FINAL
PRELIMINARY ASSESSMENT REPORT
FORMER KANSAS ARMY AMMUNITION PLANT

September 2023

Prepared for:

U.S. ARMY

ODCS, G-9, ISE, BRAC

and

United States Army Corps of Engineers – Kansas City District

Contract No. W912DQ-19-D-3001
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List of Acronyms

AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CSM	Conceptual Site Model
CWP	Contaminated Waste Processor
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DZI	Day and Zimmerman, Inc.
ECP	Environmental Condition of Property
EDR™	Environmental Data Resources, Inc.™
EOD	Explosive Ordnance Disposal
EWI	Explosive Waste Incinerator
GPDA	Great Plains Development Authority
gpm	Gallons per Minute
HA	Health Advisory
HFPO-DA	Hexafluoropropylene oxide dimer acid
KDWP	Kansas Department of Wildlife and Parks
KSAAP	Kansas Army Ammunitions Plant
LHA	Life Health Advisory
MEC	Munitions and Explosives of Concern
mg/kg	Milligram/Kilogram
mm	Millimeter
MSL	Mean Sea Level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
OD	Open Detonation
OSD	Office of the Secretary of Defense
OWS	Oil/Water Separator
PA	Preliminary Assessment
PCB	polychlorinated biphenyl
PEP	Propellants, Explosive, and Pyrotechnics
PFAS	Per- and Polyfluorinated Substances
PFBS	Perfluorobutane Sulfonate
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexane Sulfonate

PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
POL	Petroleum, Oil and Lubricants
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
RSL	Regional Screening Level
SCS	Soil Conservation Service
SI	Site Inspection
SWMU	Solid Waste Management Unit
TNT	Trinitrotoluene
U.S.	United States
URS	URS Group, Inc.
USACE	United States Army Corps of Engineers
USAEHA	US Army Environmental Hygiene Agency
U.S.C	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VSI	Visual Site Inspection

1.1 PROJECT AUTHORIZATION AND OBJECTIVES

The Army conducted this Preliminary Assessment (PA) to investigate the potential presence of Per-and Polyfluoroalkyl Substances (PFAS) at the former Kansas Army Ammunition Plant (KSAAP) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 U.S.C. §9601 et. seq.), the Defense Environmental Restoration Program (DERP, 10 U.S.C. §2701 et. seq.), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300), and guidance documents developed by the Environmental Protection Agency and the Department of the Army. KSAAP is not on the National Priorities List, and the Army is responsible for compliance with CERCLA in accordance with Executive Order 12580, as amended.

The purpose of this PFAS PA is to identify locations that are areas of interest (AOIs) on KSAAP based on the use, storage and/or disposal of potential PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Department of the Army, 2018). The PA was conducted in general accordance with 40 CFR §300.420(b) and the United States (U.S.) Environmental Protection Agency (USEPA) *Guidance for Performing Preliminary Assessments Under CERCLA* (USEPA, 1991), the USEPA *Federal Facilities Remedial Preliminary Assessment Summary Guide*, and the U.S. Army (Army) *Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (Department of the Army, 2018). This report presents findings from research conducted to assess past use of materials containing PFAS and identify areas where these materials were stored, handled, used, or disposed at KSAAP.

The entire former KSAAP property was evaluated, including property that was previously transferred.

This project is being executed by AECOM Technical Services, Inc. (AECOM) under Contract Number W912DQ-19-D-3001, Delivery Order W912DQ21F3021 issued by the U.S. Army Corps of Engineers (USACE) Kansas City District to complete a PA for the Office of Deputy Chief of Staff, G-9 Base Realignment and Closure (BRAC) branch for Perfluorooctanesulfonic acid (PFOS), Perfluorooctanoic acid (PFOA), Perfluorobutanesulfonic acid (PFBS), Perfluorohexanesulfonic acid (PFHxS), Perfluorononanoic acid (PFNA), and Hexafluoropropylene oxide dimer acid (HFPO-DA) at KSAAP in Labette County, Kansas; the group of related compounds known in the industry as PFAS. The term PFAS will be used throughout this plan to encompass all PFAS chemicals being evaluated.

The purpose of a PA under the NCP is to 1) eliminate from further consideration those sites that pose no threat to public health or the environment; 2) determine if there is any potential need for removal action; 3) set priorities for Site Inspections (SIs); and 4) gather existing data to facilitate evaluation for the release pursuant to the Hazard Ranking System, if warranted (40 CFR §300.420(b)(1)).

The primary objective of the PA is to identify locations at KSAAP where there was use, storage, or disposal of PFAS-containing materials resulting in a potential release of PFAS to the environment and conduct an initial assessment of possible migration pathways of potential

contamination. This PA also includes development of a preliminary conceptual site model (CSM) for AOIs related to PFAS.

1.2 PFAS REGULATORY OVERVIEW AND SCREENING CRITERIA

In May 2016, USEPA issued lifetime health advisories (LHAs) for PFOA and PFOS under the Safe Drinking Water Act (SDWA). To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOS and PFOA in drinking water, USEPA established a Health Advisory (HA) level for PFOS and PFOA (individually or combined) of 70 nanograms per liter (ng/L) (USEPA, 2016a-b).

In October 2019, the Office of the Assistant Secretary of Defense (OSD) issued guidance on investigation of PFOS, PFOA, and PFBS at Department of Defense restoration sites. The OSD guidance provided risk screening levels for PFOS, PFOA, and PFBS in (groundwater) tapwater and soil, based on the USEPA Regional Screening Level (RSL) calculator for residential and industrial reuse and using the oral reference dose of 2E-05 milligrams per kilogram (mg/kg) per day (mg/kg-day). These screening levels are used during a Site Inspection (SI) to determine if further investigation in a Remedial Investigation (RI) is warranted.

In April 2021, USEPA issued an updated toxicity assessment for PFBS. USEPA developed chronic [0.0003 mg/kg-day] and subchronic (0.001 mg/kg-day) oral reference doses (RfDs) for PFBS as part of USEPA's toxicity assessment. The RSL for PFBS was previously calculated using the RfD of 0.02 mg/kg-day. New toxicity values resulted in revisions to the RSLs for PFBS in April 2021 (USEPA, 2021).

In September 2021, OSD issued a revision to *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (Assistant Secretary of Defense, 2021). The revised memorandum accounts for the updated PFBS screening levels attributable to USEPA's reassessment of PFBS toxicity in 2021. Based on USEPA research, the RSLs for PFOS and PFOA are calculated using an RfD of 2E-05 mg/kg-day. The RSL for PFBS is calculated using an RfD of 3E-04 mg/kg-day. When multiple PFAS are encountered at a site, a 0.1 factor is applied to the screening level when it is based on noncarcinogenic endpoints.

In May 2022, based on continued evaluation of target PFAS compounds by the Agency for Toxic Substances and Disease Registry (ATSDR) and the EPA Office of Water, EPA provided new screening levels for PFOA, PFOS, PFNA, PFHxS, and HFPO-DA.

In July 2022, OSD issued a policy memorandum adopting these new screening levels to be used during the SI-phase to determine whether further investigation in a RI is warranted. This revised guidance is in effect as of July 2022 and is applicable to investigating PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA at DoD restoration sites, including BRAC (Assistant Secretary of Defense, 2022). Currently, no legally enforceable Federal standards exist for PFAS in groundwater, surface water, soil, or sediment.

Table 1-1. Project Action Limits from the 2022 OSD Memorandum

Chemical	Residential Tap Water HQ = 0.1 (ng/L or ppt)	Residential Soil HQ = 0.1 (µg/kg or ppb)
HFPO-DA (GenX)	6	23
PFBS	601	1,900
PFHxS	39	130
PFNA	6	19
PFOA	6	19
PFOS	4	13

Note:

The Residential Tap Water SLs are used to evaluate groundwater and surface water data. The Residential Soil SLs are used to evaluate soil and sediment data.

HFPO-DA	Hexafluoropropylene oxide dimer acid
HQ	Hazard Quotient
OSD	Office of the Secretary of Defense
PFBS	Perfluorobutane Sulfonate
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate

The Army's strategy is to continue to assess and investigate potential releases and implement necessary response actions in accordance with CERCLA to ensure that no human health-based exposures are above the CERCLA risk-based values in drinking water. Therefore, sites where human exposure to contaminated drinking water exists will be addressed first and as quickly as possible to eliminate the exposure and then will be subsequently prioritized and sequenced to conduct the investigations and response actions necessary to characterize and, if necessary, remediate the source of PFAS contamination (U.S. Army, 2018).

1.3 REPORT ORGANIZATION

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

- **Section 1** – Introduction:
- **Section 2** – Area Descriptions and Findings
- **Section 3** – Emergency Response
- **Section 4** – Potential Adjacent Sources
- **Section 5** – Pathway and Environmental Hazards Assessment
- **Section 6** – Conclusions
- **Section 7** – References
- **Appendix A** – Data Resources
- **Appendix B** – Preliminary Assessment Documentation
- **Appendix C** – Photographic Log

1.4 FACILITY LOCATION AND DESCRIPTION

While operational, KSAAP encompassed 13,727 acres near Parsons, Kansas, in the northeast corner of Labette County (**Figure 1-1**). KSAAP is approximately 30 miles west of the Missouri border and 20 miles north of the Oklahoma border; it is located approximately 2 miles east of Parsons, Kansas and less than 1 mile north of Labette, Kansas. The surrounding area consists of sparsely populated, rural communities with primarily agricultural land use (URS Group, Inc. [URS], 2006).

The construction of KSAAP was authorized by the Secretary of War on May 31, 1940. Construction began in August 1941, was completed in November 1942, and the site remained operational throughout World War II. The site initially consisted of 17,321.9 acres but was reduced to 13,727 in 1946 through the sale of three parcels that were declared excess property. The initial construction consisted of three load lines, one each for the 105-millimeter (mm) shell, the 155mm shell, and the 100-pound bomb. Facilities for production of fuzes, boosters, detonators, and primers were also constructed along with facilities for the manufacture of amatol (TNT and ammonium nitrate) and ammonia nitrate; administrative, maintenance, and support; and the requisite utilities (URS, 2006). The plant was placed on standby status from September 1945 to August 1950 (USACE, 2016).

In August 1950, the Ordnance Corps issued orders for partial reactivation of the plant in support of the Korean War, and by September 1954, all production lines were reactivated. The active production areas were decontaminated and laid away after the signing of the Korean War truce. The last active production line was laid away in July 1957, and the plant was put on standby status. While on standby status, which lasted until 1967, the plant continued on a contractor-operator

basis. Activities during this period included maintenance of facilities, and receipt, storage, and issuance of ammunition items. Beginning in early 1967, all production areas were reactivated with the exception of the cartridge rework area.

On 2 March 1970, Day & Zimmermann, Inc. (DZI) began operating the plant and maintained its position as the operating contractor until site closure. By 1975, only three of the eight production lines remained in operation. The 105mm shell production line remained active until 1978. By 1980, many of the production areas were on standby status (URS, 2008).

In 1989, the USEPA issued KSAAP a Resource Conservation and Recovery Act (RCRA) Part B Permit for hazardous waste treatment and storage activities. KSAAP was designated for closure under the 2005 BRAC process. The KSAAP mission to produce munitions ended on 31 December 2008, with closure of the installation on 9 March 2009. Since closure, the installation has been transferred from the Army to multiple third parties including the Kansas Department of Wildlife and Parks (KDWP), DZI, and the Great Plains Development Authority (GPDA) (USACE, 2016). The majority of the former KSAAP footprint is now part of the Great Plains Industrial Park.

1.5 FACILITY ENVIRONMENTAL SETTING

1.5.1 Topography

KSAAP is situated within the southeastern part of the Osage Cuesta Division of the Central Lowland Physiographic Province. The region is characterized by low-relief, rolling prairie typical of eastern Kansas, interrupted intermittently by east-facing escarpments of limestone beds with relatively weaker beds of shale (URS, 2005). The surface topography at KSAAP varies from being relatively flat in the north to gently rolling in the south. The ground surface elevation ranges from 950 feet above mean sea level (msl) in the northwest near the Administration Area to 840 feet above msl near the western boundary. Except for locally steep slopes adjacent to drainages, the ground surface slopes throughout most of the KSAAP range from 0.5 to 1.0 percent (AE, 1998).

