410 D
	PFOA	18
	PFBS	1.9
30 ft	PFOS	72
	PFOA	4.2 J
	PFBS	46

Deluge System

Depth	FTMC-DLG-2	
2 ft	PFOS	<0.00057
	PFOA	<0.00057
	PFBS	<0.0019
7.5 ft	PFOS	<0.00059
	PFOA	<0.00059
	PFBS	<0.002

Depth	FTMC-DLG-2	
11 ft	PFOS	530 D
	PFOA	14
	PFBS	2

Depth	FTMC-FTBP2-1	
10.5 ft	PFOS	200 D
	PFOA	16
	PFBS	5.5

Depth	FTMC-FTBP2-1	
10 ft	PFOS	<0.00064
	PFOA	<0.00064
	PFBS	<0.0021

Former Fire Training Burn Pit #2

1990s AFFF Release

Depth	FTMC-1990R-1	
2 ft	PFOS	0.015
	PFOA	<0.0006
	PFBS	<0.002
7 ft	PFOS	0.0011
	PFOA	<0.00062
	PFBS	<.0021

Depth	FTMC-1990R-1	
13 ft	PFOS	260000 D
	PFOA	2700 J
	PFBS	510

Depth	FTMC-FTBP3-1	
2 ft	PFOS	0.28 D
	PFOA	0.00072
	PFBS	<0.002
6 ft	PFOS	0.099
	PFOA	0.0028
	PFBS	<0.0023

Depth	FTMC-FTBP3-3	
2 ft	PFOS	0.13 D
	PFOA	0.00051 J
	PFBS	<0.0019
7 ft	PFOS	0.0017
	PFOA	0.00061 J
	PFBS	<0.0021

Depth	FTMC1990R-3	
2 ft	PFOS	<0.00061
	PFOA	<0.00061
	PFBS	<0.002
8.5 ft	PFOS	0.0016
	PFOA	<0.0006
	PFBS	<0.002

Depth	FTMC-1990R-3	
13 ft	PFOS	760 D
	PFOA	320 D
	PFBS	16
26.5 ft	PFOS	8900 D
	PFOA	130 D
	PFBS	71

Depth	FTMC-FTBP3-2	
2 ft	PFOS	0.36 D
	PFOA	0.0021
	PFBS	<0.0019
6 ft	PFOS	0.043
	PFOA	0.0034
	PFBS	<0.0019

Depth	FTMC-FTBP3-4	
2 ft	PFOS	0.084 D
	PFOA	0.00045 J
	PFBS	<0.0021
6 ft	PFOS	0.17 D
	PFOA	0.0006 J
	PFBS	<0.002

Depth	FTMC-1990R-2	
2 ft	PFOS	0.0063
	PFOA	<0.00058
	PFBS	<0.0019
9 ft	PFOS	<0.00073
	PFOA	<0.00073
	PFBS	<0.0024

Depth	FTMC-1990R-2	
11 ft	PFOS	1500 D
	PFOA	130
	PFBS	31

Fire Training Burn Pit #3

Silver Creek

Notes:
1. Gray data boxes show soil sampling results, blue data boxes show groundwater sampling results, and yellow data boxes show drinking water sampling results.
2. Bold = detected result above the level of detection.
3. Shaded = value exceeds applicable OSD screening level
4. Groundwater results are reported in nanograms per liter (ng/L) and soil results are reported in milligrams per kilograms (mg/kg).
5. All samples were collected in October 2019.

Qualifiers:
B = The analyte was detected above one-half the reporting limit in an associated blank
D = The analyte was analyzed at dilution.
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft = feet
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
VAP = vertical aquifer profiling

0 200 400
Feet

Installation Boundary
AOPI
River/Stream (Perennial)
Groundwater Flow Direction
Potable Well
Monitoring Well

Sampling Locations
- Soil (surface / water table)
- Soil (surface / water table) & VAP (water table / 30 feet)
- Soil (surface / water table) and VAP (water table)
- VAP (water table / 30 feet)
- VAP (water table) and soil (water table)

Note: Groundwater flow direction is based on former FTBP#2 monitoring wells.

Data Sources:
AEC, ARID-GEO, 2005
Fort McCoy, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment/Site Inspection
Fort McCoy, WI

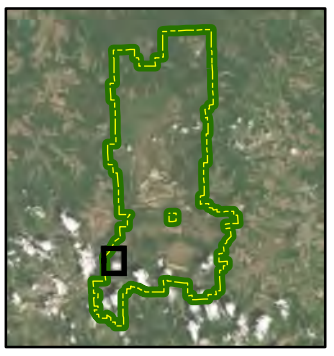


Figure 7-3
PFOS, PFOA, PFBS Sampling Results from Silver Creek

N

FTMC-SC-3-SW	
PFOS	28
PFOA	3.7
PBFS	1.8

FTMC-SC-2-SW	
PFOS	26
PFOA	1.0 J
PBFS	1.7 J

FTMC-SC-1-SW	
PFOS	2.2
PFOA	<0.87
PFBS	<0.87

Silver Creek

6082W 6081W

Sparta - Fort McCoy Airport

SW-5020

SW-6065

W6070

Former Fire Training Burn Pit #2

Former Fire Training Burn Pit #3

Notes:
1. Orange data boxes show surface water sampling results
2. Water is reported in nanograms/liter (ng/L).
3. All samples were collected in October 2019.

Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.

0 250 500
Feet

Installation Boundary
AOPI
River/Stream (Perennial)
Groundwater Flow Direction
Monitoring Well
Potable Well

Sampling Locations
Surface Water / Sediment

AOPI = area of potential interest

Data Sources:
AEC, ARID-GEO, 2005
Fort McCoy, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

Source Medium	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors: On-Installation: Site Worker	On-Installation: Resident	On-Installation: Recreational User	Off-Installation: All Types of Receptors [2]
Aqueous Film Forming Foam (AFFF) containing soil from Former Fire Training Burn Pit (FTBP) #1 and FTBP #2 was placed in this landfill.				Subsurface Soil (capped)	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○
					Inhalation (dust)	○	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	○	○	◐
					Dermal Contact	◐	○	○	◐
			Discharge / Recharge	Surface Water [1]	Ingestion	◐	○	◐	◐
					Dermal Contact	◐	○	◐	◐
			Adsorption / Desorption	Sediment	Ingestion	◐	○	◐	◐
					Dermal Contact	◐	○	◐	◐

Legend:

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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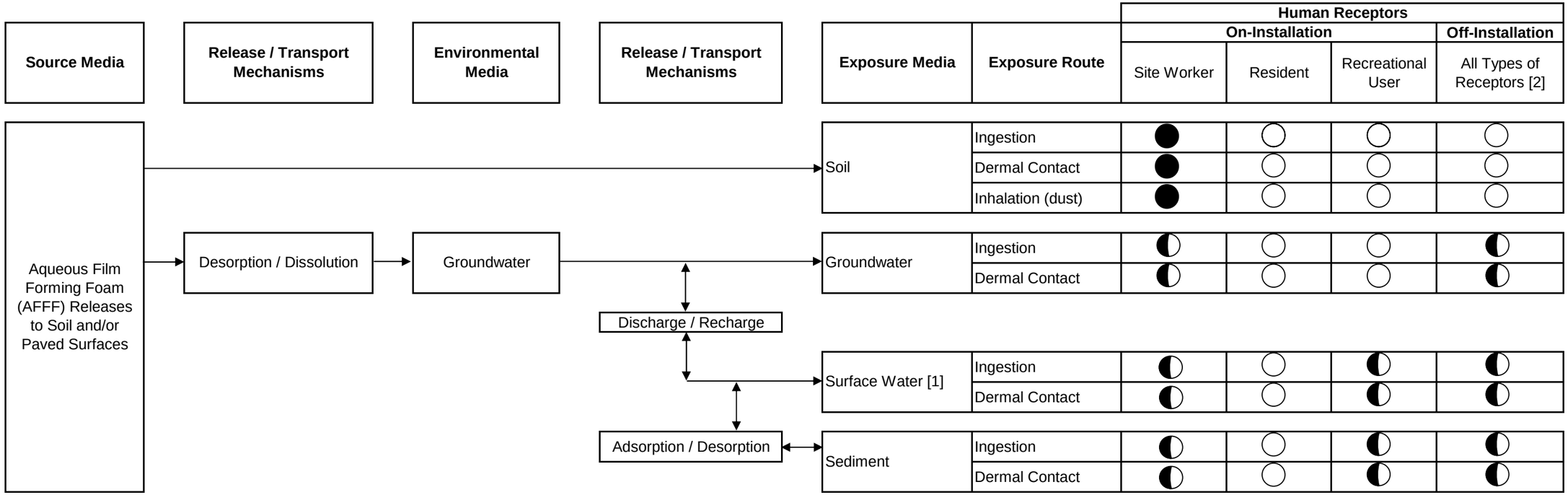
Conceptual Site Model - Former Landfill #5
USAEC PFAS Preliminary Assessment / Site Inspection
Fort McCoy, Wisconsin

Figure 7-4



Legend:

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

● = Complete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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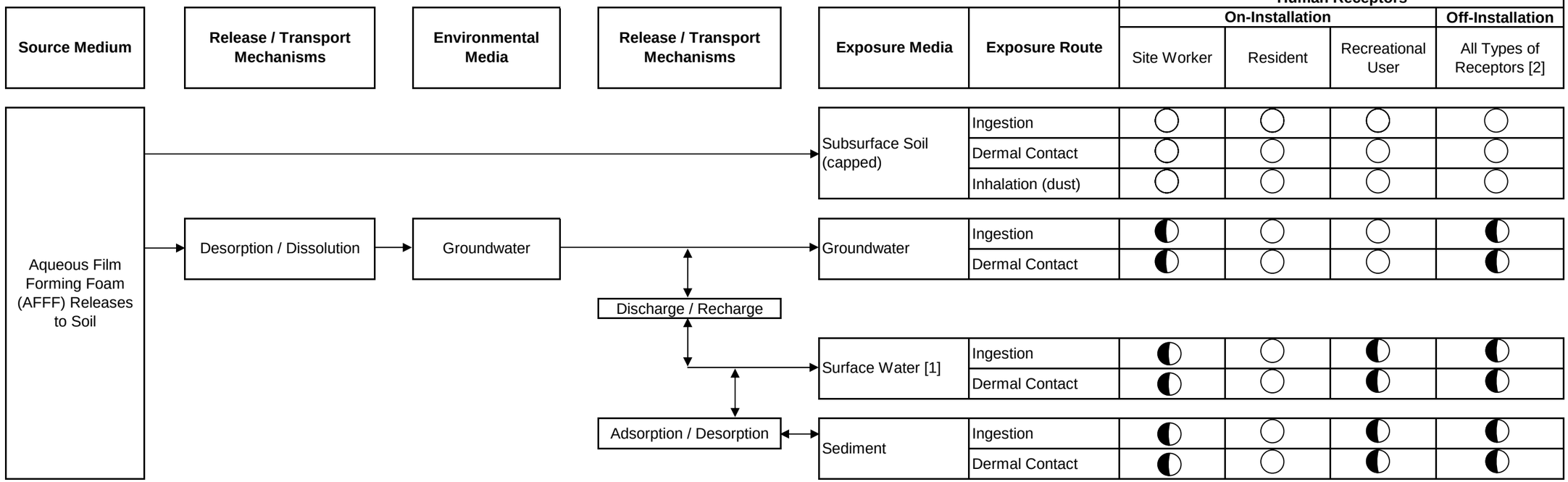
Conceptual Site Model - Former Fire Station #2, 2017 AFFF Release, 1990s AFFF Release, Former Fire Training Burn Pit #2, and Fire Training Burn Pit #3
USAEC PFAS Preliminary Assessment / Site Inspection
Fort McCoy, Wisconsin

Figure 7-5



Legend:

◐ = Potentially Complete Exposure Pathway

◯ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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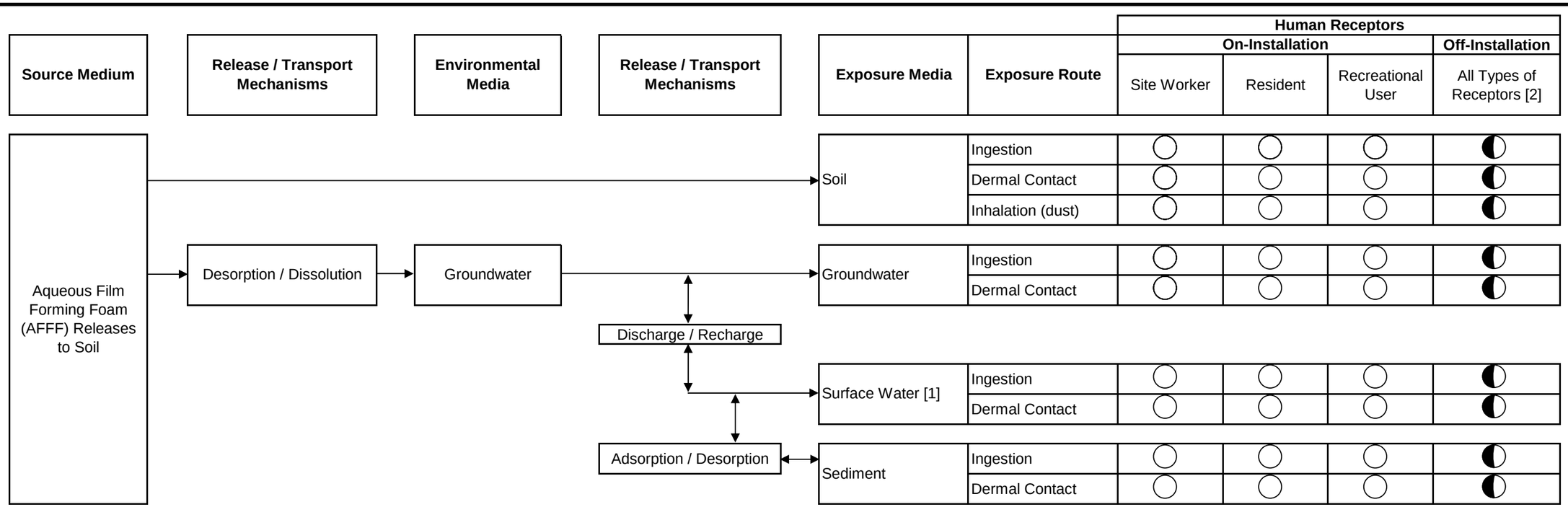
Conceptual Site Model - Former Fire Training Burn Pit #1 and Building 207
USAEC PFAS Preliminary Assessment / Site Inspection
Fort McCoy, Wisconsin

Figure 7-6



Legend:

◐ = Potentially Complete Exposure Pathway

◯ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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Conceptual Site Model - Wastewater Treatment Plant
USAEC PFAS Preliminary Assessment / Site Inspection
Fort McCoy, Wisconsin

Figure 7-7