1.5.2 Surface Water Hydrology

A well-developed surface water drainage system is present at KSAAP. KSAAP is bisected by a major drainage divide that trends northwest to southeast (**Figure 1-2**). This divide extends from the Administration Area near the northern boundary to the east of the 1900 Area near the southeast boundary. In the northeastern part of KSAAP, surface water drains east to the Neosho River, which is located about 2 miles east of KSAAP. In the southwestern portion of KSAAP, surface water drains westward to Labette Creek, which is located immediately west of KSAAP and coincides with the KSAAP boundary in the vicinity of the Sewage Treatment Plant. Labette Creek and the Neosho River both flow in a southerly direction and join about 15 miles south of KSAAP at the town of Chetopa (AE, 1998).

There are more than 100 ponds on KSAAP property. All of the ponds are man-made and range in size from 10 acres to less than 1 acre, but average 2 acres (KSAAP NRM, 2006). Three of the ponds are in abandoned quarries, 15 are associated with KSAAP processes (later referred to as

oxidation ponds), and the remainder are located in the agricultural and woodland areas. At one time, KSAAP had 40 stocked and numbered fishing ponds with open fishing (KSAAP NRM, 2006). Many of the oxidation ponds were constructed within natural surface runoff drainages with the intent to allow natural flushing of the ponds to oxidize contamination. Three ponds at KSAAP are not part of the natural drainage pattern; these include two Water Treatment Plant Sludge Lagoons (Solid Waste Management Unit [SWMUs]-121 and 122), south of the 1700 Area, and the Evaporation Pond for the 300 Area (AE, 1998).

Construction of reservoirs on the upper Neosho River during the 1950s has greatly reduced flooding. However, occasional flooding occurs for periods of up to four or five days. Approximately 200 acres are occasionally flooded for up to 24 hours during periods of heavy rainfall.

1.5.3 Soils

The surficial geology at KSAAP consists of Pleistocene terrace alluvium (mainly clays), Holocene floodplain deposits (clays, sands, and gravels), and residuum from weathered bedrock.

The alluvial deposits occur along major streams such as Labette Creek and the Neosho River and occur on the extreme east and west borders of KSAAP. Between the streams, the upland soils consist of residual silts and clays, derived from the weathering of underlying shales and limestones, and occur in the central portion of KSAAP. Pleistocene-age loess is also present in the upland areas (URS, 2005).

A series of silt loam and clay soils has been described by the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) within KSAAP and can be grouped into the following five parent materials (AE, 1998):

- Limestone bedrock residuum
- Sandstone and sandy shale residuum
- Shale residuum
- Pleistocene Age (or older) alluvium
- Recent alluvium

Specific soil series found at KSAAP that are derived from limestone bedrock residuum include Apperson silty clay loam, Catoosa silt loam, and Shidler-Catoosa silt loams. The Bates loam series is the only soil identified on KSAAP that is derived from sandstone and sandy shale residuum. Shale residuum-derived soils found on site include Dennis silt loam, Eram silty clay loam, and Zaar silty clay. Soils derived from the older alluvial deposits include Olpe-Dennis silt loams and Parsons silt loam. Recent alluvial soil series found at KSAAP include Lanton silt loam, Osage silty clay, and Verdigris silt loam (AE, 1998).

The majority of soil sampling performed during a 2015 Site Inspection (SI) for non-PFAS compounds at multiple sites included direct push sampling in some areas to collect subsurface

samples to depths of approximately 13-14 feet below ground surface (bgs). Limestone and shale bedrock refusal was encountered during drilling activities in some areas (Building 110, 2200 Area, Buildings 57/58, and Building 67), while bedrock was encountered at depths ranging between 6 and 14 feet bgs in others. Weathered bedrock/clay was typically encountered above the bedrock contact. Fill material was encountered at several sites corresponding to surrounding buildings, foundations, stand-alone structures, and berms. Fill materials were generally observed to be gravel or clay or a combination of the two. The encounter of shallow bedrock is common throughout the KSAAP areas, especially low-lying areas such as ditches and trenches (URS, 2006).

1.5.4 Geology

KSAAP is situated within the southeastern part of the Osage Cuesta Division of the Central Lowland Physiographic Province. The region is a plain of low relief, interrupted intermittently by east facing escarpments of limestone beds with relatively weaker beds of shale (URS, 2005). Surficial geology generally consists of terrace and floodplain alluvial deposits in the lowlands and residual soils, from weathered bedrock, in the uplands. Regional dip of the geologic strata is to the west-northwest at about 20 feet per mile.

KSAAP, located in the typical eastern Kansas rolling prairie of the Central Lowland Province, is situated on Pleistocene terrace clays to recent floodplain clays, sands, and gravels. This alluvium occurs along major streams such as Labette Creek and the Neosho River. Between major streams, the upland soils consist of residual silts and clay derived from the weathering of underlying shales and limestones. These clay soils may contain lenses of sand and gravel resulting from more resistant bedrock units (i.e., sandstone). Pleistocene-age loess is present on the uplands as well. The USDA SCS has identified the following soil types in the KSAAP area: silt loam of the Catoosa, Cherokee, Parsons, and Verdigris series; very fine sandy loam of the Bates series; and Orthents and silty clay loam of the Apperson, Dennis, Eram, Kenoma, Shidler, and Zaar Series (USDA, 1990).

Exposed consolidated rocks in Labette County are Pennsylvanian in age, consisting of interbedded marine and non-marine shales and limestones deposited in a cyclothem sequence. The stratigraphic formations underlying the county, from oldest to youngest, of the Marmaton Group are, the Fort Scott Limestone, the Labette Shale, the Pawnee Limestone, the Bandera Shale, the Altamont Limestone, the Nowata Shale, and the Lenapah Limestone.

The Cherokee Group underlies the Marmaton Group and ranges in thickness from about 395 to 560 feet. The Cabaniss Formation is the first unit underlying the Marmaton Group. The shale and interbedded sandstone lenses of the Cherokee thicken toward the southwest in Labette County.

The following paragraphs present descriptions of the Marmaton and Cherokee bedrock units underlying KSAAP (from oldest to youngest) based on the available information.

Marmaton Group

Fort Scott Limestone—The Fort Scott Limestone, the oldest exposed consolidated formation in the area, consists of interbedded limestones and shales. In the northeast part of Labette County,

this formation includes two 8-foot-thick limestone units and a 5-foot-thick black shale unit. Three or more limestone units constitute this formation in the southwestern part of the county. At KSAAP, the Fort Scott Limestone crops out in the stream bed northeast of the burning ground (2700 Area). The thickness of this formation is approximately 28 feet.

Labette Shale—This unit is sandstone and sandy shale with discontinuous coal and limestone beds. In the east end of the 2700 Area, it consists of thinly laminated, friable claystone. Underlying this claystone is light olive gray, fossiliferous, stylolitic limestone. The Labette Shale is about 75 feet thick.

Pawnee Limestone—This unit consists of five units of interbedded limestone and shale, with a thickness between 14 and 59 feet. The upper limestone is light brownish gray to light olive gray, fossiliferous, and thin- to medium-bedded. Thinly laminated grayish black shale, or claystone with pyrite and thin carbonaceous partings on bedding planes, underlie the limestone. Another thinly laminated, brownish gray, fossiliferous limestone bed with coal stringers is in the middle of the unit. Dark gray, blocky, bituminous coal underlies this limestone, sometimes interbedded with carbonaceous shale and with underclay. The coal layer grades laterally to carbonaceous shale or claystone in some areas. The coal layer grades downward into a shaley, carbonaceous limestone with occasional oil staining. The outcrop belt of the Pawnee appears to underlie the surface water drainage divide that trends from northwest to southeast across the installation.

Bandera Shale—The Bandera Shale occurs at the installation as a sequence of interbedded sandstone, siltstone, and sandy shale. The unit has an overall thickness that ranges from 20 to 75 feet, and there is a 2-foot-thick coal bed at the base. Monitoring well logs from the northern part of the installation near the 100, 300, and 500 Areas (USAEHA, 1988) indicate that the bedrock, interpreted to be the Bandera Shale, consists of 35 feet of yellow-brown, sandy shale grading to gray, sandy shale. The gray, sandy shale overlies very finely crystalline limestone.

Cherokee Group

Cabaniss Formation—The Cabaniss Formation is about 220 feet thick and is principally shale, but contains sandstone, limestone, and coal. Only the upper 140 feet of the formation crops out in Labette County.

Residual Soil

Section 1.5.3 lists several soil series that formed as residual soils, meaning these soils have formed in place from the weathering of parent bedrock (sandstone, limestone, and shale at KSAAP). Most of the official USDA Natural Resources Conservation Service (NRCS) descriptions for these soil series describe soil horizons that contain iron/manganese oxide concretions. Soil samples collected from these horizons that were analyzed for metals tended to show anomalously high concentrations of iron and manganese. Many soil horizons for the soil series listed in **Section 1.5.3** are characterized in the official USDA NRCS soil series descriptions having redoximorphic concentration and depletion zones. These zones are associated with the concentration or depletion of iron and manganese oxides and are characterized by changes in color.

1.5.5 Hydrogeology

Groundwater at KSAAP is present in unconsolidated alluvial and floodplain deposits and in bedrock. Regionally, the alluvial aquifers generally offer the best potential for a potable and industrial water supply in Labette County. Groundwater in the consolidated aquifer is recharged by direct infiltration of rainfall and spring run-off, emanating from the consolidated rock bounding the valleys, and by infiltration of waters during flooding (URS, 2005).

The most aerially extensive unconsolidated aquifer in Labette County is the Neosho River alluvium. It is about 35 feet thick, and wells constructed in it range from 10 to 20 feet deep. These deposits have an average long-term yield of about 50 gallons per minute (gpm) but may produce up to 100 gpm. Potable water for local rural water districts is taken from these alluvial units near the Neosho River about 5 miles east of KSAAP. Based on information from the Environmental Data Resources, Inc. (EDR)™, there are two domestic wells and one feedlot well located within a 1-mile radius from KSAAP's original boundary.

A fractured bedrock aquifer is the primary aquifer throughout much of KSAAP due to the impermeable nature of the fine-textured soils in the area. Groundwater flow velocities are highly variable and are typically highest along joints and bedding planes within the bedrock (RC, 1994). The bedrock aquifers do not generally yield sufficient quantities of water to make them viable water sources. The water tends to be hard and contains excessive amounts of chloride, nitrate, and hydrogen sulfide (AE, 1998).

Water table depths vary from 1 to 20 feet below the ground surface throughout KSAAP. The water table is generally deeper in upland areas, and it is generally shallower in small stream valleys and along Labette and Neosho Creeks. Artesian conditions were reported for monitoring wells near the active landfill in the eastern part of KSAAP. Based on groundwater levels measured at KSAAP, the following conclusions have been drawn (AE, 1998):

- A north-south trending groundwater divide subdivides the facility into two groundwater flow systems (**Figure 1-3**). In the north part of KSAAP, this groundwater divide roughly coincides with the surface water divide that separates the Labette Creek and Neosho Creek watersheds.
- West of the divide, groundwater flows west-southwest toward discharge areas along Labette Creek.
- East of the divide, groundwater flows generally east toward discharge areas along Neosho Creek. In the vicinity of the 900 and 1000 Areas, the groundwater flow direction has an east-northeast orientation.
- South of the 1100 Area, groundwater flows south toward discharge areas near the quarries on Road 5. A major tributary of Labette Creek is located in this area (AE, 1998).

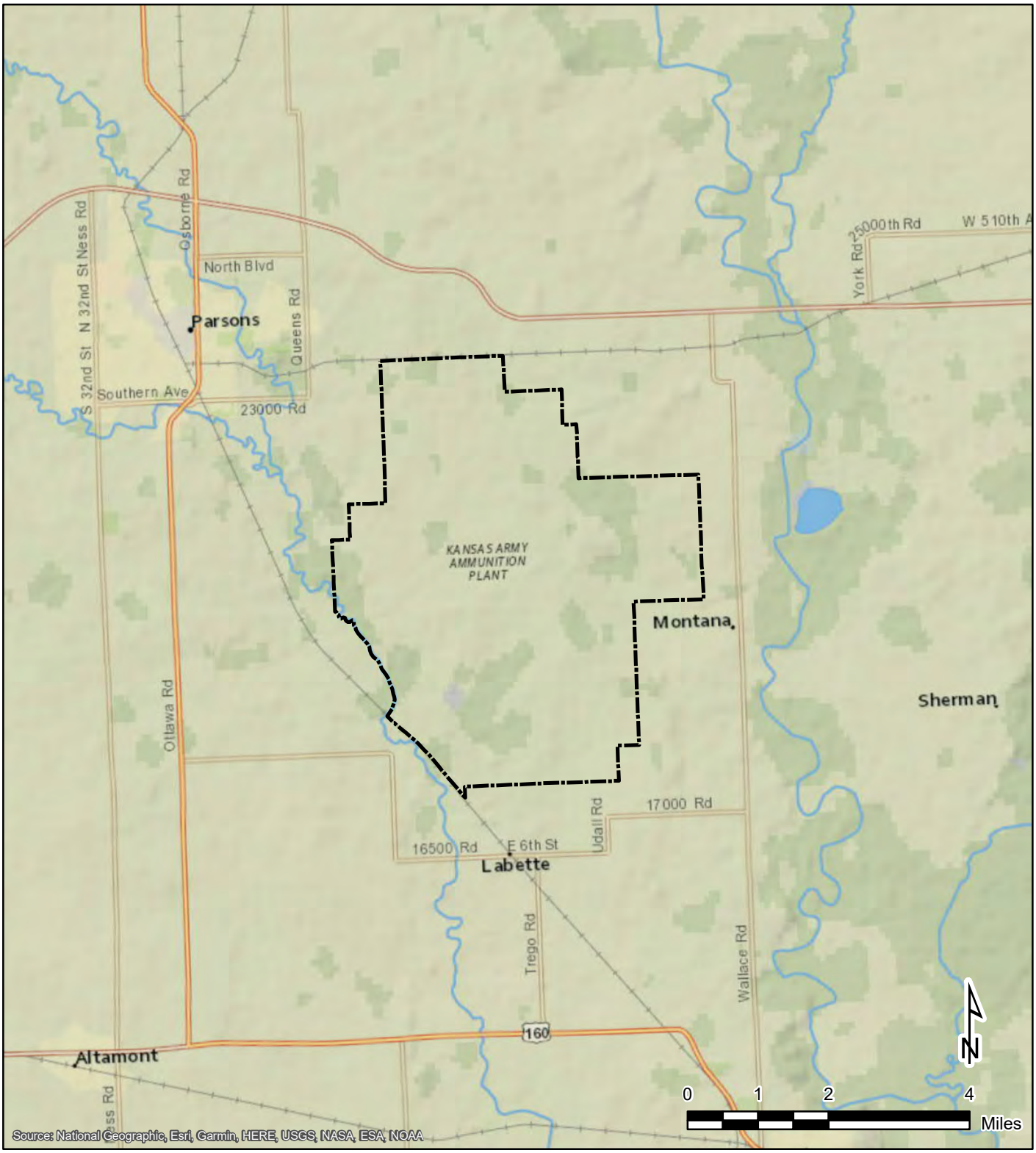
Local use of groundwater aquifers is limited. Farms and residences located within a one-mile radius of KSAAP receive potable water from rural water districts or from GPDA. Surface-water reservoirs located at least 7 miles north and west of KSAAP are also sources of water for rural water districts. A water filtration plant located on the banks of the Neosho River approximately 2

miles east of KSAAP was owned and operated by KSAAP until closure of the facility in 2009 (AE, 1998). This plant is currently owned and operated by the GPDA and draws water from the Neosho River. The unconsolidated alluvial deposits along the Neosho River and other streams are considered the best regional aquifers for potable and industrial water supply (URS, 2006).

1.6 PRELIMINARY ASSESSMENT METHODS

The performance of this PA included the following tasks:

- Data resource review of previous environmental reports, historical aerial photographs, Sanborn maps, and EDR™ report packages to obtain information relevant to suspect PFAS release (**Appendix A**).
- Site visit on 26-27 January 2022.
- Interviews of the following current and retired personnel with knowledge of KSAAP (**Appendix B**):
  - Two USACE Environmental Project Managers
  - The BRAC Environmental Coordinator
  - Three current and two retired DZI employees; one of the current DZI employees was also a former firefighter for KSAAP
  - The GPDA Property Manager
- Visual site inspections (VSIs) at known or suspected PFAS release locations that are also documented with photographs.
- Development of a conceptual site model (CSM) to outline the potential release and pathway of PFAS for the AOIs and the facility.



Legend

Installation Boundary

Figure 1-1

Installation Location
Kansas Army Ammunition Plant
Parsons, Kansas

Preliminary Assessment Report

AECOM	Project Number: 60656718	Drawn By: JZ

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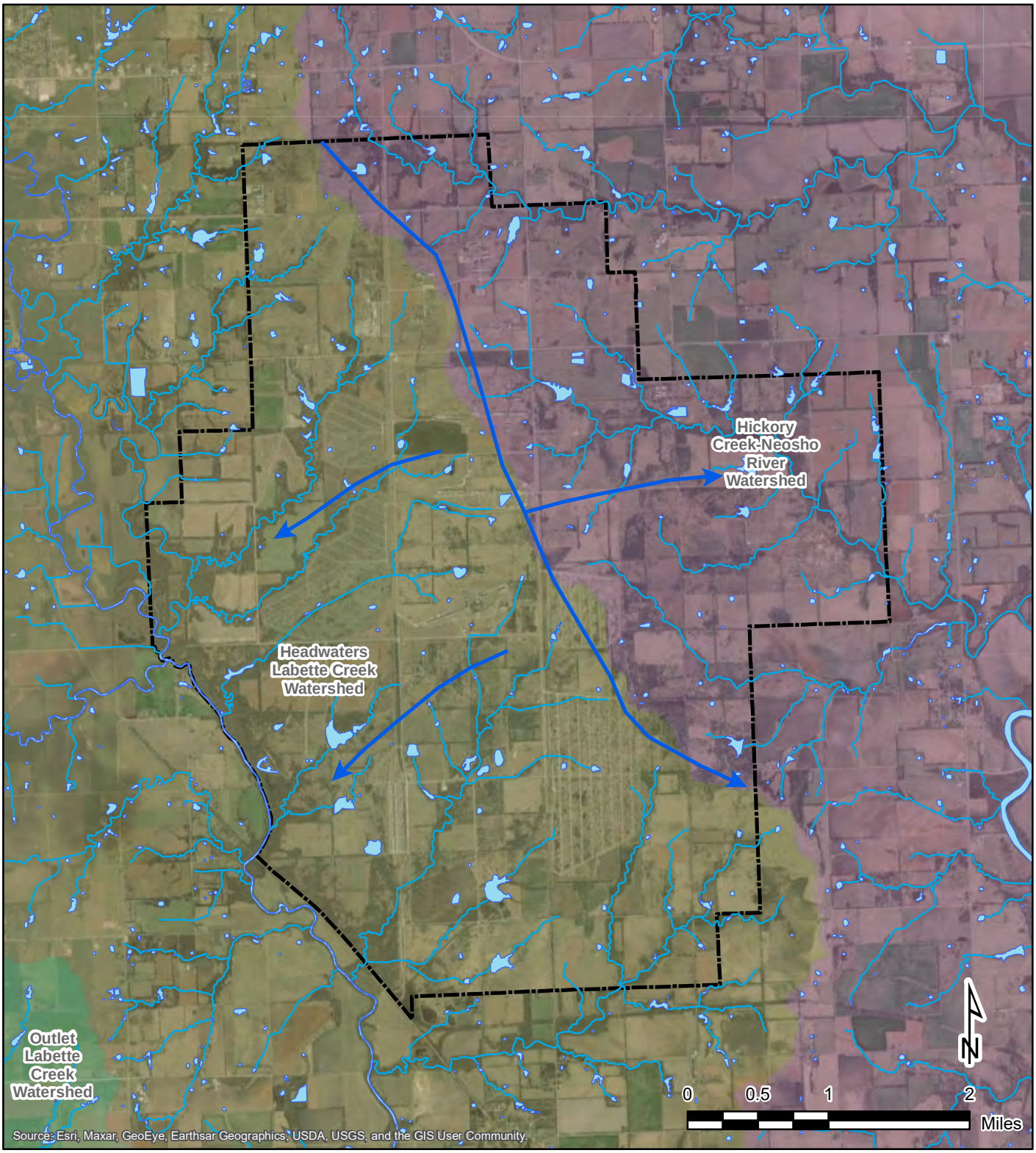

Legend

- Installation Boundary
- Water Body
- River/Creek/Stream
- Surface Water Flow Direction

Figure 1-2

Surface Water Flow Direction
Kansas Army Ammunition Plant
Parsons, Kansas

Preliminary Assessment Report

AECOM	Project Number: 60656718	Drawn By: JZ

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Legend

- Installation Boundary
- River/Creek
- Groundwater Flow Direction

Figure 1-3

Groundwater Flow Direction
Kansas Army Ammunition Plant
Parsons, Kansas

Preliminary Assessment Report

AECOM	Project Number: 60656718	Drawn By: JZ

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The PA evaluated all potential PFAS release areas at KSAAP, which may include the following locations, as outlined in the *Army Guidance for Addressing Releases of PFAS* (Department of the Army, 2018):

- Current or former fire training areas where aqueous film forming foam (AFFF) is known or suspected to have been applied.
- Current or former AFFF storage locations.
- Emergency response sites where AFFF may have been applied for fire control.
- AFFF used, stored, or disposed of at buildings and emergency response sites
- Plating facilities that may have used PFAS-containing mist suppressants.
- Landfills where PFAS-containing materials may have been disposed.
- Wastewater treatment plants that may have received wastewater from facilities that used or disposed of PFAS-containing liquid effluents.

Potential PFAS release areas were identified from environmental areas of concern such as burn areas, fire stations, landfills, and waste/wastewater management areas, and through a records review of former KSAAP properties, findings from interviews, and the VSI. The potential PFAS release areas are presented in the sections below and on Figure 2-1.

Based on the PA findings, the use and storage of AFFF were limited to KSAAP operations at Building 52 – Former Fire Station. Two other former fire stations were also operational at KSAAP prior to the 1960s; however, the usage of AFFF by the Department of Defense (DoD) did not come into prevalence until after 1969, when a military specification of AFFF was produced. Water was used for extinguishing or controlling fires at the burn areas, and there was no evidence of other PFAS-containing materials being used, stored, or disposed at the remaining evaluated areas.

2.1 KAAP-001 – CLASSIFICATION AREA CONSTRUCTION WASTE (SWMU GROUP 12)

2.1.1 KAAP-001 Site Background

KAAP-001 (SWMU Group 12) is an approximately 4-acre uncapped construction debris landfill site and is located 0.25 miles southeast of Gate 3 on the northern boundary of KSAAP. This site was used to dispose of construction waste generated during construction of KSAAP in 1942. Further investigation has determined that this was not a landfill, but rather a surface disposal area (USAEC, 2006). KAAP-001 was transferred to GPDA on 27 August 2012 (USACE, 2016).

2.1.2 KAAP-001 Site Findings

The storage, use, and/or disposal of AFFF or other PFAS-containing materials at KAAP-001 is not suspected given the operational timeframe of the site (1942), which predates prevalent AFFF usage by the DoD (after 1969). KAAP-001 is not considered to be a potential PFAS release area.

2.2 KAAP-002 – CLOSED LANDFILL NEAR QUARRY (SWMU GROUP 13)

2.2.1 KAAP-002 Site Background

KAAP-002 (SWMU Group 13) was a closed landfill that was located in the south-central part of KSAAP. This site was used between 1941 and 1945 and was located immediately north of Road 5.5 between Quarry Pond 6 and 7. The site was circular in shape with a diameter of 150 feet and covered approximately 0.4 acres. This landfill was remediated in 2005 and buried in the northwest corner of the current Industrial Landfill (SWMU-146) (USAEC, 2006). KAAP-002 was transferred to GPDA on 27 August 2012 (USACE, 2016).

2.2.2 KAAP-002 Site Findings

The storage, use, and/or disposal of AFFF or other PFAS-containing materials at KAAP-002 is not suspected given the operational timeframe of the site (1941-1945), which predates prevalent AFFF usage by the DoD (after 1969). KAAP-002 is not considered to be a potential PFAS release area.

2.3 KAAP-003 – 200 AREA CLOSED LANDFILL AND BURN PITS (SWMU GROUP 14)

2.3.1 KAAP-003 Site Background

KAAP-003 (SWMU Group 14) was located in the northwest portion of the facility and consisted of the 200 Area Closed Landfill and Burn Pits. The area, in operation from 1950 to 1969 and approximately 2.5 acres in size, reportedly contained 15 burn pits and 8 landfill trenches. The locations of the trenches and pits are no longer discernible. Trash and burned refuse were reportedly placed in the landfill trenches and covered with 4 feet of earthen fill. The materials in the burn pits were believed to be inert and contained construction/demolition wastes, maintenance/operation wastes, and waste from lunchroom and office facilities (USACE, 2016). Munitions and explosives of concern (MEC) may have been present but have not yet been confirmed (USAEC, 2006).

2.3.2 KAAP-003 Site Findings

The storage, use, and/or disposal of AFFF or other PFAS-containing materials at KAAP-003 are not suspected given the operational timeframe of the site (1950-1969), which predates prevalent AFFF usage by the DoD (after 1969). Additionally, it was reported by a former KSAAP firefighter (**Appendix B**) that controlled burns were extinguished with water rather than AFFF. KAAP-003 is not considered to be a potential PFAS release area.

2.4 KAAP-004 – CLOSED LANDFILL (SWMU GROUP 16)

2.4.1 KAAP-004 Site Background

KAAP-004 (SWMU Group 16, also referred to as SWMU Nos. 149-160), was located in the east central portion of KSAAP, immediately south of Road 3, near the open detonation area. The landfill was approximately 50 acres and operated between 1969 and 1981. The landfill consisted of twelve landfill units, and each occupied approximately 1 acre. Reportedly, ash from the burning pads at SWMU Group 24, as well as unspecified scrap metal, were disposed of at this landfill. Approximately 6 feet of waste were placed in 10-foot-deep, unlined pits and covered with 4 feet of earthen fill material. The last unit was filled and covered in 1981 (AE, 1998).

2.4.2 KAAP-004 Site Findings

The storage, use, and/or disposal of AFFF or other PFAS-containing materials at KAAP-004 is not suspected. Given the widespread absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the landfill contains waste contaminated with PFAS. KAAP-004 is not considered to be a potential PFAS release area.

2.5 KAAP-005 – INACTIVE LANDFILL (SWMU GROUP 15)

2.5.1 KAAP-005 Site Background

KAAP-005 (SWMU Group 15) was located in the northwest portion of KSAAP, immediately south of Road 2 and west of the 200 Area. The site occupied approximately 12 acres of a 40-acre parcel permitted for landfill use. Waste disposed of in the past included inert grenade bodies, asbestos, fly ash from the contaminated waste processor (CWP), maintenance operation waste, sludge from the anaerobic digester, and trash. The landfill was operational from 1982 until 2009 (USACE, 2016). KAAP-005 was transferred to GPDA on 27 August 2012 (USACE, 2016).

2.5.2 KAAP-005 Site Findings

Based on interviews with retired personnel, DZI staff conducted a burning exercise at the northcentral location of KAAP-005, near an access road. The burning exercise was also described as a “fire watch,” since the exercise involved watching wooden pallets burn, and no extinguishing agent (including AFFF) was used. The frequency and years these burning exercises were conducted are unknown.

A VSI was conducted at KAAP-005 during the PA site walk. A photograph of the reported fire training area is located in **Appendix C**. The storage, use, and/or disposal of AFFF or other PFAS-containing materials at KAAP-005 are not suspected. KAAP-005 is not considered to be a potential PFAS release area.

2.6 KAAP-009 – BURNING CAGES 14, 17, AND 22 (SWMU GROUP 23)

2.6.1 KAAP-009 Site Background

KAAP-009 (SWMU Group 23) was located in the east central portion of KSAAP. These cages (Nos. 14, 17, 22) were used to burn explosive contaminated trash from the production lines prior to construction of the CWP. These burn cages were used from approximately 1952 to 1985. Each cage was surrounded on three sides by an 8-foot berm (USAEC, 2006). The burning cages had natural soil bottoms upon which non-hazardous, explosive compounds-contaminated material was burned when the CWP was not operating (USAEC, 2006). Remedial activities were conducted between 2005 and 2006 to remove the burning cages and surrounding soil that was contaminated with lead and explosives above cleanup standards (USACE, 2016). KAAP-009 was transferred to GPDA in August 2012 (USACE, 2016).

2.6.2 KAAP-009 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-009 are not suspected. Additionally, it was reported by a former KSAAP firefighter (**Appendix B**) that controlled burns were extinguished with water rather than AFFF. KAAP-009 is not considered to be a potential PFAS release area.

2.7 KAAP-010 – OPEN BURNING PADS 5 AND 6 (SWMU GROUP 24)

2.7.1 KAAP-010 Site Background

KAAP-010 (SWMU Group 24) was located in the east central portion of KSAAP. Pads 1-6 were in use from 1967 to 1984 to burn propellants, explosives, and pyrotechnics (PEP) waste on the ground. Use of Pads 1-4 (SWMU Group 11) stopped in 1984. Pans were installed in 1984 at Pad 5 (SWMU Group 24) to use for open burning of explosive waste, while Pad 6 (SWMU Group 24) was infrequently used for burning/flashing explosive-contaminated material too large for the CWP (USAEC, 2006). The residue from the process was either salvaged or disposed of in SWMU Group 15 (AE, 1998). Pad 6 was sold to DZI in July 2013, and Pad 5 was transferred to GPDA in August 2012 (USACE, 2016).

2.7.2 KAAP-010 Site Findings

A VSI was conducted at KAAP-010 during the PA site walk. A photograph of the Open Burn Pads 5 and 6, viewed from a distance, is located in **Appendix C**. Based on information gathered during the PA interviews, only water, and not AFFF, was used as an extinguishing agent for controlled burns. KAAP-010 is not considered to be a potential PFAS release area.

2.8 KAAP-011 – OLD PESTICIDE STORAGE BUILDING (BUILDING 67)

2.8.1 KAAP-011 Site Background

KAAP-011, also referred to as the "Old Pesticide Storage Facility", was in former Building 67, on the north side of Pond No. 4. Pesticides were mixed and stored onsite until approximately 1980. A concrete pad was the only remaining remnant of the Old Pesticide Storage Area identified during the 2006 Environmental Condition of Property (ECP) (URS, 2006). The Pesticide Storage Building location was leased for pasture (USACE, 2016).

2.8.2 KAAP-011 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-011 are not suspected. KAAP-011 is not considered to be a potential PFAS release area.

2.9 KAAP-012 – CONTAINER STORAGE UNITS (SWMU GROUP 21)

2.9.1 KAAP-012 Site Background

KAAP-012 (SWMU Group 21) consisted of the hazardous waste storage units located in the 1700, 1800, 1900, and 2700 areas and one explosives magazine located in the 1800 area. There were 19 RCRA-permitted container storage units that contained explosive materials, various liquids, and items for thermal treatment (USACE, 2016). No visual indications of spills or releases from wastes stored inside the units were observed during the 2006 Phase I RFI and ECP VSI (URS, 2006).

2.9.2 KAAP-012 Site Findings

A VSI was conducted at KAAP-012 within the 2700 Area during the PA site walk. A photograph of an abandoned, former CWP at the 2700 Area is located in **Appendix C**. The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-012 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-012 is not considered to be a potential PFAS release area.

2.10 KAAP-013 – PCB STORAGE BUILDING (BUILDING 1406)

2.10.1 KAAP-013 Site Background

KAAP-013, the former polychlorinated biphenyl (PCB) Storage Area, was located in Building 1406 in the 1400 Area. Building 1406 was historically used for storing transformers, including PCB transformers, and other inert materials. Excess capacitors and transformers that contained PCBs were stored on site in an indoor unit located in Building 1406 (URS, 2006).

2.10.2 KAAP-013 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-013 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-013 is not considered to be a potential PFAS release area.

2.11 KAAP-015 – SEWAGE TREATMENT PLANT AND SLUDGE DRYING BEDS (SWMU GROUP 18)

2.11.1 KAAP-015 Site Background

KAAP-015 (SWMU Group 18) consisted of two sludge drying beds located at the 2200 Area, the Sewage Treatment Plant, in the southwest corner of KSAAP. The Sewage Treatment Plant received wastewater from KSAAP facilities and had a treatment capacity of 1 million gallons per day (USACE, 2016). The sludge drying beds were constructed in 1941, and rehabilitation of the beds occurred in 1985. The sludge drying beds are still in operation, but rarely used. Sludge and solids from the primary settling tanks are transferred to an anaerobic sludge digester and then to the sludge drying beds. Wastewater from the drying beds is transferred to secondary settling tanks. Wastewater from the Sewage Treatment Plant is discharged through the National Pollutant Discharge Elimination System (NPDES) outfall to a drainage ditch tributary to Labette Creek (URS, 2006).

2.11.2 KAAP-015 Site Findings

Sludge drying beds are often considered secondary sources of PFAS due to the accumulation of PFAS in sludge and biosolids; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the sludge drying beds at KAAP-015 contained PFAS released from primary sources. KAAP-015 is not considered to be a potential PFAS release area.

2.12 KAAP-016 – 300 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 5)

2.12.1 KAAP-016 Site Background

KAAP-016 (SWMU Group 5) consisted of wastewater sumps, ditches, and oxidation ponds. The site was located in the north central portion of KSAAP, north of Road 1.5, in the 300 Area. The site operated from 1941 until 2008 (USACE, 2016). KAAP-016 was transferred to GPDA on 27 August 2012 (USACE, 2016).

Prior to construction of a wastewater treatment system, wastewater was discharged into unlined ditches and ponds. The trough and sump systems were constructed of concrete and had no secondary containment. Spillage/overflows have occurred around the sumps. The sumps were pumped regularly to prevent overflow (USACE, 2016).

2.12.2 KAAP-016 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-016 contained PFAS released from primary sources. KAAP-016 is not considered to be a potential PFAS release area.

2.13 KAAP-017 – 500 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 6)

2.13.1 KAAP-017 Site Background

KAAP-017 (SWMU Group 6) was located in the north central portion of KSAAP, north of Road 1.5, within the 500 Area. KAAP-017 consisted of a system of three sumps and troughs that carried wastewater that contained explosive constituents. The system was used from 1942 to 1974 and again in the 1990s for limited work (USACE, 2016). The sumps were open-topped, constructed of concrete, and designed to overflow to unlined ditches. Solids that collected into the sumps were removed and burned at the open burning grounds. KAAP-017 was transferred to GPDA in August 2012 (USACE, 2016).

2.13.2 KAAP-017 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-017 contained PFAS released from primary sources. KAAP-017 is not considered to be a potential PFAS release area.

2.14 KAAP-018 – 700 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 25)

2.14.1 KAAP-018 Site Background

KAAP-018 (SWMU Group 25) has been in use from the 1940s to present and is located in the north central portion of KSAAP, south of the 500 Area. Prior to construction of the industrial wastewater treatment system in the 700 Area, wastewater was discharged into in-ground sumps. Wastewaters were then treated with acetic acid, sodium nitrate and sodium hydroxide and allowed to overflow into unlined ditches and ponds. The 700 Area was also used for loading, assembling, and packing detonator, boosters, and expulsion charges. Past processes resulted in lead being discharged to surrounding soils (USAEC, 2006).

A Consent Order between KSAAP and the Kansas Department of Health and the Environment that was issued in March 1989 focused on defining and cleaning up lead-contaminated soils and

volatile organic compound/semivolatile organic compound-contaminated groundwater present in the 700 Area (USAEC, 2006).

2.14.2 KAAP-018 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-018 contained PFAS released from primary sources. KAAP-018 is not considered to be a potential PFAS release area.

2.15 KAAP-019 – 800 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 7)

2.15.1 KAAP-019 Site Background

KAAP-019 (SWMU Group 7) was in use from 1942 to 1974 and was located in the north central portion of KSAAP, west of Road 1.5 and the 1700 Area. Opened in-ground sumps and troughs covered with metal gratings were used to convey explosive wastewater. Solids were allowed to settle out in the bottom of sumps, and wastewater that contained explosives discharged into the ditches around the sumps (USAEC, 2006).

2.15.2 KAAP-019 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-019 contained PFAS released from primary sources. KAAP-019 is not considered to be a potential PFAS release area.

2.16 KAAP-020 – 900 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 8)

2.16.1 KAAP-020 Site Background

KAAP-020 (SWMU Group 8) was located in the central portion of KSAAP, north of Road 2.5. Prior to construction of the 900 Area industrial wastewater treatment system, wastewater was discharged directly to the 900 Area unlined ditches and oxidation ponds. The site was in use from 1942 to 1975 (USAEC, 2006) and was intermittently used between 1993 and 2009 (USACE, 2016). KAAP-020 was transferred to GPDA in August 2012 (USACE, 2016).

2.16.2 KAAP-020 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-020 contained PFAS released from primary sources. KAAP-020 is not considered to be a potential PFAS release area.

2.17 KAAP-021 – 1000 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 9)

2.17.1 KAAP-021 Site Background

KAAP-021 (SWMU Group 9) was located in the central portion of KSAAP, south of the 900 Area. Prior to construction of the industrial wastewater treatment system in the 1000 Area, wastewater was discharged into the unlined ditches and oxidation ponds. In-ground sumps and troughs were constructed of concrete and were open-topped. This site was in use from 1942 to 1974 (USAEC, 2006). During this timeframe, wastewater that contained explosive compounds was discharged into the oxidation ponds via sumps and drainage ditches. Sludge was periodically removed from the sumps and incinerated at the burn pads (USAEC, 2004).

2.17.2 KAAP-021 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-021 contained PFAS released from primary sources. KAAP-021 is not considered to be a potential PFAS release area.

2.18 KAAP-022 – 1100 AREA WASTEWATER SUMPS AND DISCHARGE POINTS (SWMU GROUP 10)

2.18.1 KAAP-022 Site Background

KAAP-022 (SWMU Group 10) was located in the south-central portion of KSAAP, north of Road 4; it has been used from 1942 to the present. Prior to construction of a wastewater treatment system, wastewater that contained explosives was discharged to unlined ditches and oxidation ponds. Spills and overflows have occurred around the in-ground sumps. The sumps werepumped regularly to prevent overflow (USAEC, 2006).

2.18.2 KAAP-022 Site Findings

Wastewater treatment systems are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing

materials within the other evaluated areas on KSAAP, it is unlikely that the wastewater treatment system at KAAP-022 contained PFAS released from primary sources. KAAP-022 is not considered to be a potential PFAS release area.

2.19 KAAP-023 – WASTE ANALYSIS CHEMISTRY LABORATORY (BUILDING 58)

2.19.1 KAAP-023 Site Background

KAAP-023, the Waste Analysis Chemistry Laboratory (Building 58), was constructed in 1941, and has always been used as a chemistry laboratory; it was located in the north central portion of KSAAP. Chemical analysis of various waste materials and discharge waters were completed at the waste analysis laboratory. Numerous laboratory chemicals were stored at this facility, and laboratory wastes were generated and placed in appropriate containers prior to being sent off site. The laboratory was active until late 2009, and KAAP-023 was transferred to GPDA on 27 August 2012 (USACE, 2016).

2.19.2 KAAP-023 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-023 is not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-023 is not considered to be a potential PFAS release area.

2.20 KAAP-024 – EXPLOSIVE WASTE INCINERATOR (SWMU GROUP 20)

2.20.1 KAAP-024 Site Background

KAAP-024 (SMWU Group 20) was located in the east 2700 Area, in the far east-central portion of KSAAP; it consisted of the Explosive Waste Incinerator (EWI) (SWMU-105) and associated cyclone separator (SWMU-106) and baghouse (SWMU-107). The EWI was used from the late 1970s until 1999 to dispose of off-specification munitions and explosives.

2.20.2 KAAP-024 Site Findings

According to an interview with a retired KSAAP employee, the EWI exploded in the early 2000s. During the explosion, grenade bodies were dispersed, and the Fort Riley Explosive Ordnance Disposal (EOD) Battalion responded to the incident. No fire resulted from the explosion, and AFFF was not believed to be used in the emergency response, according to the interviewee. KAAP-024 is not considered to be a potential PFAS release area.

2.21 KAAP-025 – 200 AREA OIL LAND-FARM (SWMU GROUP 3)

2.21.1 KAAP-025 Site Background

KAAP-025 (SWMU Group 3) was located south of the 200 Area and consisted of a former oil land-farm area. The former land-farm consisted of three cells used for the treatment of oil-contaminated soil from Petroleum, Oil, and Lubricants (POL) spill cleanups. Use of the area for this purpose began in 1984 and was discontinued in 1993 (URS, 2006).

2.21.2 KAAP-025 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-025 is not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-025 is not considered to be a potential PFAS release area.

2.22 KAAP-026 – 200 AREA OIL/WATER SEPARATOR (SWMU GROUP 2)

2.22.1 KAAP-026 Site Background

KAAP-026 (SWMU Group 2) is the Oil/Water Separator (OWS) located in the northwestern portion of KSAAP in the 200 Area (URS, 2006); it consisted of a 10-foot-wide concrete dike constructed across an open, unlined ditch. This ditch received wastewater from the 200 Area, which includes a vehicle wash rack located in Building 202. Water discharged from the OWS to Pond 28 via four under drains (URS, 2006). The OWS is no longer in use (USACE, 2016).

2.22.2 KAAP-026 Site Findings

OWSs are often considered secondary sources of PFAS due to the accumulation of PFAS in wastewater; however, given the absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the OWS at KAAP-026 contained PFAS released from primary sources. KAAP-026 is not considered to be a potential PFAS release area.

2.23 KAAP-027 – MERCURY FULMINATE BURIAL SITE

2.23.1 KAAP-027 Site Background

The Mercury Fulminate Burial Site (KAAP-027) was identified in the Installation Restoration Program as 1.55 acres located in the central portion of KSAAP, southwest of closed landfill KAAP-004, approximately 0.5 miles east of Road E, and south of Road 3. According to the Range Inventory, between 1942 and the late 1940s, percussion primers containing mercury fulminate were buried at this site. The final disposition of the mercury fulminate is unclear, though several different accounts have been identified. Based on interviews and document reviews completed during the 2006 ECP VSI, there is no evidence supporting the burial of mercury fulminate at the site.

2.23.2 KAAP-027 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-027 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-027 is not considered to be a potential PFAS release area.

2.24 KAAP-028 – COAL PILE RUNOFF (SWMU GROUP 19)

2.24.1 KAAP-028 Site Background

KAAP-028 (SWMU Group 19) consisted of a coal pile run-off catchment device and associated ditches located adjacent to and east of the 200 Area, monitored as part of NPDES outfall 002a. The system was constructed in 1988 to collect runoff from a coal pile adjacent to the coal-fired boiler plant. The coal storage was present in the area until 1997 (USACE, 2016).

2.24.2 KAAP-028 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-028 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-028 is not considered to be a potential PFAS release area.

2.25 KAAP-035 – BUILDING 112 (SWMU GROUP 1)

2.25.1 KAAP-035 Site Background

KAAP-035 (SWMU Group 1) was located in the northwest portion of KSAAP in the 100 Area. This SWMU group consists of the Building 112 laundry wash water sump, an underground drainage pipeline that has generally been referred to as a "ditch," and an oxidation pond (Pond 30).

The sump was used as a settling tank for laundry process wastewater generated during the washing of miscellaneous powder-contaminated uniforms and rags used on the production lines. Discharge from the sump flowed via a drainage pipe to Pond 30. Pond 30 discharges to Labette Creek, approximately 3 miles downstream.

2.25.2 KAAP-035 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-035 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-035 is not considered to be a potential PFAS release area.

2.26 KAAP-036 – 200 AREA PAINT BOOTH

2.26.1 KAAP-036 Site Background

KAAP-036 is a former spray paint booth located in Building 247 in the 200 Area. Paint and solvents from the paint booth were captured in a metal trough about the building foundation. Solid waste from the trough was removed into 55-gallon drums and then transferred for storage in hazardous waste storage igloos. Reportedly, wastewater from the trough was discharged into an outside open ditch along Building 247. KAAP-036 was transferred to GPDA on 27 August 2012 (USACE, 2016).

2.26.2 KAAP-036 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-036 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-036 is not considered to be a potential PFAS release area.

2.27 KAAP-037 – OPEN DETONATION GROUNDS

2.27.1 KAAP-037 Site Background

KAAP-037, or the Open Detonation (OD) Grounds, is an operational range located on the western half of the 2700 Area and are accessed from Road F, south of Road 3. The OD Grounds comprise an area approximately 36 acres in size and began use in 1942 for the detonation of rejected and loaded explosive items (URS, 2006). At present, the demolition grounds are used occasionally.

Early documentation of the OD Grounds included a 5 December 1947 memorandum that discussed the demolition of rejected materials at KSAAP. According to the memorandum, the boundaries of the "demolition areas" were outlined with signs. The memorandum also indicated when demolition was in progress, road blocks were placed across the access roads to this area, and a red flag was displayed from a pole near the demolition pits to serve as warning of demolition in progress (URS, 2006).

Activities at the OD Grounds were evident in aerial photography from 1956. In an 11 October 1985 Disposal Activities document, items listed for disposal at the OD Grounds included M42/M46/XM77-loaded grenade bodies, dry sumpage, lead azide, tetracene, and other explosive items that could not be run through the EWI, which was located near the Open Burning Pads (URS, 2006).

According to the Part B Permit application, the OD Grounds consisted of linear earthen mounds aligned in three east-west oriented rows separated by aisles approximately 250 feet wide. The grounds were enclosed by a 6-foot chain link fence, and warning signs for restricted entry were posted at all entrance locations. The OD Grounds can be seen in a 1956 aerial photograph of the area, and approximately 19 U-shaped features can be seen in the area. There was also a significant

change in the features of the OD Grounds from the 1956 aerial photograph to the 2000 aerial photograph (URS, 2006).

The RCRA Permit application described how wastes were treated at the OD Grounds and indicated that the wastes were placed in pits excavated on the south side of the earthen mounds. After the wastes were placed in the pits, they were covered with dirt and detonated. The detonations were triggered via an electrical train by a remote operator located in an earthen-protected bunker. All scrap metal and other visible residues were removed after the detonation was completed, and the pits were backfilled and graded to the natural ground elevation. Based on a 10 February 2000 Standing Operation Procedure, DZI has a requirement to annually conduct range cleanup procedures at the demolition area at KSAAP. According to the document, the cleanup includes a sweep of 100 percent of the fenced-in area and up to 200 yards outside the fence. The distance may be increased or reduced depending upon the concentration of ordnance found. The document also indicates that the range sweep is to be conducted immediately following the burning of the undergrowth by the Fire Department (URS, 2006).

2.27.2 KAAP-037 Site Findings

According to an interview with a former KSAAP firefighter, controlled burn exercises were conducted within the 2700 Area; however, only water was used as an extinguishing agent during these exercises. A crew of four to five people was used to conduct the controlled burns exercises, which occurred approximately every 3 years. Firetrucks were on standby when the exercises took place. KAAP-037 is not considered to be a potential PFAS release area.

2.28 KAAP-038 – CONTAMINATED WASTE PROCESSOR (SWMU GROUP 22)

2.28.1 KAAP-038 Site Background

KAAP-038 (SWMU Group 22) was located in the east 2700 Area, in the far east-central portion of KSAAP; it consists of the CWP (SWMU-102) and associated cyclone separator (SWMU-103) and baghouse (SWMU-104).

2.28.2 KAAP-038 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-038 is not suspected. Given the widespread absence of AFFF or PFAS-containing materials within the other evaluated areas on KSAAP, it is unlikely that the CWP contained waste contaminated with PFAS. KAAP-038 is not considered to be a potential PFAS release area.

2.29 KAAP-039 – HAZARDOUS WASTE UNDERGROUND STORAGE TANKS (SWMU GROUP 4)

2.29.1 KAAP-039 Site Background

KAAP-039 (SWMU Group 4) was located in the 300 Area, southwest of the intersection of Road 1 and Road E, and east of Building 314. This site consisted of an Underground Storage Tank (UST) which was formerly used to store fuel oil but later was used to collect waste POL (No. 5 fuel oil and waste oil) and toluene. The mixture was burned in the waste oil boilers in Building 314. The installation date and history are not known, although a 1947 map of the 300 Area showed an apparent outline of a UST (AE 1998). The original tank was removed in 1992 after a new tank was installed. The new tank was subsequently removed in 1993 (URS, 2006). KAAP-039 was transferred to GPDA on 27 August 2012 (USACE, 2016).

2.29.2 KAAP-039 Site Findings

A VSI was conducted at Building 314 at KAAP-039 during the PA site walk. Building 314 has since been abandoned. A photograph of Building 314 is located in **Appendix C**.

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-039 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-039 is not considered to be a potential PFAS release area.

2.30 KAAP-040 – PISTOL RANGE

2.30.1 KAAP-040 Site Background

KAAP-040 was a former Pistol Range located along the southern end of Pond 28, southeast of the 700 Area. Firearms training was conducted at KAAP-040, and projectiles from the ammunition accumulated at the site. The Pistol Range was active from 1968 until the closure of KSAAP in 2009 (USACE, 2016).

2.30.2 KAAP-040 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-040 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-040 is not considered to be a potential PFAS release area.

2.31 KAAP-041 – WATER TOWERS

2.31.1 KAAP-041 Site Background

KAAP-041 was comprised of four water towers (Water Towers 1-4) spread out across the facility. The water towers were built in 1941 for water storage. Between 1968 and 1982, the water towers

were sandblasted and repainted for routine maintenance, which resulted in lead-based paint residue that accumulated at the base of the towers. Water Tower 4 is now part of DZI property (USACE, 2016).

2.31.2 KAAP-041 Site Findings

The storage and/or usage of AFFF or other PFAS-containing materials at KAAP-041 are not suspected based on historical site use, a review of historical documents, and personnel interviews. KAAP-041 is not considered to be a potential PFAS release area.

2.32 KAAP-042 – SLUDGE LAGOONS AOC

2.32.1 KAAP-042 Site Background

Sludge from the filter bed of the Water Treatment Plant was transported by truck and was dumped into two ponds along Road 2, south of 1700 Area. These sludge-drying beds were specifically constructed for this purpose in 1977 and were designed to meet USEPA's criteria for suspended solids.

2.32.2 KAAP-042 Site Findings

A VSI was conducted at KAAP-042 during the PA site walk. A photograph of the sludge lagoons is located in **Appendix C**.

GPDA continues to use the sludge lagoons for their operations at the Water Treatment Plant. The release of PFAS-containing materials at KAAP-042 is not suspected, since the sludge originated from the Neosho River. KAAP-042 is not considered to be a potential PFAS release area.

2.33 KAAP-043 – FORMER AMMONIUM NITRATE PLANT

2.33.1 KAAP-043 Site Background

KAAP-043 encompassed the entire 1200 Area and was an ammonium nitrate production facility from 1942 to 1951. From 1946 to 1951, the facility was leased to the Spencer Chemical Company, who produced fertilizer-grade ammonium nitrate. In 1953, the production line operations were altered to rework 105mm cartridge cases and remained as such until 1957. During these operations, wastewater was conveyed to a series of two unlined lagoons used for settling solids and collecting water treated with stabilizers and reducing agents. The lagoons have since been drained, cleaned, and backfilled (USACE, 2016). In 1996, this line was used to assemble the payload module for the Tomahawk Missile (USAEC, 2006).

2.33.2 KAAP-043 Site Findings

A VSI was conducted at Building 1206, within KAAP-043, during the PA site walk. Building 1206 has been abandoned, and all equipment and materials related to former operations have been

removed. Remnants of an overhead sprinkler system were observed during the VSI. Photographs of Building 1206 are located in **Appendix C**.

Interviews with retired and current personnel confirmed that production line operations involved cleaning and re-lacquering casings for the 105 mm cartridges. Large vats containing chromic acid were used to clean the casings prior to the re-lacquering process. However, chrome plating activities and the related usage of PFAS for mist suppression were not a part of this operation. KAAP-043 is not considered to be a potential PFAS release area.

2.34 BUILDING 52 – FORMER FIRE STATION

2.34.1 Building 52 Site Background

Building 52 was located on the northeast portion of the facility in the 700 Area. Building 52 housed one of the three former KSAAP fire stations and was the only fire station that was active after the 1960s until its closure in 2010. A total of four firetrucks that contained water tanks were stored at either Building 52 or Building 53. The firetrucks consisted of two 250-gallon mini pumpers, one 1,000-gallon tank for grass fires, and one 500-gallon tank for structural fires. All firetrucks were sold off at auction except for one 250-gallon mini pumper, which has since been converted into a snowplow. Building 52 was also a storage area for ABC (dry chemical) extinguishers, water fire extinguishers, and other equipment, although storage of the one remaining firetruck and water fire extinguishers has since been moved to Building 202 within the 200 Area. Building 52 has been renovated into an office and is currently occupied by GPDA. This area was conveyed without deed restrictions.

2.34.2 Building 52 Site Findings

Based on an interview with a retired KSAAP firefighter, there was a single documented incident where AFFF was released from a 500-gallon tank firetruck in order to test the truck's system and train staff on the general usage of AFFF. The incident occurred at the southern parking lot of Building 52 in approximately 1998. It was estimated that approximately half of a 5-gallon bucket of AFFF concentrate was mixed with 200 gallons of water, and the mixture was discharged to the ground in a southern firing direction from the firetruck. No clean-up actions were taken after the release, and the release was allowed to dissipate into the grass. No other instances of AFFF releases were recalled during the personnel's tenure, which spanned from 1997 to 1999 and from 2002 to 2009. However, a total of four 5-gallon buckets of AFFF concentrate were stored at Building 52. One of the 5-gallon buckets was used for the testing exercise, but it is unknown how the other three AFFF buckets were acquired, disposed of, or used.

The KSAAP fire department also conducted equipment testing and annual fire training at both parking lots at Building 52 and along Road 2; however, only water was discharged during these instances, based on an interview with a retired KSAAP firefighter. All maintenance, which included pressure testing and hose or O-ring replacement, on fire extinguishers was conducted within Building 52, and the water sprayers were also refilled at Building 52.

A VSI was conducted at Building 52 and Building 202 in the 200 Area during the PA site walk. Photographs of Building 52, the converted firetruck, and the water fire extinguisher are located in **Appendix C**. ABC fire extinguishers were also observed affixed to the outer and inner walls of Building 52. The area surrounding Building 52 had grassy vegetation.

Building 52 is considered a potential PFAS release area due to the discharge of AFFF in approximately 1998.

2.35 BUILDING 53 – FORMER FIRE STATION

2.35.1 Building 53 Site Background

Building 53 was located in the 1400 Area northeast from KAAP-013 and the inert storage area. Building 53 housed one of the three former KSAAP fire stations. A total of four firetrucks that contained water tanks were stored at either Building 52 or Building 53. The firetrucks consisted of two 250-gallon mini pumpers, one 1,000-gallon tank for grass fires, and one 500-gallon tank for structural fires. All firetrucks were sold off at auction except for one 250-gallon mini pumper, which has since been converted into a snowplow. Building 53 was reportedly closed in the 1960s as a fire station and then converted into an administrative building for the 1400 Area. Building 53 is currently abandoned and unoccupied.

2.35.2 Building 53 Site Findings

A VSI was conducted at Building 53 during the PA site walk. Building 53 was observed to be in dilapidated condition, with a portion of the roof caved in. The building had a metal pipe that fed into the wall, and a concrete-walled basin was observed adjacent to Building 53. The usages of these items/areas were unclear. Photographs of Building 53 are located in **Appendix C**. There is no known historical AFFF usage during the operational timeframe of the fire station (before the 1960s). Building 53 is not considered to be a potential PFAS release area due to the operational timeframe.

2.36 100 AREA – FORMER FIRE STATION

2.36.1 100 Area – Former Fire Station Site Background

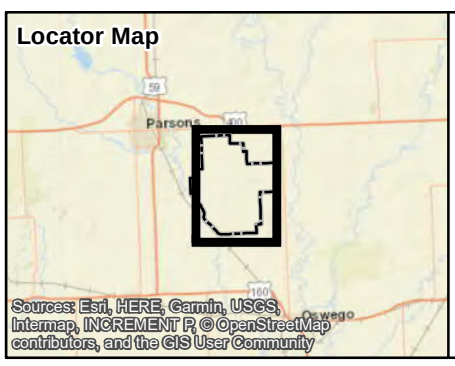
The former fire station was located within the 100 Area at the northwest portion of KSAAP. The fire station was one of the three former KSAAP fire stations that operated at the facility. The fire station was reportedly closed in the 1960s and subsequently demolished. Other historical operations at the 100 Area included those related to non-production or administration, such as a laundry facility, hospital, and base housing (USACE, 2016). The 100 Area also included KAAP-035 (SWMU Group 1), which consisted of the Building 112 laundry facility, an underground drainage pipeline, and an oxidation pond.

2.36.2 100 Area – Former Fire Station Site Findings

The exact location of the former fire station is unknown. Based on a review of historical aerial images from 1956 and 1963, it is possible that the fire station could have been the building southeast of Building 112 that was oriented northeast to southwest, similar to the diagonal orientation of the other two former KSAAP fire stations. A dark staining in the grassed area behind the building was observed in the aerial images, but the cause of the staining is unclear. There is no known historical AFFF usage during the operational timeframe of the fire station (before the 1960s). The 100 Area former fire station is not considered to be a potential PFAS release area due to the operational timeframe.

KAAP-001
100 Area
KAAP-041
KAAP-035
300 Area
500 Area
KAAP-016
KAAP-039
KAAP-017
KAAP-041
KAAP-023
200 Area
1700 Area
KAAP-012
KAAP-028
KAAP-036
KAAP-026
700 Area
KAAP-018
KAAP-019
KAAP-003
800 Area
KAAP-042
KAAP-005
KAAP-025
Building 52
KAAP-040
Lead Azide Area
East 2000 Test Area
75 Test Area
KAAP-020
900 Area
1600 Area
West 2000 Test Area
KAAP-021
1000 Area
KAAP-004
KAAP-027
KAAP-012
2700 Area
KAAP-009
KAAP-038
KAAP-024
KAAP-037
KAAP-010
KAAP-012
KAAP-010
KAAP-041
1500 Area
1800 Area
KAAP-022
1100 Area
KAAP-012
KAAP-041
KAAP-043
1200 Area
KAAP-015
KAAP-002
KAAP-013
1900 Area
Building 53
KAAP-012
KAAP-011
1400 Area
1300 Area
N
0 0.25 0.5 1
Miles
Source: Esri, Maxar, GeoEye, Earthstar Geographics, USDA, USGS, and the GIS User Community

Locator Map



Legend

- Installation Boundary
- KAAP Site
- Production Area
- Building

Figure 2-1

PFAS Evaluated Areas
Kansas Army Ammunition Plant
Parsons, Kansas

Preliminary Assessment Report

AECOM | Project Number: 60656718 | Drawn By: JZ

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Emergency responses sometimes require flame suppression, which may result in the release of PFAS to the environment in the form of AFFF. Emergency responses to explosions have historically occurred at KSAAP. General emergency fire preparedness procedures and activities for KSAAP and the Great Plains Industrial Park are also described in more detail below.

3.1 EXPLOSION INCIDENTS

Several incidents of explosions have occurred as the result of historical KSAAP activities and operations. The locations of the explosion and incident dates that have been reported by interviewees include:

- 500 Area in 2012,
- 700 Area in 1970,
- 900 Area at an unknown date, and
- 1100 Area at an unknown date.

Based on interviews, none of the explosions resulted in a fire; therefore, there was no fire extinguishing agent or AFFF used in the emergency response.

3.2 EMERGENCY FIRE PREPAREDNESS

Former emergency response for the facility was provided by the KSAAP fire department during the years of KSAAP operation. The fire department was stationed at three fire stations, although Building 52 was the only fire station that was active after the 1960s. The KSAAP fire department also conducted equipment testing and annual fire training at both parking lots of Building 52 and along Road 2 (**Figure 5-1**); however, only water was discharged during these training instances. A former KSAAP firefighter also stated during an interview that an estimated 5,000-7,000 acres at the facility were burned per year in controlled burn exercises. Grass fires were extinguished with water from mini pumper firetrucks or from a 1000-gallon tank firetruck; no structural fires were reported during the former firefighter's tenure at the facility from 1997 to 1999 and 2002 to current.

Current emergency response for the Great Plains Industrial Park is provided by three different fire townships and their volunteer fire departments through mutual aid agreements with GPDA. Additionally, GPDA pays the Parsons City Fire Department to perform fire emergency services for the facility. Grass fires and structural fires continue to be extinguished with water only.

Currently and historically, all fire suppression systems at KSAAP or Great Plains Industrial Park contained water only and were either "wet" or "dry" type deluge systems. The dry deluge system was utilized for cold storage buildings and was pressurized to deliver water to the overhead sprinklers. The wet deluge system was always charged with water and was utilized for heated storage buildings. A VSI was conducted at Building 202 in the 200 Area to observe the fire suppression system within the building. The system was disconnected from the water line at the time of the VSI, and a photograph of the Building 202 water deluge system is located in **Appendix C**.

GPDA currently has a rent-share agreement with the KDWP for 11 parcels located along the western and southwestern portion of the facility. According to interviews with a GPDA employee, as part of the agreement, the Kansas Parks and Wildlife will manage the land and perform controlled burns via water and beaters for wildfire prevention.

No emergency fire preparedness activities are anticipated to result in potential PFAS releases.

Potential adjacent sources of PFAS, not under the control of the Army, were evaluated during the PA in the immediate area surrounding KSAAP. No potential adjacent sources of PFAS were observed during the VSI, which included a site walk along the northern perimeter of KSAAP. The observed land use along the upgradient, northern KSAAP boundary includes residential, agricultural, and light industrial use (e.g. automobile mechanic shops and salvage yards). No adjacent sources of PFAS were identified through review of available environmental records, findings from interviews, or EDR™ reports.

5.1 AREAS OF INTEREST

Based on the PA findings, one AOI was identified at KSAPP: AOI 1 Building 52 – Former Fire Station. AFFF was released from a 500-gallon tank firetruck in order to test the truck's system during a single documented incident in 1998 at the southern parking lot of Building 52. It was estimated that approximately 200 gallons of diluted AFFF were discharged to the ground in a southern firing direction from the firetruck. No clean-up actions were taken after the release, and the release was allowed to dissipate into the grass. The AOI location is shown on **Figure 5-1**.

5.2 PRELIMINARY CONCEPTUAL SITE MODEL

A preliminary CSM was prepared for each of the installation's AOIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE, 2012) and EPA guidance. 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

Based on the documented or potential historical use, storage, or disposal of PFAS containing materials at KSAAP, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, runoff/dissolution/adsorption with surface water or stormwater, and recharge to groundwater from surface water. While other potential exposure media (i.e., soil and sediment) besides drinking water sources (i.e., groundwater and/or surface water) may be impacted by PFAS, direct ingestion via drinking water is the most likely exposure route, and thus the Army's primary concern for human exposure. Therefore, the focus of the Army's PA program is on potential human exposures via drinking water ingestion. The potential for human exposures to PFAS through non-drinking water pathways has not yet been established and may be evaluated in the future if it is determined that those pathways warrant further consideration. The CSMs presented in this report focus on drinking water pathways via groundwater and surface water that are known to be used as a source of potable water.

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

In general, the potential PFAS exposure pathways are ingestion and inhalation. Dermal contact is not considered to be a potential exposure pathway as studies have shown very limited absorption of PFAS through the skin (National Ground Water Association, 2018).

The preliminary CSM for AOI 1 is shown on **Figure 5-2**.

5.2.1 Receptors

Receptors for KSAAP include site workers, construction workers, recreational users, trespassers, and off-facility residents.

- Site workers typically work at or use the site and may come into contact with the surface soils. Site workers may also use surrounding areas for recreation (i.e. swimming and/or fishing) and come into contact with surface water.
- Construction workers are considered workers who represent a utility worker or other worker who would be exposed to surface and/or subsurface conditions through ground-disturbing activities.
- Trespassers and off-facility recreational users typically identify a person who has infrequent access to the site. Trespassers and off-facility recreational users could be exposed to surface soils and surface water during recreational use.
- Off-facility residents who occupy properties outside of KSAAP. Off-facility residents may use the surrounding areas for recreation and may come into contact with surface water.

The preliminary CSM for the AOI indicates which specific receptors could potentially be exposed to PFAS.

5.2.2 Groundwater Pathway

PFAS are water soluble and can migrate readily from soil to groundwater, which is estimated to be at 5 to 10 feet bgs. Because potential PFAS release to surface soil at AOI 1 has occurred, PFAS may migrate from the surface soil to the groundwater via leaching. Drinking water for KSAAP current site workers and residents who are serviced by KSAAP's water utility is drawn from alluvial units near the Neosho River about 5 miles east of KSAAP. Based on the south-southwestern groundwater flow direction at AOI 1 and distance to the Neosho River surface water intake, the drinking water supply for current site workers and residents is unlikely to be impacted by contaminated groundwater originating from AOI 1. There is a groundwater restriction established through the Kansas Environmental Use Control enrollment of the 700 Area plume (which extends into the AOI). The groundwater restriction on part of this AOI is not PFAS-specific so the exposure pathway is considered potentially complete.

5.2.3 Soil Pathway

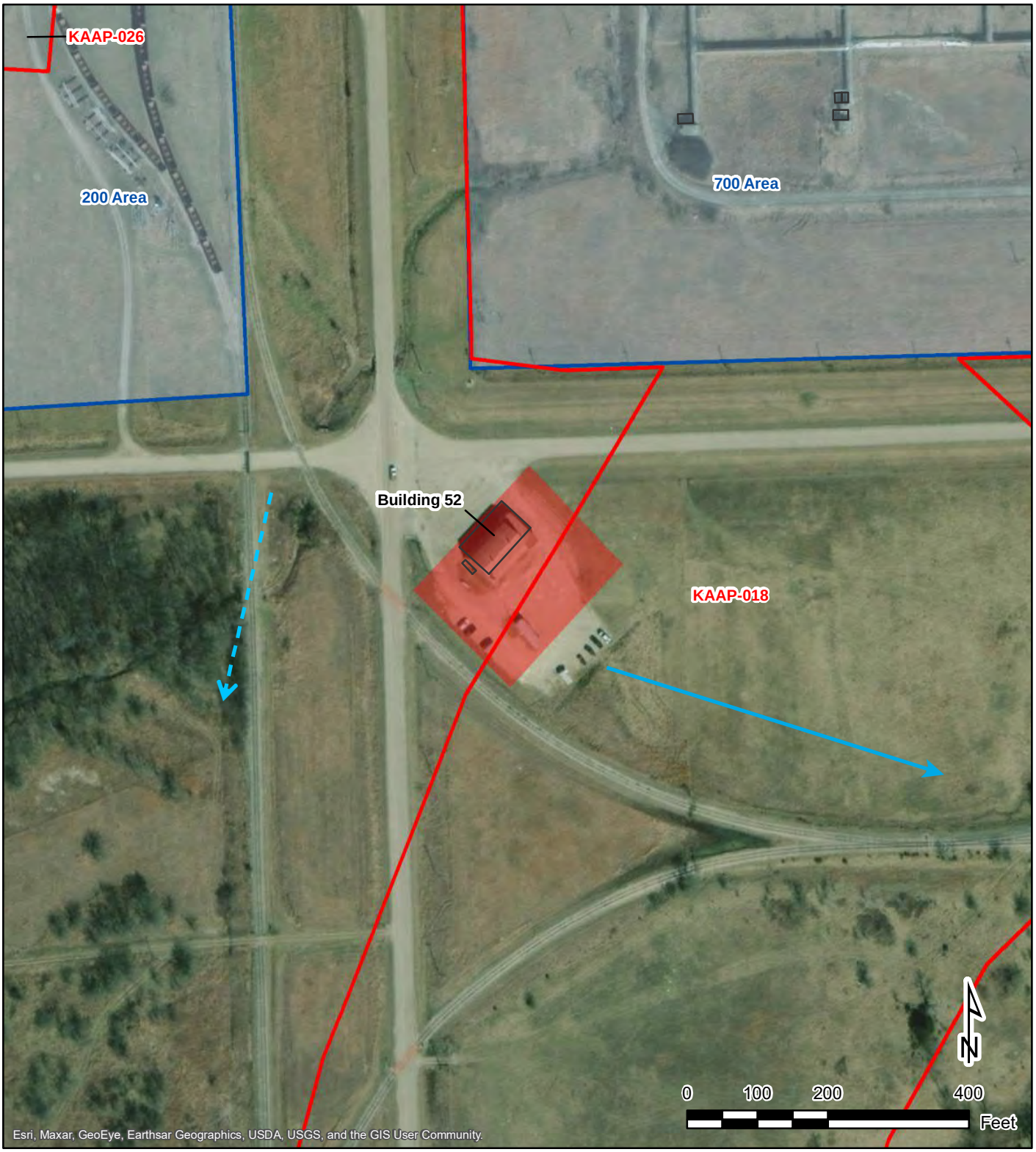
Ground-disturbing activities to surface soil at AOI 1 may result in site worker and construction worker exposure to potential PFAS contamination. Ground-disturbing activities to subsurface soil may result in construction worker exposure. Therefore, the exposure pathways for inhalation of soil particles and ingestion of soil are potentially complete for these receptors. Trespassers and residents may also be exposed to potential PFAS contamination in surface soil via the inhalation of dust particles carried off-facility.

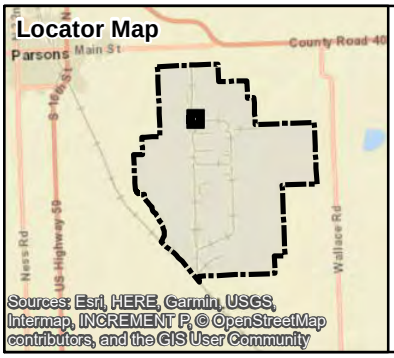
5.2.4 Surface Water Pathway

A drainage ditch is located 300 feet northwest of AOI 1. The railroad tracks south of AOI 1 also divert water to a drainage ditch located 800 feet east of AOI 1. These drainage ditches receive storm water and overland runoff from AOI 1 and drain into tributaries of Labette Creek, located approximately 2 miles southwest of AOI 1. It is highly unlikely that site workers or construction workers would enter these drainage ditches when containing water and be exposed to potential PFAS contamination via ingestion of surface water. Therefore, the site worker and construction worker exposure to surface water pathway is considered incomplete. Off-facility recreational users and residents may also be exposed to potential PFAS contamination resulting from groundwater that has discharged into downgradient receiving water bodies via ingestion of surface water and/or the human consumption of fish potentially affected by PFAS.

5.2.5 Sediment Pathway

PFAS carried in overland runoff may accumulate in the sediment of nearby surface water features. It is possible that site workers and construction workers may be exposed to potential PFAS contamination in the drainage ditches located northwest and east of AOI 1 via ingestion of sediment. Off-facility recreational users may also be exposed to potential PFAS contamination in the receiving water bodies via ingestion of sediment.





Legend

- Installation Boundary
- KAAP Site
- Production Area
- AOI 1
- Surface Water Flow Direction
- Groundwater Flow Direction

Figure 5-1

Areas of Interest
Kansas Army Ammunition Plant
Parsons, Kansas

Preliminary Assessment Report

AECOM | Project Number: 60656718 | Drawn By: JZ

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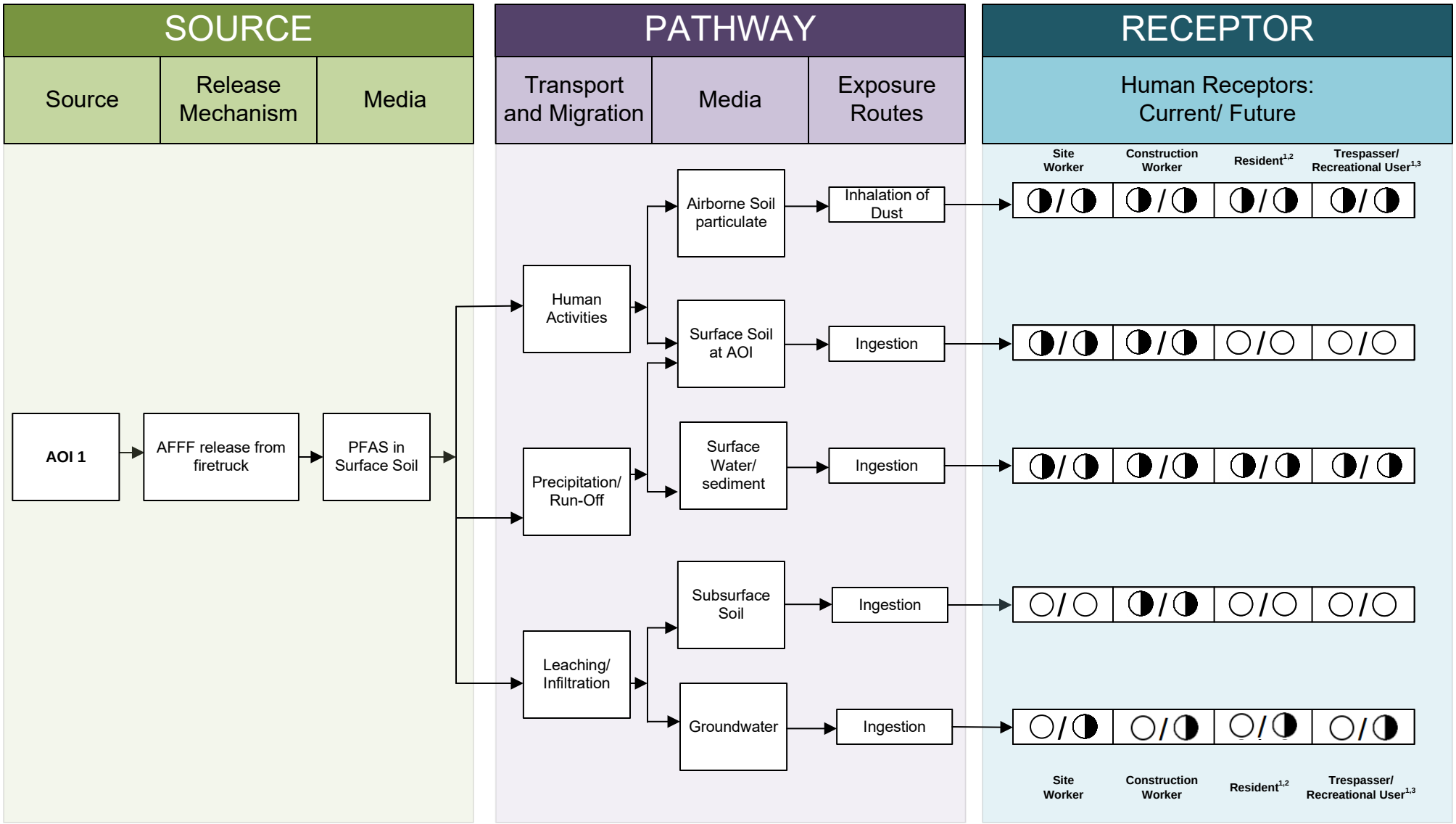

LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.

Figure 5-2
Preliminary Conceptual Site Model
AOI 1: Building 52 – Former Fire Station
Former Kansas Army Ammunition Plant

6.1 FINDINGS

One AOI related to potential PFAS release was identified at KSAAP during the PA: AOI 1 Building 52 – Former Fire Station. This potential PFAS release resulted from a single documented firetruck testing exercise that occurred with AFFF in approximately 1998.

Based on the potential PFAS release at AOI 1, there is potential for exposure to PFAS contamination in media at or near the facility. The AOI location is shown on **Figure 5-1**, and the preliminary CSM for the AOI is shown on **Figure 5-2**, which presents the potential receptors and media impacted.

6.2 UNCERTAINTIES

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

The conclusions of this PA are based on all available information, including: previous environmental reports, EDR™ reports, observations made during the VSI, and interviews. Interviews of personnel with direct knowledge of a facility generally provided the most useful insights regarding a facility's historical and current PFAS-containing materials. Sometimes, the provided information was vague or conflicted with site observations. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS were first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the amount of AFFF stored or used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves, and this PA primarily focused on AFFF sources of PFAS.

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

6.3 POTENTIAL FUTURE ACTIONS

Interviews with current and retired personnel, whose first-hand knowledge at KSAAP span from 1974 to present, and previous environmental documentation indicate that historical activities within on-facility properties may have resulted in a potential PFAS release at the one AOI (AOI 1 Building 52 – Former Fire Station) identified during the PA. Based on the preliminary CSM developed for the AOI, there is potential for receptors to be exposed to PFAS contamination in soil and groundwater at the AOI.

Table 6-1 summarizes the rationale used to determine if area should be considered for further investigation under the CERCLA process and undergo an SI (40 CFR 300.420(c)). AOI 1 Building 52 – Former Fire Station is recommended for further investigation under an SI.

Table 6-1
PA Findings Summary

Area Name	Rationale	Potential Future Action
KAAP-001 – Classification Area Construction Waste (SWMU Group 12))	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-002 – Closed Landfill near Quarry (SWMU Group 13)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-003 – 200 Area Closed Landfill and Burn Pits (SWMU Group 14)	No suspected storage and/or usage of PFAS-containing materials. Water only used for fire extinguishing during controlled burns.	No further action
KAAP-004 – Closed Landfill (SWMU Group 16)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-005 – Inactive Landfill (SWMU Group 15)	No suspected storage and/or usage of PFAS-containing materials. Fire training exercise did not involve any extinguishing agent.	No further action
KAAP-009 – Burning Cages 14, 17, AND 22 (SWMU Group 23)	No suspected storage and/or usage of PFAS-containing materials. Water only used for fire extinguishing during controlled burns.	No further action
KAAP-010 – Open Burning Pads 5 and 6 (SWMU Group 24)	No suspected storage and/or usage of PFAS-containing materials. Water only used for fire extinguishing during controlled burns.	No further action
KAAP-011 – Old Pesticide Storage Building (Building 67)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-012 – Container Storage Units (SWMU Group 21)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-013 – PCB Storage Building (Building 1406)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-015 – Sewage Treatment Plant and Sludge Drying Beds (SWMU Group 18)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-016 – 300 Area Wastewater Sumps and Discharge Points (SWMU Group 5)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action

Table 6-1
PA Findings Summary

Area Name	Rationale	Potential Future Action
KAAP-017 – 500 Area Wastewater Sumps and Discharge Points (SWMU Group 6)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-018 – 700 Area Wastewater Sumps and Discharge Points (SWMU Group 25)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-019 – 800 Area Wastewater Sumps and Discharge Points (SWMU Group 7)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-020 – 900 Area Wastewater Sumps and Discharge Points (SWMU Group 8)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-021 – 1000 Area Wastewater Sumps and Discharge Points (SWMU Group 9)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-022 – 1100 Area Wastewater Sumps and Discharge Points (SWMU Group 10)	No suspected storage, use and/or disposal of PFAS-containing materials.	No further action
KAAP-023 – Waste Analysis Chemistry Laboratory (Building 58)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-024 – Explosive Waste Incinerator (SWMU Group 20)	AFFF likely not used in emergency response, since explosion did not result in fire.	No further action
KAAP-025 – 200 Area Oil Land-Farm (SWMU Group 3)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-026 – 200 Area Oil/Waste Separator (SWMU Group 2)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-027 – Mercury Fulminate Burial Site	No suspected storage and/or usage of PFAS-containing materials.	No further action
KAAP-028 – Coal Pile Runoff (SWMU Group 19)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-035 – Building 112 (SWMU Group 1)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-036 – 200 Area Paint Booth	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action

Table 6-1
PA Findings Summary

Area Name	Rationale	Potential Future Action
KAAP-037 – Open Demolition Grounds	No suspected storage and/or usage of PFAS-containing materials. Water only used for fire extinguishing during controlled burns.	No further action
KAAP-038 – Contaminated Waste Processor (SWMU Group 22)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-039 – Hazardous Waste Underground Storage Tanks (SWMU Group 4)	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-040 – Pistol Range	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-041 – Water Towers	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-042 – Sludge Lagoons AOC	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
KAAP-043 – Former Ammonium Nitrate Plant	No suspected storage, use, and/or disposal of PFAS-containing materials.	No further action
Building 52 – Former Fire Station	AFFF release from single firetruck testing exercise in 1998	Proceed to an SI, focus on soil and groundwater
Building 53 – Former Fire Station	Fire station was unused after the 1960s	No further action
100 Area – Former Fire Station	Fire station was unused after the 1960s	No further action

Aguirre Engineers, Inc. (AE). 1998. Environmental Baseline Survey Report, Kansas Army Ammunition Plant. August.

Assistant Secretary of Defense. 2021. *Investigation Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program.* United States Department of Defense. September.

Assistant Secretary of Defense. 2022. *Investigation Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program.* United States Department of Defense. 6 July.

Department of the Army. 2018. *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances.* 4 September.

Kansas Army Ammunition Plant, Natural Resources Manager (KSAAP NRM). 2006. Personal Communications. June through September.

National Ground Water Association, 2018. *Groundwater and PFAS: State of Knowledge and Practice.* January.

Radian Corporation (RC). 1994. Phase I RCRA Facility Investigation. August.

URS Group, Inc. 2005. Final RCRA Facility Investigation Report, 1200 Area, Former Kansas Army Ammunition Plant, Parsons, Kansas. November.

URS Group, Inc. 2006. Final 2005 Environmental Condition of Property Report, Former Kansas Army Ammunition Plant, Parson, Kansas. November.

URS Group, Inc. 2008. Final Site Investigation Report, Former Kansas Army Ammunition Plant, Parsons, Kansas. December.

U.S. Army. 2005 Environmental Condition of Property Report Kansas Army Ammunition Plant.

Unites States Army Corps of Engineers (USACE). 2016. Final 2015 Evaluation of Corrective Measure Effectiveness and Performance Report, Former Kansas Army Ammunition Plant, Parsons, Kansas. November.

U.S. Army Environmental Center (USAEC). 2004. Kansas Army Ammunition Plant, Final Closure Report, Interim Soils Removal. October.

U.S. Army Environmental Center (USAEC). 2006. Kansas Army Ammunition Plant, Installation Action Plan, IAP. April.

United States Army Environmental Hygiene Agency (USAEHA). 1988. Interim Final Report, Ground-Water Contamination Survey No. 38-26-0305-89, Evaluation of Solid Waste Management Units, Kansas Army Ammunition Plant, Parsons, Kansas, U.S. Army Environmental Hygiene Agency.

United States Department of Agriculture (USDA), 1990. Soil Survey of Labette County, Kansas. USDA Soil Conservation Service, in cooperation with the Kansas Agricultural Experiment Station.

United States Environmental Protection Agency (USEPA). 1991. Guidance for Performing Preliminary Assessments under CERCLA. September.

USEPA. 2005. *Federal Facilities Remedial Preliminary Assessment Summary Guide.* 21 July.

USEPA. 2016a. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). Office of Water (4304T).* Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May.

USEPA. 2016b. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS). Office of Water (4304T).* Health and Ecological Criteria

USEPA. 2021. *Technical Fact Sheet: Toxicity Assessment for PFBS.* https://www.epa.gov/pfas/learn-about-human-health-toxicity-assessment-pfbs. 8 April.